AN EMPIRICAL STUDY ON ESG INFORMATION AND MARKET VALUATION IN THE UK STOCK MARKET

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Abstract

Motivated by the requirements of the UK Companies Act 2006 for a Strategic Report introduced in late 2013, and the subsequent Directive 2014/95/EU of the European Parliament and of the Council, we investigate the relationship between the levels of disclosures on environmental and social activities and performance (analyst following) and subsequent analyst following (subsequent levels of disclosures on environmental and social activities and performance). We do so to investigate the value relevance of information about environmental and social activities and performance. Our evidence is consistent with their value relevance and an associated demand for, or general interest in, such disclosures from informed market participants. We also argue that our results suggest positive links between analyst following and the *quality* of environmental and social disclosure.

1 INTRODUCTION

On December 6, 2014, "Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups" came into force. The requirements of the Directive are for '(...) a non-financial statement containing information to the extent necessary for an understanding of the undertaking's development, performance, position and impact of its activity relating to, as a minimum, environmental, social and employee matters, respect for human rights, anti-corruption and bribery matters' and '(...) any relevant non-financial key performance indicators'.[1] National EU governments then had two years to translate the new Directive into national law.

[1] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/500760/BIS-16-35-non-financial-reporting-directive-consultation-February-2016.pdf, p.12. To slightly paraphrase the consultation document (p.6), the Directive applies to large undertakings that are public interest entities (PIEs), that have an average of 500 employees over their financial year and that: (i) issue transferable securities that are admitted to trading on a regulated market in

To this end, a UK consultation, organised by the Department for Business Innovation and Skills (BIS), was launched on February 16, 2016, with comments to be received by April 15, 2016. At the time of the consultation, the UK already had a requirement for all quoted companies to provide information similar to that required by the EU Directive. In particular, the UK Companies Act 2006 requires that the Strategic Report of a quoted company should include information on a range of environmental and social issues. This should be provided '(...) to the extent necessary for an understanding of the development, performance or position of the company's business.'[2] . Overall, the original consultation document argued that, other than the concentration on large firms, '(...) the EU framework is broadly similar to the current UK framework as laid out by the Companies Act 2006.'[3]

At the time of the consultation, the preferred option of the BIS was to adopt the Directive as it was written, suggesting that, in the absence of objections, they were content to drop the disclosure requirement for smaller quoted firms (who would still be subject to the requirement to produce a Strategic Report). Following the consultation, the UK Department for Business, Energy, and Industrial Strategy issued the government response to the EU Directive in November 2016 in which the UK government states that it '(...) will create legislation to require companies that fall within the scope of the directive to report using the

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the EU; (ii) are a credit institution (a bank or building society, though not a credit union); (iii) are an insurance undertaking; or, (iv) are designated by a Member State as a PIE (for instance because of their business, size, or the number of their employees).

2 http://www.legislation.gov.uk/ukdsi/2013/9780111540169/pdfs/ukdsi_9780111540169_en.pdf, p.3.

3 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/500760/BIS-16-35-non-financial-reporting-directive-consultation-February-2016.pdf, p.12. The regulation of the requirement to report on environmental and social performance falls within the general obligation to report inside information. Inside information is defined as information that 'if it were made public, would be likely to have a significant effect on the prices of those financial instruments or on the price of related derivative financial instruments (that is, it is information that a reasonable investor would be likely to use as part of the basis of their investment decisions)' under the EU Market Abuse Regulation (Regulation 596/2014). This regulation supersedes previous UK market regulation and 'strengthens the previous UK market abuse framework by extending its scope to new markets, new platforms and new behaviours.' (https://www.fca.org.uk/markets/market-abuse/regulation). The Financial Services Authority's Disclosure and Transparency Rules included similar obligations for fully listed companies over the period covered by the current research. It is difficult, however, to find specific information on actual cases and penalties for non-disclosure.

requirements laid out in the Directive. It will also allow companies outside the scope of the Directive to adopt the EU requirement voluntarily or to continue to use the existing requirements in the Strategic Report.'[4]

Both the UK and the subsequent overarching EU regulation leave broadly unspecified what precisely should be reported under the regulations with respect to, in particular, environment and social activities performance. Put another way, it is left unclear how firm managers should assess the extent to which it is necessary to report information on environmental and social performance, for example, in order that shareholders can form '(...) an understanding of the development, performance or position of the company's business'.[5] Under such circumstances, UK corporate managers would likely want to consider the costs and benefits of the provision of such information and, implicitly, the demand for, or general interest in, such information from shareholders including, in particular, informed shareholder representatives such as financial analysts (analysts being viewed as an important set of users of information about businesses).[6] Further, in particular, there is variation in the extent to which UK companies provide information on environmental and social activities and performance, as measured relative to industry norms.

Within this general context, our study considers the association between analyst following and the levels of disclosure of environmental and social activities and performance in the UK. We do so to identify whether information concerning environmental and social activities and performance is value relevant or not. By value relevant, we mean that the content of the disclosures is potentially useful for predicting the future cash flows of firms over some

4 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/575530/beis-16-41-non-financial-reporting-directive-implementation-consultation-government-response.pdf, p.4.
5 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/500760/BIS-16-35-non-financial-reporting-directive-consultation-February-2016.pdf, p.3.
6 See Schipper (1991).

unspecified time horizon, or their levels of risk, or both, implying that analysts could be interested in this information as an input into their forecasts and recommendations. Further, we assume that corporate managers will take into account the potential demand for, or general interest in, such information from analysts in judging how much disclosure to provide.

We then would not expect to observe any association between the level of environmental and social disclosures and analyst following (once other factors that might help explain either or both of the level of environmental and social disclosures, and analyst following, are properly considered) if information on environmental and social activities and performance is value irrelevant. If information on environmental and social activities and performance is value relevant, such an association becomes possible. The study therefore represents one way of assessing whether environmental and social disclosures are regarded as value relevant by UK stock market participants.[7]

We investigate the possible association between the level of environmental and social disclosures and analyst following in two different ways. First, we ask if the number of analysts making beginning-year, one year-ahead, earnings forecasts is associated with the level of environmental and social disclosure for that year. This question is based upon the idea that, *ceteris paribus*, the size of analyst following can be thought of as a proxy for the demand for information concerning environmental and social activities and performance, and corporate managers will respond to this demand. Second, as an alternative possibility, we ask if the level of environmental and social disclosure in a year is associated with the number of

[7] It is reasonable to assume that the EU regulators responsible for the Directive believe that EU stakeholders, possibly including stock market participants, have some interest in information of environmental and social performance, for at least some companies. Further, it is also reasonable to assume that UK lawmakers share these basic beliefs, and have done so for a number of years. If shareholders are interested then, presumably, this is because these non-financial disclosures concerning environmental and social activities are assumed to have the potential for providing information useful for predicting the future cash flows of firms over some unspecified time horizon, or their levels of risk, or both.

analysts making beginning-year, one year-ahead, earnings forecasts for the subsequent year. This question is based upon the idea that, *ceteris paribus*, analysts are more likely to follow a firm the higher is its level of value relevant disclosures.[8]

In pursuing answers to our research questions, we use a balanced panel of 138 UK firms with publicly available measures of environmental and social disclosures for the period 2008 to 2012.[9] Following Qiu *et al*. (2016), we distinguish between environmental and social disclosures and, as a consequence, we consider them separately. In identifying the possible relationships between environmental and social disclosures and analyst following, we use models that contain both *between firm* (i.e., cross-sectional) and *within firm* (i.e., dynamic) relationships. We then can identify whether any relationships identified are *between firms*, or *within firms*, or both, in nature. If information on environmental and social activities and performance is value irrelevant, we expect that there will be neither *between firm* nor *within firm* relationships between the level of environmental and/or social disclosures and analyst following. We also benchmark the results from estimating our models against other modelling approaches found in relevant literature on both the determinants of environmental and social disclosure levels and the impact of environmental and social disclosures on analyst following.

Our key results are as follows. After controlling for various firm characteristics thought to potentially explain the levels of environmental and social disclosure (analyst following) and general sector and time fixed effects, we find positive, *between firm*, relationships both

[8] Arguments for both of these possible relationships can be found in Lang and Lundholm (1996).

[9] This is a period prior to the implementation, in late 2013, of the requirements for UK listed companies to produce a Strategic Report covering similar ground to that required by Directive 2014/95/EU. During the period we study, the requirements were for a Business Review with somewhat looser requirements than the Strategic Report with respect to environmental and social disclosures. As a consequence, during this period, companies would have had to assess even more the costs and benefits of disclosing, including the demand for, or general interest in, such disclosures from informed market participants, than currently.

between beginning-year analyst following and the level of environmental or social disclosures in the year, and the level of environmental or social disclosures in a year and beginning-year analyst following in the following year. We find no consistent evidence of *within firm* relationships between analyst following and either environmental or social disclosure levels in either of the directions investigated. In other tests, we conclude that UK firm environmental and social disclosure levels are highly persistent (as in Qiu *et al*., 2016), as is analyst following. We argue against the possibility of spurious correlations inducing the various positive and significant, *between firm*, associations found.

Overall, the evidence of positive, *between firm*, associations between analyst following and the level of social and environmental disclosures, but no *within firm* associations, is suggestive of the relationships between the levels of disclosure of information on environmental and social activities and performance and analyst following being slow moving processes. Nonetheless, we argue that the *between firm* associations are consistent with the overall value relevance of information on environmental and social activities and performance.

The remainder of the paper is organised as follows. The next section (section 2) discusses prior literature relevant to developing our hypotheses. Section 3 describes our research methodology, and Section 4 describes the data and data sources needed to test our hypotheses. Section 5 documents and discusses our main results, together with the impact of any changes in our methodology. The final section summarises the key points of the paper and draws overall conclusions.

2 RELEVANT PRIOR LITERATURE AND HYPOTHESIS DEVELOPMENT

As established above, we infer value relevance for information on environmental and social activities and performance by looking at the relationships between beginning-year analyst following and the level of environmental and social disclosures, whether analyst following is associated with subsequent environmental and social disclosures or *vice versa*. Underpinning our analysis, therefore, is the assumption that information concerning firms' environmental and social activities and performance is *potentially* value relevant for UK capital market participants.

Dhaliwal *et al.* (2012, 2014) argue that societies differ as to whether, for example, government action and/or consumer activism can harm firms which fail to demonstrate satisfactory levels of environmental and social performance, suggesting that links between environmental, social and economic performance could vary by society. According to Dhaliwal *et al.* (2012, 2014), the UK only has a moderate score on this dimension, suggesting that environmental and social performance is less likely to have a link with future economic performance than in other jurisdictions. As a consequence, environmental and social disclosures are less likely to be value relevant.

The Dhaliwal *et al.* (2012, 2014) studies, however, cover a period prior to that covered by this research. UK attitudes could have changed over time. Certainly, Milne and Chan (1999) suggest that UK analysts *used to* have little or no interest in environmental and social disclosures. Further, more recently, Campbell and Slack (2011, p.55) argue generally that '(...) there is mixed evidence on the investment materiality and decision-usefulness of environmental disclosure to investors and analysts'. By way of contrast, however, Solomon

and Solomon (2006) suggest that UK fund managers regard such information as useful, and not only those responsible for ethical investment funds.

More directly, Qiu *et al*. (2016) report that social (but not environmental) performance is associated with UK firms' market values for the period from 2005 to 2009. They argue that this result implies that social performance matters more to investors. Nonetheless, they do not provide evidence that either information on environmental or social activities and performance is associated with future financial performance or the equity cost of capital. Thus, the source of value relevance is unclear.[10]

Overall, it is not obvious from previous UK empirical evidence whether information on environmental and social activities and performance of UK firms will or will not be value relevant in the period we study. Our study can, therefore, contribute useful information in this regard.

Our study can be seen as lying within a broader literature that looks at the determinants and consequences of environmental and social disclosures. With few exceptions, the following general features characterise prior studies in these areas, primarily with respect to identifying the determinants of environmental disclosures.

First, sample sizes are relatively small. Arguably, this is understandably caused by the need to generate disclosure scores manually, a labour-intensive activity. Second, perhaps because of the point made in the previous sentence, only one year of data is considered. Given these

[10] The focus of Qiu *et al*. (2016) is on the value relevance of the *level* of environmental and social disclosures, as opposed to the value relevance of the *content* of these disclosures. Other studies in this vein include Clarkson *et al.* (2013) and Plumlee *et al.* (2015). In effect, these studies can be interpreted as asking whether transparency with respect to environmental and social activities and performance creates an intangible asset which increases in the level of disclosure.

two points, there is a risk that any findings are of relatively low statistical power (because of the size of the sample) and/or are sample-specific. Third, the data included in the samples in previous studies are relatively old and, as a consequence, if attitudes (whether societal or capital market or both) towards environmental and social activities and performance have changed over time, it is not clear whether previous results can be generalised to more recent times.[11] Fourth, as pointed out by Qiu *et al*. (2016), either the indices of disclosure are not clearly demarcated between those related to environmental activities and performance, and those related to social activities and performance, or only one type of activity is considered. Our study responds to all of these concerns.

Recent studies of the determinants of the levels of environmental and social disclosures have stressed the informational concerns of capital markets as a possible determinant of the levels of these disclosures. For example, basing their arguments on Frankel *et al*. (1995), Clarkson *et al.* (2008, p. 314) argue that US firms raising finance '(...) have a higher propensity for disclosure in voluntary channels.' As a consequence, in their study, the authors include a variable capturing finance raising activities as a possible determinant of environmental and social disclosures, consistent with the assumptions that information on environmental and social activities and performance are potentially value relevant to capital market participants and that corporate managers are willing to respond to the demand for this information. Studies such as Clarkson *et al.* (2011) and Qiu *et al.* (2016) also employ this reasoning. Further, other measures such as profitability, leverage, and Tobin's Q are included as

[11] For example, with regard to these three issues, recent studies with some, or all, of these characteristics include Plumlee *et al.* (2015), who use annual cross-sections for US firms from 2000 to 2005 with a total of 474 firm-year observations. Herbohn *et al.* (2014) use a single cross-section of 339 Australian firms belonging to the extractive industries, with data for 2006. Clarkson *et al.* (2013) use annual cross-sections for US firms for 2003 and 2006, containing 92 and 103 firm-years respectively and study aspects of environmental disclosure. Bouten *et al.* (2012) use a single cross-section of 108 Belgian firms for 2005 and a single cross-section of 480 disclosing and non-disclosing US firms for 2002 (for disclosing firms, they use the data from Cho *et al.*, 2010). De Villiers and van Staden (2011) use a single cross-section of 120 US firms from 2005. Clarkson *et al.* (2008) use a single cross-section of 191 US firms, with data for 2004. Brammer and Pavelin (2006, 2008) use a single cross-section of 447 UK firms, with data for 2000.

explanatory variables in these studies, primarily based upon their use in earlier economics-based studies of financial disclosures. The results are mixed on whether these variables help explain the level of environmental and social disclosures, however.

The studies mentioned above do not include any explicit argument that the size of analyst following could directly influence the supply of disclosures on environmental and social activities and performance. They typically include a measure of firm size as an explanatory variable, however, which Herbohn *et al*. (2014) consider a proxy for, amongst other things, attention paid to a firm by analysts.

Bhushan (1989) discusses how different levels of value relevant disclosure about firms are associated with the size of firms' analyst following. The overall effect depends upon how additional information affects both the supply and demand for analyst services. He argues that increased disclosure increases the supply of analyst services, but the effect on the demand side is varied. If the increased disclosure complements information provided by analysts, the demand will increase; if it competes, demand will decrease. As a consequence, the overall effect could be either positive or negative.

Lang and Lundholm (1996) provide some empirical evidence on the relationship between the level of firm *financial* disclosures and analyst following in the US. Initially, however, the authors also acknowledge that the direction of causality could run in either direction: '(...) analysts are attracted to firms that disclose more (…) or (...) are able to apply pressure on firms which they follow for other reasons to increase their disclosure levels' (p.471). The quotation portrays the size of the analyst following either as an element of the demand for disclosure by firms (the larger the size of the analyst following, *ceteris paribus*, the more will

be disclosed) or a consequence of the level of value relevant disclosures made by the firm (the higher the level of disclosure, *ceteris paribus*, the larger the size of analyst following).

The empirical analysis in Lang and Lundholm (1996) provides some evidence that higher financial disclosure attracts a higher analyst following, although they do state that their results are limited. In support of Lang and Lundholm (1996), Healy *et al.* (1999), for example, find that *sustained* improvements in the level of financial disclosure increase analyst following, amongst other outcomes. Botosan and Harris (2000) find that firms that increase their financial disclosure levels by initiating quarterly segment disclosures have a subsequent increase in analyst following.

Of direct relevance to this study, Gao *et al.* (2016) argue that higher levels of disclosure of information on environmental and social activities and performance can have impacts on the cost of debt and equity financing, and also have intermediate effects, such as increasing the numbers of analysts following a firm in the Netherlands. They find a relationship between environmental and social disclosure levels and analyst following for their sample of Dutch companies, but only for firms belonging to the Dow Jones Sustainability Index. Firm-years belonging to the Dow Jones Sustainability Index constitute just over 18% of their overall sample of firms (see Gao *et al*., 2016, Table 4, p.15), however, suggesting that there is no relationship between environmental and social disclosure levels and analyst following for the majority of firm-years in their sample.

In the studies of Dhaliwal *et al.* (2012, 2014), the Netherlands has a much higher score for stakeholder awareness than the UK. If this is still true, the results of Gao *et al*. (2016) from the Netherlands might suggest that a relationship in which higher levels of the disclosure of

information on environmental and social activities and performance are associated with higher subsequent analyst following is unlikely for the UK. As pointed out above, the studies of Dhaliwal *et al*. (2012, 2014) cover an earlier period than either Gao *et al.* (2016) or the current study, however. It is possible that the relative ranking of the Netherlands and the UK with respect to stakeholder awareness might have changed over time. It is then not clear whether the results in Gao *et al.* (2016) can be automatically generalised to the UK.

Overall, although some studies concerned with financial disclosures suggest that the direction of causality runs from the level of value relevant disclosure to the size of analyst following, other studies suggest that capital market informational concerns could drive the level of environmental and social disclosures. As a consequence, we allow for both directional possibilities when studying the relationship between environmental and social disclosures and analyst following. Note, however, that establishing the direction of causality of the relationship between the level of disclosures concerning environmental and social activities and performance and analyst following is not, in and of itself, central to the study. Studying the possible relationships is a means to an end of establishing the value relevance of disclosures of information on environmental and social activities and performance.

When larger sample studies have taken place in our general research contexts, with samples covering many years and many firms (e.g., Dhaliwal *et al.*, 2011, 2012, 2014), there can be a cost in terms of the measure of disclosure. For example, a simplified measure of disclosure is used (the issuance of a standalone CSR report) by Dhaliwal *et al.* (2011, 2012, 2014), as opposed to an evaluation of its quality *via* the construction of a disclosure index. To improve on this situation, Gao *et al.* (2016) use a Dutch government-provided CSR index, obviating the need to create a disclosure index, or use a simple measure of disclosure. This measure

does not separate disclosures related to environmental activities and performance from those related to social activities and performance, as is suggested to be important in the UK context by Qiu *et al*. (2016). Following Qiu *et al*. (2016), we use commercially provided indices of the levels of environmental and social disclosures, helping us create a larger sample covering a number of years, and avoiding simplified measures of disclosure levels.

Pursuing either element of our study requires us to address one particular methodological problem. This problem concerns the use of panels of data in which firms can feature at more than one point in time. When pooling data in which firms can appear more than once across years, it is well understood that such data can contain relationships between disclosure levels/analyst following and explanatory variables across firms independent of time (*between firm*, or cross-sectional) and relationships within a firm over time (*within firm* or dynamic). It is not clear why such relationships should be identical.[12] For example, if environmental and social disclosure levels are persistent over time (Qiu *et al*., 2016), the *between firm* and *within firm* relationships are likely to be different. Given this possibility, we offer a methodological innovation by developing a model which allows the separation of *between firm* and *within firm* relationships between environmental and social disclosure levels (analyst following) and potential explanatory variables.

Overall, we put forward the following null hypotheses with respect to the effects of analyst following on the levels of disclosure of information about environmental and social activities and performance:

[12] Discussions over the advantages of dynamic, as opposed to cross-sectional, analyses of the determinants of the level of environmental and social disclosures can be found in Clarkson *et al*. (2008, 2011).

H_1N: The average size of a firm's beginning-year analyst following over time is not associated with the average level of a firm's environmental (social) disclosures for the year over time (a *between firm* or cross-sectional relationship); and

H_2N: Departures of the size of a firm's beginning-year analyst following from the firm's average over time are not associated with departures of the level of subsequent environmental (social) disclosures from the firm's average over time (a *within firm* or dynamic relationship).

We put forward two hypotheses because, as indicated above, we wish to distinguish between two relationships: (i) one capturing the relationship between disclosure levels and explanatory variables *between firms* (or cross-sectional – H_1N); and (ii) the other capturing the relationship between disclosure levels and explanatory variables *within firms* over time (or dynamic – H_2N). If the disclosures of information on environmental and social activities and performance are value relevant, and the direction of any effect runs from analyst following to the levels of disclosures of environmental and social activities and performance, we expect one or both of the *between firm* and *within firm* relationships to be positive.

Similarly, we put forward the two null hypotheses with respect to the effect of the levels of environmental and social disclosures on subsequent analyst following:

H_3N: The average level of a firm's environmental (social) disclosure over time is not associated with the size of the firm's average subsequent analyst following over time (a *between firm* or cross-sectional relationship); and

H_4N: Departures of the level of a firm's environmental (social) disclosure from the firm average over time is not associated with departures of the size of a firm's subsequent analyst following from the firm average over time (a *within firm* or dynamic relationship).

Again, we put forward two hypotheses because we wish to distinguish between general relationships *between firms* (cross-sectional – H_3N) and relationships *within firms* over time (dynamic – H_4N). If the levels of disclosures of environmental and social activities and performance are value relevant, and the direction of any effect runs from the levels of disclosure of environmental and social activities and performance to the size of subsequent analyst following, we again expect one or both of the *between firm* and *within firm* relationships to be positive.

3 MODELS AND ESTIMATION

Within the context of the use of a balanced panel research design, we start our discussion of the methodology adopted by describing a model of environmental and social disclosure levels in which analyst following is our key experimental variable, which allows *between firm* and *within firm* relationships to be separately identified. This is our preferred model. The model is:

$$DI_{ijt} = \sum_{l=1}^{L} \eta_l Ind_{ilt} + \sum_{t=1}^{T} \lambda_t D_t + \alpha_1 \overline{NoA_i} + \alpha_2 (NoA_{it} - \overline{NoA_i}) + \sum_{k=1}^{K} \gamma_k^1 \bar{X}_{ik} + \sum_{k=1}^{K} \gamma_k^2 (X_{ikt} - \bar{X}_{ik}) + \varepsilon_{ijt} \quad (1)$$

where DI_{ijt} is the value of disclosure level measure j ($j = 1,2$ for our two disclosure measures) for firm i for year t; Ind_{ilt} is a dummy variable equal to one if firm i belongs to industry l ($l = 1$ to L) in year t, and zero otherwise; D_t is a dummy variable equal to one for any firm-year observation in year t ($t = 1$ to T), and zero otherwise; NoA_{it} is the size of analyst following for firm i *at the beginning* of year t; $\overline{NoA}_i$ is estimated as the sample average value for firm i of the size of analyst following; the X_{ikt} are a set of K ($k = 1$ to K) control variables for firm i for year t; and $\bar{X}_{ik}$ is estimated as the sample average value of $\bar{X}_{ikt}$ for firm i.

In this model, there are two components: (i) a *between firm* component; and (ii) a *within firm* component. The coefficients α_1 and the γ_k^1's capture the *between firm* sensitivities of disclosure levels to firm characteristics, the relationships across firms that are independent of time and are only related to firm sample averages, which represent the *between* component of our preferred model. The estimated coefficient α_1 then enables us to test hypothesis H_1N.

The coefficients α_2 and the γ_k^2's capture the *within firm* sensitivities of disclosure levels to firm characteristics, the relationship that explains movements over time for firm dependent variables, the influence of any *between firm*, time independent, element of the relationship having been removed. These coefficients represent the *within firm* component of our preferred model. The estimated coefficient α_2 enables us to test hypothesis H_2N.

We generate estimates of the key coefficients in our model in the following way. By taking firm sample averages, equation (1) implies:

$$\overline{DI}_{ij} = \sum_{l=1}^{L} \eta_l \overline{Ind}_{il} + \sum_{t=1}^{T} \lambda_t \overline{D}_t + \alpha_1 \overline{NoA}_i + \sum_{k=1}^{K} \gamma_k^1 \overline{X}_{ik} + \overline{\varepsilon}_{ij} \quad (2)$$

Therefore, we can generate estimates of α_1 and the γ_k^1's, the *between firm* sensitivities of disclosure levels to analyst following and the control variables (the *between firm* component of our preferred model), by applying the 'between' fixed effects estimator to the following generic equation:

$$DI_{ijt} = \sum_{l=1}^{L} \eta_l Ind_{ilt} + \sum_{t=1}^{T} \lambda_t D_t + \alpha NoA_{it} + \sum_{k=1}^{K} \gamma_k X_{ikt} + \varepsilon_{ijt} \quad (3)$$

Using the 'between' fixed effects estimator, α and the γ_k's become the estimators of α_1 and the γ_k^1's in equation (1). To generate appropriate hypothesis tests, we estimate robust (heteroscedasticity-adjusted) standard errors.[13]

We can also generate the following equation by subtracting equation (2) from equation (1), producing:

$$(DI_{ijt} - \overline{DI}_{ij}) = \sum_{t=1}^{T} \lambda_t (D_t - \overline{D}_t) + \alpha_2 (NoA_{it} - \overline{NoA}_i) + \sum_{k=1}^{K} \gamma_k^2 (X_{ikt} - \overline{X}_{ik}) + (\varepsilon_{ijt} - \overline{\varepsilon}_{ij}) \quad (4)$$

We can then estimate α_2 and the γ_k^2's, the *within firm* sensitivities of disclosure levels to firm characteristics, and the *within firm* component of our preferred model, by applying the 'within' fixed effects estimator to equation (3). In this case, α and the γ_k's in equation (3)

[13] As a practical matter, when we estimate equation (3), we exclude the time dummies and only include a constant term, because the summation term involving the time dummies in equation (2) amounts to a fixed number.

are the estimators of α_2 and the γ_k^2's. To generate appropriate hypothesis tests, we again estimate robust (heteroscedasticity-adjusted) standard errors.[14]

Another transformation of equation (1) produces:

$$(DI_{ijt} - DI_{ijt-1}) = \sum_{t=2}^{T}(\lambda_t D_t - \lambda_{t-1} D_{t-1}) + \alpha_2 (NoA_{it} - NoA_{it-1}) + \sum_{k=1}^{K} \gamma_k^2 (X_{ikt} - X_{ikt-1}) + (\varepsilon_{ijt} - \varepsilon_{ijt-1}) \quad (5)$$

This is also equivalent to applying the difference operator to equation (3). As a consequence, estimating the coefficients of a differenced version of equation (3) is similar to generating estimates of α_2 and the γ_k^2's, the *within firm* sensitivities of disclosure levels to firm characteristics. Although doing so uses up data, we estimate equation (5) (our 'differences' model) as another (if lower power) way of identifying *within firm* effects.[15]

We also estimate the relationship between analyst following, as an independent variable, and environmental and social disclosure levels, as dependent variables in other ways. These ways do not represent methodologies that best suit our research questions. We merely use these

[14] Using Stata, we use the 'xtreg' command to estimate equations (2) and (4), using the 'be' option to estimate the *between firm* sensitivities and the 'fe' option to estimate the *within firm* sensitivities. To estimate the standard errors for equation (3) when using the 'fe' option, we use the option 'vce (cluster id)' which allows the standard errors to be clustered by firm, together with the possession of a generalised form of heteroscedasticity across firms. To estimate the standard errors when using the 'be' option, we use the option 'vce (conventional)' which allows the standard errors to possess a generalised form of heteroscedasticity across firms. The two sets of coefficient estimates, taken together, produce estimates of the relevant parameters of equation (1), which allows for both *between firm* and *within firm* relationships between firm characteristics and levels of environmental and social disclosures.

[15] Lang and Lundholm (1996) use 'differences' models when trying to identify the direction of causality between disclosure and analyst following. They use simple correlations between the differences, without any attempt to control for the effects of other variables. They note that their approach (p.484) does not establish causality running from disclosure levels to analyst following. They also note (p.483) that the approach can be expensive on data. Thus, we can emphasise that a 'differences' specification establishes causality no more or no less effectively than the *within firm* element of our preferred model, because of this formal equivalency. Further, the 'differences' specification is less economical on data and, hence, of a lower power. In general, 'differences' models will typically be equivalent to 'levels' models, at least for the experimental variables. As indicated above, here the differences specification is implied by more than one model, suggesting that, in our context, it cannot add any *unambiguous* understanding of the possible relationships between environmental and social disclosure levels and analyst following.

estimation approaches as benchmarks against which we can compare and contrast the results from our preferred modelling approach. The approaches represent modelling approaches found in recent literature with respect to understanding the relationship between firm characteristics and the level of environmental and/or social disclosures or the relationship between levels of environmental and/or social disclosures and the extent of analyst following.

Our first benchmark approach (our 'conventional' model) assumes that the *between firm* and *within firm* relationships between firm characteristics and disclosure levels are identical. Observing differences between *between firm* and *within firm* relationships can be regarded as a diagnostic test that implies that the 'conventional' model is mis-specified.[16]

We estimate equation (3) using ordinary least squares (OLS) estimates of the coefficients, with standard errors estimated under the assumptions of heteroscedasticity across firms and correlation over time for individual firms. The assumption of time series dependence in the error terms implies that if, for example, a firm has a level of disclosure different from that predicted by firm characteristics, that difference will persist to some degree, *ceteris paribus*, over time. The source of such persistence is not explicitly modelled. This approach is similar to that used by Gao *et al.* (2016).

The 'conventional' model implies that a difference in the value of one of the independent variables has the same average effect on disclosure levels, irrespective of whether the difference is *between firms* or *within firms*. If disclosure policies have a degree of persistence over time, it is possible that, for example, although big firms might have different disclosure policies relative to small firms, changes in the size of these firms over time will not

[16] Insight for our modelling approach can be found on p.9 of https://www.stata.com/manuals13/xtxtreg.pdf

necessarily cause either set of firms to change their disclosure policies. Estimating the 'conventional' model hides potential differences between *between firm* and *within firm* relationships.

One way of modelling persistence in disclosure levels is to include the lagged value of the disclosure level as an independent variable in the model to be estimated. Qiu *et al*. (2016) incorporate persistence in environmental and social disclosure levels by modelling current disclosure levels as a function of prior disclosure levels, plus other variables. Therefore, our second benchmark specification (our 'persistence' model) emulates Qiu *et al*. (2016) and introduces the lagged value of the dependent variable as an additional independent variable. We still estimate coefficient p-values using firm clustered, heteroscedasticity-adjusted, standard errors, and coefficients are again estimated using OLS. The 'persistence' model we estimate is:

$$DI_{ijt} = \sum_{l=1}^{L} \eta_l Ind_{ilt} + \sum_{t=1}^{T} \lambda_t D_t + \alpha NoA_{it} + \omega_1 DI_{ijt-1} + \sum_{k=1}^{K} \gamma_k X_{ikt} + \varepsilon_{ijt} \quad (6)$$

Although this approach models persistence in disclosure levels, its drawback is that there is no explicit model of what causes, in particular, *between firm* variations in disclosure levels that have a degree of persistence over time. Also, this approach still implies that a difference in the value of one of the independent variables has the same average effect on disclosure levels, irrespective of whether the difference is *between firms* or *within firms*.

When we study whether environmental (social) disclosure levels have an impact on the level of analyst following in the subsequent year, we substitute NoA_{it+1} for DI_{ijt} as the dependent

variable. Then, we substitute DI_{ijt} for NoA_{it} as one of the independent variables. The basic control variable strategy stays the same in this modelling. Hence, our preferred model is:

$$NoA_{it+1} = \sum_{l=1}^{L} \theta_l Ind_{ilt} + \sum_{t=1}^{T} \phi_t D_t + \beta_2 \overline{DI}_{ij} + \beta_2 (DI_{ijt} - \overline{DI}_{ij}) + \sum_{k=1}^{K} \kappa_k^1 \bar{X}_{ik} + \sum_{k=1}^{K} \kappa_k^2 (X_{ikt} - \bar{X}_{ik}) + \nu_{ijt} \quad (7)$$

In similar fashion to the approach for equation (1), we derive estimates of the coefficients of equation (7) by applying the 'between' and 'within' fixed effects estimators to:

$$NoA_{it+1} = \sum_{l=1}^{L} \theta_l Ind_{ilt} + \sum_{t=1}^{T} \phi_t D_t + \beta DI_{ijt} + \sum_{k=1}^{K} \kappa_k X_{ikt} + \nu_{ijt} \quad (8)$$

The β and the κ_k's are the estimators of β_1 and the κ_k^1's when the 'between' fixed effect estimator is applied to equation (8), and of β_2 and the κ_k^2's when the 'within' fixed effect estimator is applied.

We also estimate a 'differences' model equivalent to the 'within firm' element of equation (7), given by:

$$(NoA_{it+1} - NoA_{it}) = \sum_{t=2}^{T} (\phi_t D_t - \phi_{t-1} D_{t-1}) + \beta_2 (DI_{ijt} - DI_{ijt-1}) + \sum_{k=1}^{K} \kappa_k^2 (X_{ikt} - X_{ikt-1}) + (\nu_{ijt} - \nu_{ijt-1}) \quad (9)$$

and a 'persistence' model, in which it is assumed that the number of analysts following a firm has a degree of persistence, given by:

$$NoA_{it+1} = \sum_{l=1}^{L} \theta_l Ind_{ilt} + \sum_{t=1}^{T} \phi_t D_t + \beta DI_{ijt} + \omega_2 NoA_{it} + \sum_{k=1}^{K} \kappa_k X_{ikt} + \nu_{ijt+1} \quad (10)$$

Overall, we use the estimates of our preferred models (equations (1) and (7)) to draw conclusions. Nonetheless, we also compare and contrast these results with those from our benchmark models.[17]

We should point out that our preferred modelling approach is not without restrictions. In estimating our *within firm* relationships, we emphasise short-run reactions - how one year-ahead beginning year analyst following reacts to environmental and/or social disclosure levels, or how environmental and/or social disclosure levels react to beginning year analyst following. If the reactions take longer, the estimates of our *within firm* relationships will not identify them. In robustness tests, we allow the reaction period to be extended.

If longer run reactions do take place, or if the reaction times are not homogeneous across firms, our *between firm* relationships are more likely to capture them. Nonetheless, our approach of using firm average characteristics as the basis for estimating cross-sectional relationships also comes with a cost. If different disclosure levels produce different subsequent analyst following, or *vice versa*, it is possible that such effects will show up in the *between firm* relationships between both subsequent analyst following and environmental or social disclosure levels and subsequent environmental or social disclosure levels and analyst following. The way of estimating the *between firm* relationships blunts the ability to infer the direction of causality from our tests. Nonetheless, as pointed out above, inferring the direction of causality is not central for answering our research question concerning the value

[17] At the *JAPP* Conference, Sudipta Basu pointed out that more sophisticated models could allow for asymmetric responses to changes in either environmental, or social disclosure levels, or beginning-year analyst following within firms. We have not followed up on this possibility and, as a consequence, it remains an area for future research.

relevance of disclosures of information on environmental and/or social activities and performance.

4 VARIABLE DEFINITIONS, DATA SOURCES AND DESCRIPTIVE STATISTICS

Our dependent variables are annual environmental disclosure levels, annual social disclosure levels and one year-ahead, beginning-year, analyst following. Our experimental variables are beginning-year analyst following (when environmental disclosure levels or social disclosure levels are the dependent variable) and annual environmental or social disclosure levels (when one year-ahead, beginning-year, analyst following is the dependent variable). Our control variables are strategic posture, board independence, firm size, the book-to-market ratio, leverage, return on sales, loss status, relative age of non-current assets, capital expenditure intensity, debt raised, equity raised, industry effects and time effects. Our control variables are the same for all the dependent variables, although the timing of their measurement can differ between them.

With respect to environmental and social disclosure levels as the dependent variable, the use of one or more of the control variables can be found in, for example, Gao *et al.* (2016), Qiu *et al*. (2016), Herbohn *et al.* (2014), Bouten *et al.* (2012), Clarkson *et al.* (2011) and Clarkson *et al.* (2008). With respect to analyst following as the dependent variable, the use of some of the control variables can be found in Lee and So (2017), Gao *et al*. (2016), Sun (2009), Yu (2008) and Doukas *et al*.(2005). Some of the variables included when one year-ahead, beginning-year, analyst following is the dependent variable have not been included as explanatory variables in other studies of the determinants of analyst following, to the best of

our knowledge. We include them to ensure that any potential effects they have on analyst following do not bias the coefficients of either environmental or social disclosures.[18,19]

Our variables are measured as follows:

Dependent and Experimental Variables:

(i) *Environmental Disclosure* is the environmental disclosure level provided by Bloomberg for year *t*;

(ii) *Social Disclosure* is the social disclosure level provided by Bloomberg for year *t*; and

(iii) *Analyst Following* is the number of analysts preparing earnings *per* share forecasts for: (a) year *t+1* immediately after the disclosure of year *t* results when it is the dependent variable; and (b) year *t* immediately after the disclosure of year *t-1* results when it is an independent variable.

Control Variables:

(i) *Strategic Posture* is the ratio of community spending to sales for year *t*;

(ii) *Board Independence* is the ratio of non-executive directors to total board size for year *t*;

[18] Standardised control variable strategies are not apparent in either the literature on the determinants of environmental and/or social disclosure levels or the literature in which models of analyst following feature. As is standard, our underlying assumption is that our control variable strategy is sufficiently complete that any omitted variables will not bias our conclusions and that the existence of irrelevant control variables will not substantively bias hypotheses away from rejecting the null hypothesis.

[19] A possibility raised at the *JAPP* Conference is that firms will design their disclosure strategies in order to minimise litigation risk (and associated costs), and by taking into account trade-offs between different forms of information and its ability to satisfy regulatory requirements. Our control variable strategy does not explicitly recognise this possibility. If the trade-offs are common to firms in a given industrial sector, and are stable over time, our use of industry dummies variables will control for such effects.

(iii) *Employees* is the log of the number of firm employees for year *t-1 (t)* when *Environmental Disclosure* or *Social Disclosure (Analyst Following)* are (is) the dependent variable(s);[20,21]

(iv) *Return on Sales* is the ratio of operating profit to total revenues for year *t-1 (t)* when *Environmental Disclosure* and *Social Disclosure (Analyst Following)* are (is) the dependent variable(s);

(v) *Loss* is a dummy variable equal to one if operating income is negative for year *t*; zero otherwise;

(vi) *Book-to-Market* is the ratio of book value to market value at the beginning (end) of year *t* when *Environmental Disclosure* or *Social Disclosure (Analyst Following)* are (is) the dependent variable(s);

(vii) *Leverage* is the ratio of total liabilities to total assets at the beginning (end) of year *t* when *Environmental Disclosure* or *Social Disclosure (Analyst Following)* are (is) the dependent variable(s);

(viii) *Capital Expenditure Intensity* is the ratio of expenditures on property, plant and equipment to total revenues for year *t*;

(ix) *Age* is the ratio of net property, plant and equipment to gross property, plant and equipment at the end of year *t*;

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20 We use the log of the number of employees of a firm as our measure of firm size in a given year. Other measures of firm size are possible. Such measures include market capitalisation, sales and total assets (typically in log form). We choose to use the log of the number of employees for three reasons. First, we follow a recent UK study which uses this definition of firm size when studying the determinants of UK environmental and social disclosure levels (Qiu *et al*., 2016). Second, we choose this measure of firm size because it has the least correlation with the size of analyst following. Third, Herbohn *et al.* (2014) argue that firm size acts as a proxy variable for a number of theories, of which the potential impact of analyst following on environmental and social disclosure levels is one. This argument reinforces the desirability of picking a measure of firm size with the least correlation with the size of analyst following, leaving the firm size measure to act as a control variable for the other theories related to firm size and/or a proxy for the level of general value relevant disclosures.

21 Beyer *et al*. (2011, p.328) point out that firm size can be interpreted as a proxy '(...) for the amount of public information available for a firm'. If the level of environmental and social disclosures is associated with firms' general propensities to disclose information, including a firm size variable will control for this and lessen the likelihood that an effect on disclosure of a specific user group such as analysts, or a consequence of disclosure on the number of analysts following a firm, will be found.

(x) *Equity Raised* is the ratio of equity raised/repurchased to market value for year *t+1 (t)* when *Environmental Disclosure* or *Social Disclosure (Analyst Following)* are (is) the dependent variable(s); and

(xi) *Debt Raised* is the ratio of debt raised/repaid to market value for year *t+1 (t)* when *Environmental Disclosure* or *Social Disclosure (Analyst Following)* are (is) the dependent variable(s).

We derive our data from three different sources. We use Bloomberg for our measures of environmental and social disclosure levels, strategic posture (Bloomberg report on community spending), board independence (Bloomberg provide the ratio of non-executive directors to total board size), and firm size (Bloomberg provide the number of employees each year). We use IBES to generate data on the number of analysts preparing earnings *per* share forecasts. We use Compustat Global to derive any required accounting variables and our measure of firm market value. We confine our attention to non-financial services firms for the conventional reasons when using financial ratios in the analysis.[22]

We use Bloomberg environmental disclosure scores for a number of reasons. First, they have wider coverage of firms around the world. In using Bloomberg disclosure measures, Ioannou and Serafeim (2017, p.15) state that 'Bloomberg has the widest coverage of all ESG datasets, assessing the ESG disclosure of more than 10,000 companies around the world. By comparison, MSCI covers less than 6,000 companies, and Thomson Reuters fewer than 4,000 companies.' Further, Huang and Watson (2015) point out that MSCI only started rating the environmental and social performance of non-US firms in 2013. As a consequence, there are more data available using Bloomberg measures.

[22] In order to preserve data and our balanced panel, we winsorize (as opposed to trim) all variables (other than the dependent and experimental variables, board independence, the loss dummy and age) at the 1% level. When a variable is truncated at zero, we winsorize only at one end of the distribution.

Second, Qiu *et al*. (2016) use the Bloomberg environmental and social disclosure levels in a recent study that considers the determinants of these levels in the UK. They document that Bloomberg consider 86 items overall (60 for environmental disclosures and 26 for social disclosures), and that 80% (73%) of the disclosure items considered in assessing the degree of environmental (social) disclosure are 'hard' data items, whereas 20% (27%) are 'soft' items (Appendix 1 of Qiu *et al*. (2016) documents the data items used by Bloomberg in forming their disclosure measures). The Bloomberg measures are industry-adjusted, in the sense that they only take into account data items that are of specific relevance to particular sectors in forming their measures.[23] Bloomberg then use a proprietary system to weight, or score, each data item, with some weighted more heavily than others, in considering the extent of disclosures. Scores are normalised to run from 0 to 100. These scores represent firm disclosures as a percentage of the highest possible, sector-specific, score that could be achieved by that firm in a given year. Overall, and because of the predominance of 'hard' data in developing the disclosure measures, Qiu *et al*. (2016) argue that not only do the Bloomberg disclosure scores capture the *extent* of environmental and social disclosures, they also capture the *quality* of such disclosures.

For each analysis, we use balanced panel datasets for the same set of firms for a five year period of environmental and social disclosure measures running from t = 2008 to t = 2012. As a result, we study the 138 firms that have full data for each analysis, resulting in 690 firm-year observations in total.

Table 1 provides details of how our firms are distributed across industrial sectors.

[23] In their study of the links between information disclosure and analyst following, Lang and Lundholm (1996) use industry-adjusted disclosure scores. Their study then converts disclosure scores into sector/year percentiles. Bloomberg convert the scores into percentages.

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Insert Table 1 Here

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Twenty-five different sectors are represented, with Support Services, General Retailers and Travel and Leisure being the sectors with the highest representations in both samples. The twenty-five sectors identified provide the basis for the sector dummies featuring in the models described in Section 3.

Table 2 provides descriptive statistics for both datasets.

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Insert Table 2 Here

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We observe that our datasets provide us with a wide range of values for *Environmental Disclosure*, *Social Disclosure* and *Analyst Following*. Further, the mean for the loss firm dummy suggests that relatively few of the firm-years feature losses. This contrasts with evidence on the relatively high proportions of UK loss firms in recent years found in Jiang and Stark (2013), suggesting that it is likely that our firms are relatively large and stable by UK stock market standards.

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Insert Table 3 Here

Table 3 provides some indication of how environmental and social disclosure levels have changed over the time period covered by our sample. Panel A provides data on the differences between the 2012 and 2008 values for each of the 138 firms in our balanced panel for both disclosure measures. The data suggests that the central tendency of changes in disclosure levels, whether environmental or social, is positive, with the average or median change higher for social disclosures. The middle 50% of the firms for each disclosure measure are fairly tightly bunched together, with minimum and maximum values for each distribution showing some large changes, both positive and negative. Panel B provides data for annual disclosure level changes. Similar conclusions to those for Panel A can be drawn.

Table 4 contains the Pearson correlations between our basic variables for both datasets.

Insert Table 4 Here

Given the sample size, a correlation coefficient significant at the 5% level is approximately .0747 and above in absolute size. Many of the correlation coefficients are significant at this level. Nonetheless, the correlation coefficients are not of sufficient size to raise any immediate alarm concerning the existence of multi-collinearity problems in our regressions.

More specifically, *Environmental Disclosure* and *Social Disclosure* are highly correlated, but not to an extent that it is likely they are capturing identical constructs. Also, *Analyst*

Following has high individual correlations with *Environmental Disclosure* and *Social Disclosure* relative to other variables, although its correlation with *Social Disclosure* is less than with *Environmental Disclosure*. Nonetheless, our firm size measure, *Employees*, also has similarly high correlations with *Environmental Disclosure* and *Social Disclosure* to those that *Analyst Following* has, and a higher correlation with *Analyst Following* than *Environmental Disclosure* and *Social Disclosure*. *Strategic Posture*, *Board Independence* and *Leverage* are generally the variables with the next highest correlations with *Analyst Following*, *Environmental Disclosure* and *Social Disclosure*.

5 RESULTS

In this section, we report the results of estimating the models described in Section 3. We start by reporting our results for the determinants of the levels of environmental and social disclosures in Table 5. For each measure of disclosure, five columns of results are provided: (i) the 'Between' component, denoting the *between firm* or cross-sectional part of the estimation of equation (1); (ii) the 'Within' component, denoting the *within firm* or dynamic part of the estimation of equation (1); (iii) the Difference model, denoting the estimates of equation (5); (iv) the Conventional model, denoting the estimates of equation (3); and (v) the Persistence model, denoting the estimates of equation (6), which includes the lagged value of the environmental disclosure level as a way of modelling persistence in disclosure levels.

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Insert Table 5 Here

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The results in Table 5 for environmental disclosure levels have the following characteristics. When we consider the *between firm* and *within firm* aspects of the relationship between beginning-year analyst following and environmental disclosure levels, we find that the size of analyst following only has a *between firm* relationship with disclosure levels, and the relationship is positive (we can reject H_1N). Put another way, our results suggest that, once other effects are taken into account, variations in firm analyst followings around their firm averages do *not* help explain subsequent variations in firm disclosure levels around their firm averages (we cannot reject H_2N). Further, in the *within firm* relationships, we find that none

of the control variables are significant at the 5% level or better. For the *between firm* relationships, two variables are significant at the 5% level (book-to-market and debt raised).

When we estimate our difference model (the Difference model) as an alternative way of estimating the *within firm* component of equation (1), we get qualitatively similar results. There is no significant relationship between changes in analyst following and the change in environmental disclosure levels. Hence, again, we cannot reject H_2N. And, again, none of the control variables are significant.

When conventional methods of estimation (the Conventional model) are used (which do not distinguish between *between firm* and *within firm* effects), we find similar results to our *between firm* results. Beginning year analyst following has a positive relationship with the level of environmental disclosures, and the same control variables have statistically significant coefficients. The implication of the model, however, is that changes in analyst following, whether across firms or over time for the same firm, are associated with changes in environmental disclosure levels, which the contrast between the estimates for the *between firm* and *within firm* components of equation (1) suggests is not true. The conventional analysis then appears to be mis-specified and dominated by the *between firm* component of the relationship.

The final specification allows for persistence in disclosure levels (the Persistence model) by including the lagged value of the disclosure level as an independent variable in the model. Estimation of equation (6) results in only three coefficients being significant at 5% levels – lagged environmental disclosure levels, employees and capital intensity. The coefficient of lagged environmental disclosure levels is high (although less than one), implying that there is

persistence in disclosure levels. The coefficient of analyst following is insignificant, suggesting it is not associated with one year-ahead environmental disclosures.

In summary, we find that beginning-year analyst following has a positive and significant *between firm* relationship with environmental disclosure levels, but has no *within firm* association, whether captured by estimates of the *within firm* element of equation (1) or by the difference model in equation (5). In our benchmark models, the conventional analysis gives results similar to the *between firm* results. The persistence model reaches conclusions similar to the *within firm* and difference models.

When we turn our attention to the determinants of social disclosure levels, we find similar evidence to that for environmental disclosures. The evidence from estimates of our preferred model suggests that there is a *between firm*, but no *within firm*, relationship between beginning-year analyst following and social disclosures. The difference model provides similar evidence to that provided by the *within firm* estimates. As a consequence, we can reject H_1N but not H_2N. For the *between firm*, *within firm*, or difference estimates, we find that none of the control variables are significant at the 5% level or better.

In the benchmark model estimates, we find a significant relationship between beginning-year analyst following and social disclosure levels in the conventional analysis. Nonetheless, the differences between the *between firm* and *within firm* estimates suggest that the conventional model is mis-specified. We find no evidence of a relationship between beginning-year analyst following and social disclosure levels in the persistence model estimates.

Table 6 provides the results for the use of environmental or social disclosure levels to explain one-year ahead, beginning-year, analyst following.

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Insert Table 6 Here

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When environmental disclosure level is the independent variable, we find that there is a significant *between firm* relationship between the level of environmental disclosures and one year-ahead, beginning-year, analyst following. The *within firm* and difference model estimates show no evidence of a relationship. Overall, the evidence suggests that we can reject H_3N but not H_4N.

There are control variables with coefficients significant at the 5% level of significance in the *between firm* and *within firm* estimates, but they are not identical for the two components of the overall model. For the *between firm* component of equation (7), employees, return on sales, book-to-market, leverage, and debt raised have significant coefficients, whereas only the coefficients of employees, book-to-market and leverage are significant for the *within firm* component.

The conventional model estimates provide evidence similar to that provided by the *between firm* estimates, other than that more of the control variables are significant. Nonetheless, the differences between the *between firm* and *within firm* components suggest that the conventional estimates result from a mis-specified equation, and are mainly picking up the *between firm* relationship. The persistence model estimates suggest that analyst following is

similarly persistent to the level of environmental and social disclosures. Further, the level of environmental disclosures does help explain one year-ahead, beginning year, analyst following, even after the persistence in analyst following is taken into account.

When using the social disclosure level as the independent variable, there is similar evidence to that for environmental disclosure levels - a *between firm* relationship with one year-ahead, beginning-year, analyst following exists, but no such *within firm* relationship exists. Perhaps not surprisingly, the pattern of significance of the control variables in both sets of estimates is similar to that found when the environmental disclosure level is the experimental variable. When we use the differences specification, however, evidence of a relationship between social disclosures and one year-ahead, beginning-year, analyst following is found. Overall, we can reject H_3N and have some, if equivocal, evidence to reject H_4N.

The conventional model estimates suggest a significant relationship between social disclosures and one year-ahead, beginning-year, analyst following. As before, however, the differences between the *between firm* and *within firm* estimates suggest that the conventional estimates result from estimating a mis-specified equation. The persistence model estimates also suggest that social disclosures do not help explain one year-ahead, beginning-year, analyst following.

Concentrating on the key relationships about which we are concerned, and the preferred modelling approach, we conclude that beginning-year analyst following (environmental or social disclosure levels) has a *between firm* association with environmental or social disclosure levels (one year-ahead, beginning-year, analyst following). Evidence from the difference model estimates suggests that social disclosure levels have a *within firm*

association with one year-ahead, beginning-year, analyst following. Otherwise, there is no evidence of *within firm* relationships between beginning-year analyst following (environmental or social disclosure levels) and environmental or social disclosure levels (one year-ahead, beginning-year, analyst following). These results arise in a context where disclosure levels and analyst following display high degrees of persistence.

Overall, the fact that there is no robust evidence of *within firm* relationships between either beginning-year analyst following and environmental or social disclosure levels or environmental or social disclosure levels and one year-ahead, beginning-year, analyst following makes it difficult to assert either that a change in the size of analyst following influences firms' subsequent disclosure decisions or that a firm disclosure decision affects the numbers of analysts following the firm in the year following the disclosures. Nonetheless, our *within firm* estimates, as they stand, only capture reactions that occur one year ahead. In additional tests, we run the regressions with the dependent variable measured two and three years ahead. The qualitative nature of our results, however, is not altered for either *between firm* or *within firm* estimates.

Further, following Clarkson *et al*. (2011), we take differences between our data for 2012 and our data for 2008 and run equations (5) and (9) with these expanded period differences. The purpose of so doing is to help deal with the evolution of environmental and social disclosures and the level of analyst following over time being slow-moving processes. Again, there is no evidence of *within firm* relationships.

Because of the bunching of disclosure level changes, whether annual or over the whole period, in the middle two quartiles, we run sub-sample analyses that focus on the two extreme

quartiles combined. We do this for both annual differences and differences over the whole period. Such analyses provide no evidence of *within firm* relationships.

Finally, the results in Tables 5 and 6 are not altered in any substantive way that affects the conclusions drawn about our key variables when other measures of size, such as log market value, log total assets or log sales, are used instead of log employees. Our results suggest that, when explaining environmental and social disclosure levels, a separate measure of analyst following is needed to capture the demand for such information by analysts. Further, if firm size is used to (partially) explain the size of firms' analyst following, as a proxy for the amount of public information available about the firm, there appears to be a separate role for the level of environmental and social disclosures. This is consistent with the level of analyst following being differentially influenced by different types of public information.[24]

The *between firm* relationships, with no robust *within firm* relationships, are consistent with the relationships between environmental or social disclosure levels and analyst following being slow-moving processes with, as indicated by our Persistence models, both analyst following and environmental and social disclosures being broadly persistent otherwise.[25] We find relationships in both directions for both environmental and social disclosure levels but, as pointed out above, we would argue that the method of estimating *between firm*

[24] We accept that we could have also analysed the impact of the level of disclosures on environmental and social activities and performance on analyst earnings forecast errors in the UK. We do not do so because, as part of a different experiment, Bernardi and Stark (2018, fn.25) report that there is no relationship between the level of disclosures on environmental and social activities and performance and analyst one-year ahead earnings forecast errors in the UK. We investigate this result on our sample of firms, using the control variables in our study, and find exactly the same result. If our basic conclusions on the value relevance of disclosures of information on environmental and social activities and performance are accepted, but analysts do not use the information on environmental and social activities and performance to improve short-term earnings forecasts, what do they use it for? One possibility is it improves explicit longer-term forecasts, such as two-year ahead earnings forecasts, or implicit longer-term forecasts such as target prices or buy/hold/sell recommendations. We leave this to other researchers to investigate.

[25] Another possibility is that any adjustments in environmental and social disclosure levels to the demands of the analyst following, or the adjustment of the analyst following to changes in environmental and social disclosure levels, took place before the sample period started, with both environmental and social disclosure levels and analyst following largely persistent since then.

relationships using firm averages makes this possible, even though the direction of any relationship can only run one way.

Given the persistence levels of both analyst following and environmental and social disclosures, it is also possible that there exists some third variable, or set of variables, that is/are correlated with both the average size of analyst following and the average level of both environmental and social disclosures, producing a spurious partial correlation between the two variables. We do use a comprehensive control group strategy, however, that, at least in part, rules out such a possibility.

To summarise, and focussing on our preferred model, we observe that there is robust evidence of *between firm* relationships between environmental and social disclosure levels and analyst following, running in both directions, but none for *within firm* relationships. There is evidence of a *within firm* relationship between social disclosure levels and one year-ahead, beginning-year, analyst following. The latter evidence is not derived from our preferred modelling approach, however, and, hence, is not robust to methodological choice. We conclude that the evidence overall is consistent with the value relevance of disclosures of information concerning environmental and social activities and performance.[26]

[26] We recognize that some researchers will believe that cross-sectional relationships must suffer from endogeneity (correlated omitted variable) concerns, leaving the analysis fatally flawed. Such researchers might then conclude that our *within firm* and Difference model analyses provide little evidence of value relevance and our *between firm* results are too unreliable to be trusted.

6 SUMMARY AND CONCLUSIONS

Motivated by the requirements of the UK Companies Act 2006 and the subsequent Directive 2014/95/EU of the European Parliament and of the Council, we investigate the relationship between the levels of environmental and social disclosures (analyst following) and analyst following (levels of environmental and social disclosures). We do so to investigate the value relevance of information about environmental and social activities and performance, in a context where corporate managers have to gauge the level of disclosures necessary to satisfy the requirements of the Act. We also introduce a modelling innovation that allows us to distinguish between *between firm* and *within firm* relationships on the same set of data.

After controlling for time and sector fixed effects, and a variety of control variables including a measure of firm size, we conclude that there is no robust evidence to suggest that changes in environmental or social disclosure levels (beginning-year analyst following) around firm averages are associated with one year-ahead, beginning-year, changes in analyst following (environmental and social disclosure levels) around their firm averages. We find strong evidence that firm averages for the levels of environmental or social disclosures (beginning-year analyst following) are associated with the firm averages for one year-ahead beginning-year analyst following (levels of environmental or social disclosures).

We then conclude that, overall, our evidence suggests that there are positive *between firm* relationships between the levels of environmental and social disclosures and the level of analyst following, consistent with disclosures of information on both environmental and social activities and performance providing value relevant information. In this regard, our analysis provides support for the requirements of the UK and EU with respect to disclosures

concerning environmental and social activities and performance, because we would argue that the evidence is consistent with a demand for such disclosures from informed market participants. The evidence is also consistent with corporate managers taking into account the demand for, and general interest in, disclosures of value relevant information on environmental and social activities and performance from market participants in deciding on the appropriate amount of such disclosures.

Qiu *et al* (2016) argue that the Bloomberg measures of disclosure are not only measures of disclosure *levels*, they are also measures of disclosure *quality*. Quality, in this case, captures the extent to which *hard* (numerical) disclosures of environmental and social performance are provided. We then can also argue that our results suggest positive links between analyst following and the *quality* of environmental and social disclosure.

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TABLE 1

BALANCED PANEL FIRM DISTRIBUTION BY INDUSTRIAL SECTOR

Sector	Frequencies	Percentages
Aerospace & Defence	8	5.80
Automobiles & Parts	1	0.72
Beverages	1	0.72
Chemicals	4	2.90
Construction & Materials	3	2.17
Electricity	2	1.45
Electronic & Electrical Equipment	9	6.52
Fixed Line Telecommunications	2	1.45
Food & Drug Retailers	3	2.17
Food Producers	4	2.90
Gas, Water & Multi-Utilities	4	2.90
General Industrials	4	2.90
General Retailers	15	10.87
Health Care Equipment & Services	1	0.72
Household Goods	7	5.07
Industrial Engineering	7	5.07
Media	9	6.52
Oil Equipment, Services & Distribution	1	0.72
Personal Goods	2	1.45
Pharmaceuticals & Biotechnology	4	2.90
Software & Computer Services	4	2.90
Support Services	26	18.84
Technology Hardware & Equipment	2	1.45
Tobacco	2	1.45
Travel & Leisure	13	9.42
Total	**138**	**100**

TABLE 2

PANEL A - DESCRIPTIVE STATISTICS – DATASET WHEN THE DEPENDENT VARIABLE IS ENVIRONMENTAL/SOCIAL DISCLOSURE LEVEL

Variables	Minimum	Median	Mean	Maximum	St Dev
Environmental Disclosure	0.00	17.44	19.72	58.14	13.74
Social Disclosure	12.28	28.07	32.47	77.19	11.32
Analyst Following	1.00	13.00	13.37	37.00	6.76
Strategic Posture	0.00	0.00	0.00	0.01	0.00
Board Independence	10.53	50.00	53.52	83.33	12.28
Employees	4.20	8.94	8.95	13.40	1.50
Return on Sales	-0.25	0.10	0.13	0.57	0.09
Loss	0.00	0.00	0.01	1.00	0.09
Book-to-Market	-1.20	0.38	0.71	20.79	1.43
Leverage	0.10	0.64	0.64	1.81	0.22
CapEx Intensity	0.00	0.03	0.05	0.60	0.07
Age	0.06	0.49	0.51	1.00	0.16
Equity Raised	-1.42	0.00	0.00	0.50	0.08
Debt Raised	-14.99	0.00	-0.06	4.07	0.74

PANEL B - DESCRIPTIVE STATISTICS – DATASET WHEN THE DEPENDENT VARIABLE IS ONE YEAR-AHEAD, BEGINNING YEAR, ANALYST FOLLOWING

Variables	Minimum	Median	Mean	Maximum	St Dev
Analyst Following	1.00	14.00	13.97	37.00	6.82
Environmental Disclosure	0.00	17.44	19.72	58.14	13.74
Social Disclosure	12.28	28.07	32.47	77.19	11.32
Strategic Posture	0.00	0.00	0.00	0.01	0.00
Board Independence	10.53	50.00	53.52	83.33	12.28
Employees	4.20	8.94	8.98	13.40	1.49
Return on Sales	-0.25	0.10	0.13	0.57	0.09
Loss	0.00	0.00	0.01	1.00	0.09
Book-to-Market	-0.50	0.34	0.58	20.79	1.13
Leverage	0.13	0.63	0.64	1.62	0.21
CapEx Intensity	0.00	0.03	0.05	0.60	0.07
Age	0.06	0.49	0.51	1.00	0.16
Equity Raised	-1.42	0.00	0.01	5.03	0.21
Debt Raised	-14.99	0.00	-0.04	4.07	0.77

Notes: There are 690 firm years in both datasets. *Environmental disclosure* is the environmental disclosure level provided by Bloomberg for a given year; *Social disclosure level* is the social disclosure level provided by Bloomberg for a given year; *Analyst Following* is the number of analysts preparing earnings *per* share forecasts for a given year; *Strategic Posture* is the ratio of community spending to sales in a given year; *Board Independence* is the ratio of non-executive directors to total board size for a given year; *Employees* is the log of the annual number of firm employees at the start of the given year; *Return on Sales* is the ratio of operating profit to sales in a given year; *Loss* is a dummy variable equal to one if operating income is negative in a given year; *0* otherwise; *Book-to-market ratio* is the ratio of book value to market value at the start of the given year;

Leverage is the ratio of total liabilities to total assets at the start of the given year; *Capex Intensity* is the ratio of expenditures on property, plant and equipment to total revenues for a given year; *Age* is the ratio of net property, plant and equipment to gross property, plant and equipment for a given year; *Equity Raised* is the ratio of equity raised/repurchased to market value for a given year*;* and *Debt Raised* is the ratio of debt raised/repaid to market value for a given year.

TABLE 3

PANEL A - DESCRIPTIVE STATISTICS FOR DISCLOSURE LEVEL CHANGES BETWEEN 2008 AND 2012

	Minimum	Q1	Median	Mean	Q3	Maximum
Environmental Disclosure	-23.96	-1.56	1.17	2.34	6.97	25.58
Social Disclosure	-28.07	0	5.26	4.12	10.52	24.56

PANEL B - DESCRIPTIVE STATISTICS FOR ANNUAL DISCLOSURE LEVEL CHANGES

	Minimum	Q1	Median	Mean	Q3	Maximum
Environmental Disclosure	-23.96	0	0	0.59	2.32	21.71
Social Disclosure	-19.30	0	0	1.03	3.51	19.30

Notes: There are 138 firms for which we identify disclosure level changes between 2008 and 2012. There are 552 firm-years for which we identify annual disclosure level changes. *Environmental disclosure* is the environmental disclosure level provided by Bloomberg, and *Social disclosure level* is the social disclosure level provided by Bloomberg.

TABLE 4

PANEL A - CORRELATIONS BETWEEN VARIABLES (ANALYSES WHEN THE DEPENDENT VARIABLE IS ENVIRONMENTAL OR SOCIAL DISCLOSURE LEVELS)

Variables	*Environmental Disclosure*	*Social Disclosure*	*Analyst Following*	*Strategic Posture*	*Board Independence*	*Employees*	*Return on Sales*	*Loss*	*Book-to-Market*	*Leverage*	*CapEx Intensity*	*Age*	*Equity Raised*
Social Disclosure	0.60												
Analyst Following	0.44	0.34											
Strategic Posture	0.29	0.25	0.41										
Board Independence	0.21	0.25	0.28	0.12									
Employees	0.46	0.35	0.57	0.22	0.32								
Return on Sales	-0.05	0.01	0.17	0.19	-0.03	-0.24							
Loss	-0.03	-0.04	-0.06	-0.02	-0.01	-0.09	-0.02						
Book-to-Market	-0.03	-0.03	-0.06	-0.10	0.02	-0.04	0.07	0.14					
Leverage	0.16	0.15	0.10	0.08	0.01	0.31	-0.03	-0.08	-0.17				
CapEx Intensity	0.00	0.03	0.02	0.09	-0.07	-0.10	0.40	0.01	0.00	0.02			
Age	0.05	-0.09	0.14	0.04	-0.02	0.05	0.34	0.08	0.21	0.10	0.37		
Equity Raised	0.01	-0.07	-0.05	-0.04	-0.05	0.01	-0.02	0.20	0.12	0.01	0.00	0.07	
Debt Raised	0.10	0.08	-0.01	0.09	0.01	0.06	-0.16	-0.12	-0.48	-0.07	0.02	-0.20	-0.16

PANEL B - CORRELATIONS BETWEEN VARIABLES (ANALYSES WHEN THE DEPENDENT VARIABLE IS ONE YEAR-AHEAD, BEGINNING-YEAR, ANALYST FOLLOWING)

Variables	*Analyst Following*	*Environmental Disclosure*	*Social Disclosure*	*Strategic Posture*	*Board Independence*	*Employees*	*Return on Sales*	*Loss*	*Book-to-Market*	*Leverage*	*CapEx Intensity*	*Age*	*Equity Raised*
Environmental Disclosure	0.44												
Social Disclosure	0.33	0.60											
Strategic Posture	0.41	0.29	0.25										
Board Independence	0.28	0.21	0.25	0.12									
Employees	0.57	0.46	0.35	0.25	0.32								
Return on Sales	0.14	-0.06	0.00	0.18	-0.03	-0.28							

Loss	-0.05	-0.03	-0.04	-0.02	-0.01	-0.10	-0.13						
Book-to-Market	-0.07	0.00	-0.04	-0.11	0.05	-0.05	0.04	0.08					
Leverage	0.07	0.17	0.17	0.08	0.02	0.33	-0.08	-0.08	-0.16				
CapEx Intensity	0.01	0.00	0.03	0.09	-0.07	-0.09	0.42	0.01	0.03	0.05			
Age	0.13	0.05	-0.09	0.04	-0.02	0.05	0.28	0.08	0.28	0.11	0.37		
Equity Raised	-0.03	0.02	-0.06	-0.06	-0.06	0.03	-0.07	-0.01	0.09	-0.03	-0.10	0.09	
Debt Raised	0.00	0.07	0.02	0.04	0.01	0.14	-0.15	-0.03	-0.35	0.00	0.09	-0.10	-0.16

Notes: There are 690 firm years in both datasets. *Environmental disclosure* is the environmental disclosure level provided by Bloomberg for a given year; *Social disclosure level* is the social disclosure level provided by Bloomberg for a given year; *Analyst Following* is the number of analysts preparing earnings *per* share forecasts for a given year; *Strategic Posture* is the ratio of community spending to sales in a given year; *Board Independence* is the ratio of non-executive directors to total board size for a given year; *Employees* is the log of the annual number of firm employees for a given year; *Return on Sales* is the ratio of operating profit to sales in a given year; *Loss* is a dummy variable equal to one if operating income is negative in a given year; *0* otherwise; *Book-to-market ratio* is the ratio of book value to market value for a given year; *Leverage* is the ratio of total liabilities to total assets for a given year; *Capex Intensity* is the ratio of expenditures on property, plant and equipment to total revenues for a given year; *Age* is the ratio of net property, plant and equipment to gross property, plant and equipment for a given year; *Equity Raised* is the ratio of equity raised/repurchased to market value for a given year*;* and *Debt Raised* is the ratio of debt raised/repaid to market value for a given year.

TABLE 5

BEGINNING-YEAR ANALYST FOLLOWING AND ENVIRONMENTAL AND SOCIAL DISCLOSURE LEVELS

	DEPENDENT VARIABLE IS ENVIRONMENTAL DISCLOSURE LEVEL					DEPENDENT VARIABLE IS SOCIAL DISCLOSURE LEVEL				
	Preferred Model		Difference Model	Conventional Model	Persistence Model	Preferred Model		Difference Model	Conventional Model	Persistence Model
	'Between' Component	'Within' Component				'Between' Component	'Within' Component			
Analyst Following	**0.80*** **	-0.05	0.00	**0.53*** **	0.01	**0.45** **	-0.05	-0.06	**0.33** **	0.04
	(0.00)	(0.62)	(0.96)	**(0.00)**	(0.79)	**(0.02)**	(0.60)	(0.42)	**(0.01)**	(0.20)
Lagged Environmental Disclosure					**0.86*** **					
					(0.00)					
Lagged Social Disclosure										**0.83*** **
										(0.00)
Strategic Posture	*2,352.03**	1,217.66	383.94	**2,529.18*** **	*314.17**	1,448.84	612.99	-115.10	**1,547.05*** **	56.91
	(0.05)	(0.20)	(0.66)	**(0.00)**	*(0.09)*	(0.14)	(0.52)	(0.85)	**(0.01)**	(0.74)
Board Independence	-0.08	0.03	0.02	-0.02	0.01	0.10	0.02	0.03	0.09	0.00
	(0.45)	(0.33)	(0.43)	(0.78)	(0.47)	(0.26)	(0.64)	(0.20)	(0.11)	(0.88)
Employees	*2.06**	0.32	1.33	**2.76*** **	**0.65*** **	*1.59**	-0.86	1.27	**1.91*** **	**0.51*** **
	(0.05)	(0.51)	(0.36)	**(0.00)**	**(0.00)**	*(0.07)*	(0.15)	(0.29)	**(0.00)**	**(0.00)**
Return on Sales	-15.71	-1.69	-7.50	*-16.26**	*-5.25**	-10.89	5.95	3.69	-6.77	-1.58
	(0.33)	(0.85)	(0.29)	*(0.09)*	*(0.06)*	(0.41)	(0.39)	(0.54)	(0.42)	(0.54)
Loss	2.55	-1.81	-2.80	-0.08	-0.52	5.44	-0.83	-0.94	0.14	0.32
	(0.90)	(0.24)	(0.16)	(0.98)	(0.50)	(0.75)	(0.58)	(0.69)	(0.94)	(0.88)
Book-to-Market	**4.03** **	-0.20	-0.02	0.80	**-0.39** **	1.93	0.14	0.01	0.57	-0.22
	(0.03)	(0.58)	(0.92)	(0.15)	**(0.02)**	(0.20)	(0.67)	(0.94)	(0.30)	(0.45)
Leverage	6.26	*-5.82**	0.20	1.31	-1.45	6.63	-2.46	2.34	*4.82**	1.19
	(0.26)	*(0.05)*	(0.95)	(0.75)	(0.15)	(0.15)	(0.48)	(0.36)	*(0.09)*	(0.24)

CapEx Intensity	21.78	5.05	5.48	15.93	**4.82****	9.20	1.66	-2.40	7.30	2.30
	(0.32)	(0.38)	(0.50)	(0.18)	**(0.05)**	(0.60)	(0.82)	(0.79)	(0.51)	(0.44)
Age	-1.21	6.60	1.22	1.19	*2.73**	-1.20	0.85	-2.79	-1.30	0.26
	(0.88)	(0.15)	(0.75)	(0.86)	*(0.07)*	(0.86)	(0.87)	(0.46)	(0.80)	(0.83)
Equity Raised	65.07	-1.35	-0.43	15.02	-0.45	-49.92	1.03	2.40	-5.55	-2.28
	(0.19)	(0.68)	(0.89)	(0.15)	(0.89)	(0.22)	(0.74)	(0.28)	(0.29)	(0.41)
Debt Raised	**25.67****	-1.06	-0.41	*5.54**	0.25	9.12	-0.26	0.39	1.96	-1.35
	(0.02)	(0.29)	(0.50)	*(0.05)*	(0.82)	(0.30)	(0.75)	(0.45)	(0.31)	(0.29)
Constant	4.63	**17.11*****	0.45	**-19.26*****	-1.58	**31.86*****	**42.17*****	*0.73**	1.50	**7.16*****
	(0.73)	**(0.00)**	(0.30)	**(0.00)**	(0.36)	**(0.00)**	**(0.00)**	*(0.09)*	(0.77)	**(0.00)**
Adjusted R^2	0.50	0.04	-0.01	0.51	0.87	0.48	0.09	-0.01	0.49	0.85

Notes: There are 690 firm years in the dataset. For the 'difference' models, 552 firm-years are employed. All the regressions provide estimates of models which include sector and time dummies. *Environmental disclosure* is the environmental disclosure level provided by Bloomberg for a given year; *Social disclosure level* is the social disclosure level provided by Bloomberg for a given year; *Analyst Following* is the number of analysts preparing earnings *per* share forecasts for a given year; *Strategic Posture* is the ratio of community spending to sales in a given year; *Board Independence* is the ratio of non-executive directors to total board size for a given year; *Employees* is the log of the annual number of firm employees for a given year; *Return on Sales* is the ratio of operating profit to sales in a given year; *Loss* is a dummy variable equal to one if operating income is negative in a given year; *0* otherwise; *Book-to-market ratio* is the ratio of book value to market value for a given year; *Leverage* is the ratio of total liabilities to total assets for a given year; *Capex Intensity* is the ratio of expenditures on property, plant and equipment to total revenues for a given year; *Age* is the ratio of net property, plant and equipment to gross property, plant and equipment for a given year; *Equity Raised* is the ratio of equity raised/repurchased to market value for a given year*;* and *Debt Raised* is the ratio of debt raised/repaid to market value for a given year.

TABLE 6

ENVIRONMENTAL AND SOCIAL DISCLOSURE LEVELS AND ONE YEAR-AHEAD, BEGINNING-YEAR, ANALYST FOLLOWING

	DEPENDENT VARIABLE IS ONE YEAR-AHEAD, BEGINNING-YEAR, ANALYST FOLLOWING									
	Preferred Model		Difference Model	Conventional Model	Persistence Model	Preferred Model		Difference Model	Conventional Model	Persistence Model
	'Between' Component	'Within' Component				'Between' Component	'Within' Component			
Environmental Disclosure	**0.14*** **	0.03	0.02	**0.10*** **	**0.02*** **					
	(0.00)	(0.29)	(0.37)	**(0.00)**	**(0.00)**					
Social Disclosure						**0.11** **	0.03	**0.06** **	**0.09*** **	*0.02**
						(0.04)	(0.22)	**(0.02)**	**(0.01)**	*(0.07)*
Lagged Analyst Following					**0.81*** **					**0.82*** **
					(0.00)					**(0.00)**
Strategic Posture	**731.24**	-498.13	-291.17	**859.64** **	55.91	*1,005.07**	-488.23	-281.07	**1,008.71*** **	84.04
	(0.15)	(0.19)	(0.57)	**(0.01)**	(0.52)	*(0.05)*	(0.19)	(0.58)	**(0.00)**	(0.33)
Board Independence	*0.08**	0.00	0.01	0.04	*0.02**	0.06	0.00	0.01	0.03	*0.02**
	(0.08)	(0.84)	(0.42)	(0.17)	*(0.05)*	(0.20)	(0.82)	(0.48)	(0.27)	*(0.09)*
Employees	**2.43*** **	**2.53*** **	-0.63	**2.47*** **	**0.54*** **	**2.68*** **	**2.55*** **	-0.70	**2.64*** **	**0.56*** **
	(0.00)	**(0.00)**	(0.52)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	(0.48)	**(0.00)**	**(0.00)**
Return on Sales	**20.71*** **	**9.38** **	0.22	**21.86*** **	2.24	**22.00*** **	**9.20** **	-0.23	**21.55*** **	2.03
	(0.00)	**(0.03)**	(0.96)	**(0.00)**	(0.14)	**(0.00)**	**(0.03)**	(0.95)	**(0.00)**	(0.18)
Loss	9.45	0.67	0.08	**3.48** **	0.36	10.71	0.61	-0.00	**3.67** **	0.38
	(0.27)	(0.60)	(0.94)	**(0.02)**	(0.61)	(0.23)	(0.63)	(1.00)	**(0.01)**	(0.58)
Book-to-Market	**-4.01*** **	*0.52**	**1.02*** **	**-1.47** **	**-0.98*** **	**-3.45*** **	0.49	**1.02*** **	**-1.38** **	**-0.96*** **
	(0.00)	*(0.09)*	**(0.00)**	**(0.01)**	**(0.00)**	**(0.00)**	(0.10)	**(0.00)**	**(0.02)**	**(0.00)**
Leverage	**-6.73*** **	**-6.54*** **	**-7.18*** **	**-4.83** **	**-2.68*** **	**-6.43** **	**-6.70*** **	**-7.05*** **	**-5.08** **	**-2.72*** **

	(0.01)	**(0.00)**	**(0.00)**	**(0.01)**	**(0.00)**	**(0.01)**	**(0.00)**	**(0.00)**	**(0.01)**	**(0.00)**
CapEx Intensity	-7.15	*7.10**	**10.52*****	-4.14	1.67	-5.61	*7.25**	**10.89*****	-3.19	1.93
	(0.44)	*(0.09)*	**(0.01)**	(0.50)	(0.40)	(0.56)	*(0.09)*	**(0.01)**	(0.57)	(0.30)
Age	2.69	1.67	-0.59	1.17	0.23	2.07	1.76	-0.44	1.17	0.23
	(0.43)	(0.46)	(0.74)	(0.63)	(0.75)	(0.56)	(0.43)	(0.81)	(0.63)	(0.75)
Equity Raised	-3.56	1.50	0.88	-1.27	2.28	5.32	1.53	1.03	0.30	2.69
	(0.85)	(0.47)	(0.33)	(0.57)	(0.30)	(0.79)	(0.47)	(0.27)	(0.90)	(0.22)
Debt Raised	**-9.59****	-0.20	-0.39	-0.94	-0.57	*-7.07**	-0.18	-0.38	-0.64	-0.49
	(0.02)	(0.73)	(0.35)	(0.16)	(0.15)	*(0.10)*	(0.75)	(0.36)	(0.38)	(0.23)
Constant	**-15.89*****	-7.33	**-0.69*****	**-8.21****	-1.17	**-11.37****	-8.14	**1.05*****	**-17.75*****	**-3.73*****
	(0.00)	(0.29)	**(0.00)**	**(0.01)**	(0.25)	**(0.05)**	(0.25)	**(0.00)**	**(0.00)**	**(0.00)**
Adjusted R^2	0.63	0.29	0.14	0.62	0.86	0.61	0.29	0.15	0.61	0.86

Notes There are 690 firm years in the dataset. For the 'difference' models, 552 firm-years are employed. All the regressions provide estimates of models which include sector and time dummies. *Environmental disclosure* is the environmental disclosure level provided by Bloomberg for a given year; *Social disclosure* is the social disclosure level provided by Bloomberg for a given year; *Analyst Following* is the number of analysts preparing earnings *per* share forecasts for a given year; *Strategic Posture* is the ratio of community spending to sales in a given year; *Board Independence* is the ratio of non-executive directors to total board size for a given year; *Employees* is the log of the annual number of firm employees for a given year; *Return on Sales* is the ratio of operating profit to sales in a given year; *Loss* is a dummy variable equal to one if operating income is negative in a given year; *0* otherwise; *Book-to-market ratio* is the ratio of book value to market value for a given year; *Leverage* is the ratio of total liabilities to total assets for a given year; *Capex Intensity* is the ratio of expenditures on property, plant and equipment to total revenues for a given year; *Age* is the ratio of net property, plant and equipment to gross property, plant and equipment for a given year; *Equity Raised* is the ratio of equity raised/repurchased to market value for a given year; and *Debt Raised* is the ratio of debt raised/repaid to market value for a given year.