Accounting and Management Information Systems
Vol. 16, No. 1, pp. 59-88

The impact of online corporate reporting quality on analyst following and properties of their EPS forecasts

Ahmed Saleh[a,1] and Clare Roberts[b]

[a] *University of East London, UK*
[b] *University of Aberdeen, UK*

Abstract: This paper investigates the impact of the quality of online corporate reporting (OCR) by UK listed firms on analyst behavior. Using a proposed new OCR index, we find that higher quality of OCR is related to increased analyst following. Additionally, we find that the main OCR component that drives analyst following is financial information content. However, we find no association between the quality of OCR and properties of analyst EPS forecasts as proxied by error in analyst EPS forecasts, dispersion in analyst EPS forecasts and common uncertainty in analyst information environment. We also investigate the direction of causality between OCR quality and analyst following and find that the later has no impact on the first. Furthermore, we find no evidence that herding behavior by financial analysts in the UK has interrupted the association between the quality of OCR and forecast properties. Our results contribute to the understanding of the role of analysts as information intermediaries in providing information to investors.

Keywords: Financial analysts; disclosure quality; online corporate reporting; analyst behavior; analyst herding

JEL codes: M41

[1] *Corresponding author*: Department of Accounting, University of East London; Stratford Campus; Water Lane; London; E15 4LZ; UK.; tel.; email address: a.saleh2@uel.ac.uk.

1. Introduction

The internet provided businesses with a revolutionary means of business reporting, leading to rapid growth in its use by firms (Beattie & Pratt, 2003). However, whilst financial analysts are one of the most frequent users of OCR (Beattie & Pratt, 2003; Hodge & Pronk, 2006; Rowbottom & Lymer, 2009), relatively little is known about the impact of OCR on analyst behavior. Since financial analysts collect and analyze information on a large population of firms and disseminate information about them, then the issue of OCR is closely related to financial analysis. The main objective of this paper is to examine the impact of OCR quality on two aspects of analyst behavior, the decision to follow firms and properties of their EPS forecasts as proxied by error, the degree of dispersion among forecasts and common uncertainty in the information environment.

Financial analysts are sophisticated users of corporate information, they use sophisticated financial software and specialized financial databases such as Reuters and Bloomberg (Rowbottom & Lymer, 2009) to collect information about firms. However, these financial databases are considered a complementary source of corporate information rather than a substitute to corporate websites. Corporate websites still provide detailed information about firms not available on financial databases, particularly qualitative information and narrative disclosure, such as corporate social responsibility information, corporate strategy, research and development activities, future products or services, and management discussions. Therefore, information on corporate websites would be necessary if analysts are to make initiation, continuation or termination decisions on a specific firm. This is consistent with Quagli and Riva (2005) who found listed firms websites more important to Italian analysts than specialized financial databases. Furthermore, the London Stock Exchange (LSE, 2010) noted that corporate websites are the first port of call for most investors.

As firms started to rely heavily on the internet as a platform to communicate with stakeholders (LSE, 2010), studies started to examine how this technology would impact analyst behavior (Aerts *et al.*, 2007; Liu *et al.*, 2014; Bagnoli *et al.*, 2014). However, none of these studies used a comprehensive tool to measure the quality of OCR. In this paper we propose a new thematic multidimensional index to investigate the association between the quality of OCR by UK firms listed on FTSE 350 index and the number of analysts following these firms and properties of their EPS forecasts. We document a significant positive relationship between analyst following and OCR quality, and interpret this relationship to suggest that OCR provided by UK firms complements, rather than substitutes for, analyst activities. Consequently, financial analysts in the UK play the role of information intermediaries, i.e., they play a complementary role to firms in providing information directly to investors. This means that higher quality of OCR is related

to increased analyst following. Furthermore, we find that OCR quality has no impact on properties of analyst EPS forecasts. We examine whether herding behavior by financial analysts in the UK has interrupted this relationship using Olsen's (1996) herding index, and find no evidence of herding behavior by financial analysts.

This study contributes to the literature in the following ways. First, our overall findings add to the literature on how analysts respond to firms' quality of OCR. This study provides insights to firms about the economic benefits of using OCR and its potential to be more than simply an electronic version of the paper based reporting. Second, the difficulty of measuring disclosure quality has been an issue considered by many researchers (Cooke & Wallace, 1989; Moore & Benbasat, 1991; Healy & Palepu, 2001), making it an unresolved issue until now. When it comes to OCR, the concept of quality becomes more complex as it includes, in addition to the quality of information content, the quality of the firm's website design in terms of accessibility and the layout of information. This study proposes a new thematic multidimensional index as a comprehensive measure of OCR quality that lies in a middle-range position between traditional disclosure indices and content analysis. It examines four different dimensions of each OCR item in the index, these dimensions are "Content Richness", "Presentation", "Accessibility" and "Language and Currency". Furthermore, both unweighted and weighted indices are used to examine the impact of OCR quality on analyst behavior. All prior studies measured OCR using judgmental weights to build their indices (Pirchegger & Wagenhofer, 1999; Xiao *et al.*, 2004; Bollen *et al.*, 2006). However, based on questionnaire responses, we use financial analysts' perceptions of the usefulness of individual items included in the checklist to calculate a weighted index and avoid judgmental weights.

The remainder of this study proceeds as follows: Section 2 discusses prior studies, the role of OCR and the hypotheses development. Section 3 describes the sample, data collection and measurement of variables, and section 4 presents our empirical evidence and discusses the results. Section 5 concludes.

2. Literature review and hypotheses development

A sizable amount of literature provided evidence on the relationship between corporate disclosure and analyst behavior. These studies differed in the type of disclosure under examination with the majority focusing on the effect of a single financial statement or disclosure item. For example, Barth *et al.* (2001) and Barron *et al.* (2002) found that a firm's level of intangible assets increases analyst following, uncertainty and forecast error. Also segment disclosure was found to have a relationship with analyst following (Botosan & Harris, 2000; Botosan &

Stanford, 2005; Andre *et al.*, 2016). Hope (2003a) examined accounting policy disclosure level and found it related to forecast dispersion and error. Management forecasts and voluntary earnings disclosure were also found to influence analyst following and accuracy of their forecasts (Lakhal, 2009). Other studies used comprehensive tools to measure overall corporate disclosure properties instead of focusing on a single piece of corporate disclosure. For example, Lang and Lundholm (1996) and Healy *et al.* (1999) used the Financial Analysis Federation Corporate Information Committee (FAF) reports (1985-1989) as a measure of the informativeness of a firm's disclosure policy. Also Eng and Teo (2000) used the accounting standards rating index created by the Center for International Financial Analysis and Research Incorporation to measure the quality of accounting standards. These studies indicated that the relationship between disclosure level and analyst following depends on the role financial analysts play in capital markets (Bhushan, 1989). For example, Barth *et al.* (2001) found that financial analysts are information providers who compete with firm-provided disclosure. They argued that because intangible assets typically are unrecognized and estimates of their fair values are not disclosed, analysts have more incentives to follow firms with larger intangible assets relative to their industry. On the other hand, Lang and Lundholm (1996) indicated that financial analysts are information intermediaries that process information disclosed by firms and transmit to the capital markets. They provided evidence that firms with more informative disclosure policy have larger analyst following.

Another stream of research focused on complexity or readability, rather than the level, of corporate disclosure. Given the increasing complexity of firm disclosure and the related concerns about their usability, studies tried to find out whether financial analysts use their expertise to examine this complex communication and provide useful information to financial statement users, or if they prefer to focus their efforts on firms with less complex communication (Plumlee, 2003; Hodder *et al.*, 2008; Lehavy *et al.*, 2011). These studies found an increasing demand for analyst services for firms with less readable disclosure, supporting the notion that financial analysts are substitutes to firm-provided disclosure (i.e. information providers).

Regarding the relationship between disclosure level and properties of analyst EPS forecasts, prior studies provided conflicting results. For example, consistent with the Agency Theory, accounting policy disclosure (Hope, 2003a,b) and management forecasts and voluntary earnings disclosure (Lakhal, 2009) were found to have a negative relationship with error and dispersion in analyst EPS forecasts. Also, Botosan and Stanford (2005) found a negative relationship between the adoption of SFAS No. 131 and dispersion in analyst forecasts. Bozzolan *et al.* (2009) found a negative relationship between financially verifiable forward-looking information

and error in analyst forecasts. Furthermore, Dhaliwal (2012) found that the issuance of stand-alone CSR reports is associated with lower analyst forecast error. In contrast, Botosan and Stanford (2005) found segment disclosure level to have a positive relationship with uncertainty in analyst EPS forecasts. Similarly, Andre *et al.* (2016) found segment disclosure level to have a positive relationship with dispersion and uncertainty in analyst EPS forecasts. Other studies found insignificant relationship between disclosure level and error and dispersion in analyst EPS forecasts (Hope *et al.*, 2006, Bugeja *et al.*, 2015). Lang and Lundholm (1996) found an insignificant relationship between annual report ratings and accuracy of analysts' forecasts. Moreover, they found other publications (quarterly filings and press releases) to be insignificantly related to dispersion in analysts' forecasts. Also Eng and Teo (2000) found an insignificant relationship between accuracy and dispersion in analysts' earnings forecasts and voluntary disclosure made by firms listed on the stock exchange of Singapore, provided that firms have large earnings surprises. Buchman and Fort (1996) found that accuracy of analyst EPS forecasts are not affected by the method of presenting an accounting change.

While each of these studies contributed to our understanding of the effect of corporate disclosure on analyst behavior, they focused on paper based reporting. However, few studies only examined the impact of OCR on analyst behavior. For example, Aerts *et al.* (2007) examined the impact of OCR on analysts' behavior, however, the disclosure index used measured only financial ratios and ignored the impact of other financial information available on corporate websites. Furthermore, they ignored firms' utilisation of technology in disseminating information to users, for example, their index did not take into account usability of OCR, the quality of technological facilities provided, or presentation formats used on corporate websites (video files, audio files, PDF, Word processing applications, XBRL), instead, Aerts *et al.* (2007) focused strictly on HTML format. Additionally, it did not examine the impact of OCR on the accuracy of analyst EPS forecasts or uncertainty in analysts' information environment, which are examined in the current study. Following the mandatory adoption of XBRL in the USA, Liu *et al.* (2014) examined whether there exists a positive association between both the number of analysts following a firm and analyst forecast accuracy and the use of XBRL. Results demonstrated a significant positive association between mandatory XBRL adoption and both analyst following and forecast accuracy. Bagnoli *et al.* (2014) found that the level of information content of corporate websites is affected by the regulatory environment of capital markets with well-developed disclosure regulation having higher level of disclosure by firms, leading to higher analyst following. Similar to Aerts (2007), Bagnoli *et al.* (2014) used a condensed OCR index that reflects specific financial information content. In this study, however, we propose a comprehensive measure of OCR quality to examine its impact on two aspects of analyst behavior, their choice of which firms to follow and characteristics of their EPS forecasts as measured by error in forecasts, the degree

of dispersion among forecasts and common uncertainty in the information environment.

2.1 Analyst following

Bhushan (1989) provided a simple framework to examine how various factors influence analyst following. According to this framework, the effect of OCR quality on the number of analysts following a firm depends on the role that analysts play in capital markets. More specifically, if an increase in the quality of OCR resulted in a decrease in the number of analysts following the firm, then analysts are information providers. In other words, they represent a substitute for the firm as a source of information for users. Consistent with this negative relationship between the number of analysts following firms and disclosure level, Barth *et al.* (2001), Lehavy *et al.* (2011) and Lobo *et al.* (2012) found that analysts are information providers. On the other hand, if an increase in the quality of OCR resulted in an increase in the number of analysts following a firm, then analysts are information intermediaries, i.e. they have a complementary role to firms in providing information directly to investors. This means that firms with poor disclosure practices are less likely to be followed by analysts. Analysts mainly follow firms with extensive disclosure practices, because the cost of information collection is relatively low for richer information environment firms (Lang & Lundholm, 1996). Consistent with this positive relationship between the number of analysts following the firm and disclosure, Lang and Lundholm (1996) and Lakhal (2009) found that analysts are information intermediaries. Since it is unclear how OCR quality will affect the number of analysts following firms in the UK, we posit the following nondirectional hypothesis:

> *H_1: There is a relationship between the number of analysts following a firm and OCR quality.*

2.2 Error in analyst EPS forecasts

Many studies tried to find out how financial analysts process corporate information to develop their EPS forecasts (e.g., Rogers & Grant, 1997; Bowen *et al.*, 2002; Conrad *et al.*, 2006), however, as Ramnath *et al.* (2008) pointed out, these studies offer more generalisable results and are limited in their ability to penetrate the black box of analysts' actual decision process. The challenge is that analysts deal with each firm as a context-specific task, represented in the quality of its disclosure (Schipper, 1991; Brown, 1993).

We expect that when the firm increases its OCR quality, which in turn will normally be more informative about future earnings, accuracy of EPS forecasts will increase. In addition, the unique presentation formats provided on corporate websites such as live webcasts of analyst day presentations, board of directors'

interviews, interim preliminary results announcements and business unit seminars are expected to help financial analysts develop more accurate EPS forecasts. Accessibility of corporate websites are expected to have an impact on accuracy of EPS forecasts through increasing the ease with which financial analysts could locate information on corporate websites. Beattie and Pratt (2003) addressed the issue of accessibility and found that the search tools on corporate websites are ranked as very useful. Similarly, Debreceny *et al.* (2001) also provided evidence that users of corporate websites view search and query functions and navigation tools such as site maps, tables of contents and navigation tools to be important. This negative relationship between disclosure and error in analyst forecasts was found in previous studies. For example, Hope (2003a,b) found that the extent of firms' disclosure of their accounting policy in the annual report is negatively associated with analyst forecast error. Bozzolan *et al.* (2009) found the same relationship between financially verifiable forward-looking information and error in analyst forecasts. This relationship is also confirmed by Lakhal (2009) and Dhaliwal (2012). Based on the above discussion, we posit the following hypothesis:

H_2: There is a negative relationship between error in analyst EPS forecasts and OCR quality.

2.3 Dispersion in analyst EPS forecasts

The effect of additional OCR quality on forecast dispersion is measured by differences in the forecast issued by each analyst. Barron *et al.* (1998) found that dispersion in analyst forecasts results from idiosyncratic error (i.e. error stemming from differences in private information), therefore, we predict that as firms increase the quality of information provided on their websites, analysts will place less weight on their private information, consequently reducing dispersion. Lang and Lundholm (1996) argued that additional disclosure reduces the divergence of beliefs across analysts by increasing the precision of their shared information. Hope (2003a) found that the level of accounting policy disclosure is negatively related to forecast dispersion. Similarly, Lakhal (2009) found that voluntary earnings disclosures are negatively associated with forecast dispersion. Based on the above discussion, we posit the following hypothesis:

H_3: There is a negative relationship between dispersion in analyst EPS forecasts and OCR quality.

2.4 Common uncertainty in analyst information environment

To further examine the impact of OCR quality on properties of analyst EPS forecasts, we follow the model derived in Barron *et al.* (1998) that combines the accuracy, the dispersion, and the number of analyst following firms, to find out how OCR quality relates to analysts' information environment uncertainty. Their model is based on the premise that each analyst determines his earnings forecast

based on both public information (common to all analysts) and private information. The common error component arises from error in the public information analysts use and the idiosyncratic error component arises from error in the private information analysts use, therefore, overall uncertainty is the sum of the idiosyncratic uncertainty (i.e., uncertainty associated with analysts' private information) and common uncertainty (i.e., uncertainty associated with information common to all analysts). Common uncertainty is calculated as a percentage of the overall uncertainty to show to what extent financial analysts rely on common information (provided by OCR) versus private information (obtained from their private sources). We predict as firms provide higher quality of OCR which increases the amount of publically available information, the proportion of common uncertainty to overall uncertainty decreases (i.e., how much the average belief reflects common versus private Information). Therefore, we posit the following hypothesis:

> *H_4: There is a negative relationship between common uncertainty in analyst information environment and OCR quality.*

3. Sample and variable definitions

A list of FTSE 350 firms was obtained from the London Stock Exchange website on 28 March 2012, then reduced to 270 firms[1]. The quality of OCR was measured three months before the fiscal year-end date of each firm. Data collection started on 31 March 2012 and ended on 30 March 2013. Analyst following and earnings forecast estimates were obtained from I/B/E/S.

3.1 OCR quality

The proposed OCR index examines different four dimensions of OCR quality. The first dimension is "Content Richness" which examines information content provided on the corporate website. Richness is defined as the width (e.g. specific themes) and diversification (e.g. quantitative vs. qualitative) of information content. The second is "Presentation" which measures how different formats are employed in presenting information content (e.g. HTML, PDF, Word). The last two dimensions, "Accessibility" and "Language and Currency", measure ease of use of the website by financial analysts (see Appendix B). The summation of score awarded to the four dimensions represents an overall OCR quality index. In addition to the overall OCR quality index, we examine which of the two main individual components of OCR quality (content richness and accessibility) are the main drivers of analyst behavior. Consequently, we analyse three separate models in terms of the dependent variable. The first examines the impact of overall OCR quality on analyst behavior (OCR model), while the second model decomposes the overall OCR quality into two components, content richness and accessibility

(Content and Accessibility model). The third model further decomposes the content richness component into financial and non-financial information (Financial and Nonfinancial model). These three models are tested using both unweighted and weighted OCR indices.

The total unweighted score is, then, equal to the summation of score given to content richness, presentation, accessibility, and languages and currency columns, as follows:

$$U\text{-}OCR_j = \frac{1}{us_j} \sum_{i=1}^{n_j} d_i \qquad (1)$$

Where:

$U\text{-}OCR_j$ is the total unweighted online corporate reporting index for firm j.

d_i is the unweighted online corporate reporting score for n items provided by firm j.

us_j is the maximum total unweighted online corporate reporting score to be obtained by a firm.

Similarly, the weighted online corporate reporting index is measured as follows:

$$W\text{-}OCR_j = \frac{1}{ws_j} \sum_{i=1}^{n_j} w_i d_i \qquad (2)$$

Where:

$W\text{-}OCR_j$ is the total weighted online reporting index for firm *j*.

ws_j is the maximum total weighted online corporate reporting score to be obtained by a firm.

w_i is the weight attached to the i item by firm j[2].

This means that both unweighted and weighted OCR indices are to be computed on the basis of the maximum score obtained by a firm, not the maximum score applicable to all firms. This is due to the difficulty of practically obtaining a maximum possible score for the proposed OCR index. When calculating the total score for a particular firm, a problem may arise in that certain items may not be applicable to a particular firm. The OCR index used in this study has only one item "other stock exchange fillings" that has this problem, as it applies only to US listed firms. Firms should obviously not be penalized for nondisclosure in this case (Marston & Shrives, 1991). To overcome this issue a relative score was calculated[3].

Tables 1 and 2 summarize descriptive statistics for the unweighted and weighted OCR index and their components. As expected, sample firms show a high overall quality of OCR (unweighted 60.02% and weighted 60.60%). Additionally, there is a wide range in the quality of OCR (unweighted 86.78% and weighted 85.88%).

Table 1. Descriptive statistics of the unweighted OCR total score and its components

Variable	Mean	S.D.	Min.	Max.	Range	Skewness	Kurtosis
U-OCR	0.6002	0.1632	0.1322	1	0.8678	-0.091	-0.082

Variable	Mean	S.D.	Min.	Max.	Range	Skewness	Kurtosis
U-Content	0.5589	0.1635	0.1142	1	0.8857	-0.021	-0.279
U-Accessibility	0.5930	0.1969	0.0526	1	0.9473	-0.347	-0.251
U-Financial	0.5433	0.1670	0.1194	1	0.8805	-0.127	-0.260
U-Nonfinancial	0.5263	0.1616	0.0781	1	0.9218	0.061	-0.165

Table 2. Descriptive statistics of the weighted OCR total score and its components

Variable	Mean	S.D.	Min.	Max.	Range	Skewness	Kurtosis
W-OCR	0.6060	0.1635	0.1412	1	0.8588	-0.095	-0.120
W-Content	0.5673	0.1635	0.1282	1	0.8717	-0.024	-0.292
W-Accessibility	0.5615	0.1840	0.0143	1	0.9856	-0.369	-0.070
W-Financial	0.5091	0.1610	0.1254	1	0.8745	0.012	-0.358
W-Nonfinancial	0.4772	0.1430	0.1112	1	0.8887	0.062	0.203

It can be noted from Tables 1 and 2, and the Pearson correlation coefficients in Table 3, that the unweighted and weighted OCR indices are very close, indicating that it is highly likely that using them in a multivariate regression analysis would generate the same results. The similarity between unweighted and weighted indices could be due to the large number of items included in the checklist used, combined with the relatively narrow scale used to weigh individual items (5 points Likert-style rating scale). This might have caused the index to be quantity-driven with little impact of weights attached to individual items. Due to the similarity between the unweighted and weighted OCR indices, this study will present results of the analysis using the weighted OCR index and its components only.

Table 3. Pearson correlations between unweighted online corporate reporting total score and its components and their weighted counterparts

	OCR	Content	Accessibility	Financial	Nonfinancial
Pearson correlation	0.971**	0.971***	0.950***	0.963***	0.941***

Note: **, *** denote significance at $p < 0.05$ and $p < 0.01$, respectively.

3.2 Dependent variables

Similar to prior research (Lang & Lundholm, 1996; Lang *et al.*, 2003), we define analyst following (# ANAL) as the number of analysts providing an annual earnings forecasts obtained from I/B/E/S. We define error in analyst EPS forecasts (ERROR) as the absolute value of the analyst forecast error, deflated by stock price (i.e., $(|EPS_t - AF_t|)/P_t$, where EPS_t, AF_t and P_t are earnings per share, the median analyst forecast of earnings per share obtained from I/B/E/S and price per share in period t, respectively). Dispersion in analysts' EPS forecasts (DISP) is measured as the analyst forecast standard deviation deflated by stock price, obtained from

I/B/E/S. We define common uncertainty ($UNCERT_{COMMON}$) using the following equations derived by Barron *et al.* (1998):

$$UNCERT_{COMMON} = \frac{ERROR - \frac{DISP}{\#\ ANAL}}{UNCERT_{OVERALL}} \quad (3)$$

Where:

$$UNCERT_{OVERALL} \left(1 - \frac{1}{\#\ ANAL}\right) * DISP + ERROR \quad (4)$$

Following Barron *et al.* (1998), overall uncertainty ($UNCERT_{OVERALL}$) is interpreted as the sum of the idiosyncratic uncertainty (i.e., uncertainty associated with analysts' private information) and common uncertainty (i.e., uncertainty associated with information common to all analysts). $UNCERT_{COMMON}$ is calculated as the proportion of common uncertainty to overall uncertainty. As shown in equations (3) and (4), if DISP equals 0 (i.e., there is no disagreement among analysts), $UNCERT_{OVERALL}$ equals error and $UNCERT_{COMMON}$ equals 1, which means that the total uncertainty is only associated with analysts' common information and all information impounded in analyst forecasts is public.

3.3 Control variables

Our analysis controls for a variety of variables that have been shown by prior studies to be associated with firms' information environment and business complexity, and therefore relate to analyst behavior. Prior research consistently showed that firm size is positively related to the number of analysts following the firm (Aerts *et al.*, 2007; Lakhal, 2009; Lang & Lundholm, 1996; Bhushan, 1989, Lehavy *et al.*, 2011; Lobo *et al.*, 2012). We use the log of market value of equity (MV) in £ millions at fiscal year-ending as a proxy for size. US listing is expected to be positively associated with the number of analysts following the firm and negatively associated with error, dispersion in analysts' earnings forecasts and common uncertainty in information environment. US listing (LIST) is measured by a dummy variable that is equal to 1 if the firm is listed on a US market (NYSE or NASDAQ) and to 0 otherwise. Aerts *et al.* (2007) argued that forecasting earnings is more difficult for firms that experience losses, and that most analysts are reluctant to estimate earnings for loss firms (Hope, 2003a; Lakhal, 2009). Therefore, we expect to find a negative relationship between negative earnings and forecasts accuracy, and that negative earnings positively influences analysts' forecasts dispersion. Negative earnings (NEG-E) variable is measured by a dummy variable that is equal to 1 if the annual EPS is negative and to 0 otherwise. Trading volume is included in the regression model to capture potential benefits to analysts related to brokerage commissions and fees (Barth *et al.*, 2001; Bhushan, 1989; McNichols & O'Brien, 1997; Irvine, 2000; Francis & Willis, 2000). We expect to

find trading volume is positively related to the number of analysts following the firm, and hence lead to more accurate and less dispersed forecasts, and less common uncertainty in information environment. Trading volume (VOL) is measured as the log of annual number of shares traded in millions.

Finally, Earnings surprise and Analyst following are added to properties of earnings forecast regression models. Earning surprise is expected to be positively associated with forecast error, dispersion and common uncertainty in information environment as it increases the difficulty of forecasting (Aerts *et al.*, 2007; Lakhal, 2009; Lang & Lundholm, 1996; Bozzolan *et al.*, 2009). Earnings surprise (E-SURP) is measured as the absolute value of the difference between the current year EPS and last year's EPS, divided by the price at the beginning of the fiscal year. Furthermore, properties of EPS forecasts are likely to improve when more analyst reports on a firm are provided (Aerts *et al.*, 2007; Alford & Berger, 1999). Therefore, we expect a negative relationship between analyst following (# ANAL) and properties of EPS forecasts.

4. Results

4.1 Descriptive Statistics

All firms in the sample are followed by analysts (#ANAL). On average, the sample firm is followed by 15.57 analysts. Furthermore, on average, the sample firms have forecast error (ERROR) of 1.86% of its share price and forecast standard deviation (DISP) of 0.8% of its share price (see table 4). Sample firms are generally large in size (MV), as indicated by a mean market value of equity in excess of £4.7 billion. However, market value ranges from £32.3 billion to £383 million, indicating a large variability in sample size which of particular importance to the current study as the sample is limited to the FTSE 350 listed firms characterized by large capitalization. Annual trading volume (VOL) has a mean value of 559 million shares and again a wide range of 2.68 billion shares. With regard to variability of return (E-SURP), 20 firms have no change in their EPS, while the remaining firms have an earnings surprise ranging from 0.01% to 8% of stock price, with 1.94% average earnings surprise. Finally, 70 firms (25.9%) are listed on US stock exchange (LIST), and 25 firms (9.3%) have negative earnings (NEG-E).

Table 4. Descriptive statistics of dependent and control variables

Variable	Mean	S.D.	Min.	Max.	Range	Skewness	Kurtosis
# ANAL	15.57	6.794	1	33	32	.330	-.494
ERROR	0.018	0.027	0.00	0.11	0.11	20.387	40.947
DIS	0.008	0.010	0.00	0.04	0.04	20.177	30.923
UNCERT COMMON	0.322	0.283	-0.05	0.89	0.94	0.595	-0.781

Variable	Mean	S.D.	Min.	Max.	Range	Skewness	Kurtosis
MV	4,722.8	8,106.7	383.3	32,662.4	32,279.1	2.565	5.668
MV (log)	14.46	1.35	12.48	18.79	6.31	1.04	.623
VOL	559.3	718.9	20.8	2,704.4	2,683.5	1.863	2.593
VOL (log)	12.44	1.34	9.95	14.81	4.86	-0.065	-0.752
E-SURP	0.0194	0.0210	00.00	0.08	0.08	10.770	20.546

Appendix C presents simple correlations between OCR variables, dependent variables and control variables. Correlation coefficients between OCR variables and control variables range from 0.625 to -0.007. Furthermore, correlation coefficients between control variables range from 0.506 to -0.007, suggesting that multicollinearity among OCR variables and control variables might be an issue in the multivariate regression analysis. Therefore, the Variance Inflation Factor (VIF) and tolerance value are calculated. The largest VIF value is 2.606 and the lowest tolerance value is .384. These statistics reveal that multicollinearity between all independent variables in the current study is not a problem. With regard to the number of analysts, correlations are consistent across all OCR variables with coefficients significant at the 5% level. Moreover, the number of analysts following the firm is positively correlated with firm size. US listing is also found, as expected, to be positively correlated with the number of analysts following the firm.

Regarding properties of analysts' forecasts (error and dispersion in analyst EPS forecasts and common uncertainty in analyst information environment), the correlation matrix results do not support the expected relationships indicated in H_2, H_3 and H_4. Finally, the three forecast properties are significantly and positively correlated to each other suggesting that they behave similarly in relation to the quality of OCR.

4.2 Analyst following and OCR quality

Our first prediction is that analyst following is affected by the quality of OCR as measured by the OCR index. To control for other factors that can affect analyst following, we estimate the following multivariate regression model:

$$\#ANAL = \beta_0 + \beta_1 OCRvariables + \beta_2 MV + \beta_3 LIST + \beta_4 NEG\text{-}E + \beta_5 VOL + \varepsilon \quad (5)$$

Appendices D and E report results of the regression analysis. The results in column 1 (analyst following analysis) indicate a significant relationship between the total score of OCR quality and the number of analysts following the firm. The positive sign of the coefficient suggests that higher quality of OCR is related to increased analyst following. Column 2 decomposes the total score of OCR quality into its two main components, information content and accessibility of the website. Results

show that the main OCR component that drives analyst following is content richness rather than its accessibility. Column 3 further decomposes the OCR information content into financial and nonfinancial. Results suggest that analysts mainly visit corporate websites to obtain financial information.

All in all, the positive relationship between the number of analysts following the firm and the quality of OCR suggests that OCR provided by the firm complements rather than substitutes for analysts' activities. Consequently, financial analysts play the role of information intermediaries, i.e., they play a complementary role to firms in providing information directly to investors. These results are consistent with prior studies investigating different types of disclosures (Aerts *et al.*, 2007; Botosan & Harris, 2000; Lakhal, 2009; Lang & Lundholm, 1996). The coefficients on the control variables are found to be as expected and consistent with prior research. Larger firms are associated with greater analyst following as well as US listing and trading volume. We find that analyst following is negatively associated with firms incurring losses.

In the previous analysis we assumed that management chooses the level of OCR quality to partly influence analyst decision to follow their firms. Consequently, we view quality of OCR causing the observed number of analysts following firms. However, the direction of causality could be the opposite (i.e. higher analysts following convinces firms to increase the quality of their OCR to meet their information needs and keep the high rate of analyst following) or that both OCR quality and analyst following are simultaneously determined by other exogenous variables. Fama (1980) argued that financial analysis may be a crucial monitoring mechanism, analogous to that of bond rating agencies or the nonexecutive directors of a firm's board. According to Jensen and Meckling (1976), the principal-agent relationship could involve parties other than managers of the firm (i.e. agent) and investors (i.e. principals). In the context of the study, financial analysts follow firms, monitor and eventually evaluate their activities by issuing reports to investors (Fama, 1980; Gentry & Shen, 2013) and consequently managers need to improve their disclosure practices and increase the quality of OCR.

One approach to investigate the direction of causality is to examine the association between changes in OCR quality scores and changes in the lead and lag number of analysts (Lang & Lundholm, 1996). However, the current study is cross sectional, which makes this approach inapplicable. Instead, we examine the impact of analyst following on the quality of OCR using the number of analysts following firms in 2013/2014 as a dependent variable and the quality of OCR as an independent variable along with all control variables in equation (5). Results show that the number of analysts following firms has no influence on the level of OCR quality by these firms. This is consistent with Lang and Lundholm (1996) and Lakhal (2009)

who investigated the direction of causality and found that disclosure has an impact on analyst behavior but not the opposite.

We also investigated whether firm size should be modelled as an endogenous variable using the Hausman (1978) test. If MV is endogenous (i.e., correlated with the error term ε) in Equation (5), ordinary least squares (OLS) will not provide consistent parameter estimates. Specifically, we regress each of our OCR quality measures on the residuals of a first-stage regression, along with the exogenous variables. The coefficient on the residual was not statistically significant from zero, thus failing to reject the null hypothesis of exogeneity; therefore, we conclude that firm size is not endogenous to OCR quality.

4.3 Properties of Analyst EPS Forecasts

Given our findings regarding the impact of OCR quality on analyst following, a reasonable next step is to examine its impact on properties of analyst forecasts. As previously explained, we hypothesize that more OCR quality will be associated with more analyst forecast accuracy and less forecast dispersion. We also predict that common analyst uncertainty will be lower for firms with more OCR quality.

For each of these hypotheses, we estimate the following regression model:

$$\text{Forecast Properties} = \beta_0 + \beta_1\text{OCR variables} + \beta_2\#\text{ANAL} + \beta_3\text{MV} + \beta_4\text{LIST} + \beta_5\text{NEG-E} + \beta_6\text{VOL} + \beta_7\text{E-SURP} + \varepsilon. \quad (6)$$

The results in appendix D show that error in analyst forecasts is not a function of the overall quality of OCR. Results of the three models are consistent and indicate that OCR and its components are not related to error in analyst forecasts. In addition, as shown in appendix D, the main determinant of error in analysts' earnings forecasts is earnings surprise (E-SURP), which has coefficients around 0.5 and is significantly greater than zero at the 0.01 level in all models, suggesting that forecasts tend to be less accurate in cases when the forecasting task is difficult as indicated by the high level of earnings variability, which is consistent with prior studies (Aerts *et al.*, 2007; Lakhal, 2009; Lang & Lundholm, 1996; Bozzolan *et al.*, 2009; Lang *et al.*, 2003).

Results in appendix E indicate an insignificant relationship between dispersion in analysts' forecasts and all OCR variables and control variables except for trading volume and earnings surprise. Similar to error in analyst forecasts, the main determinant of dispersion in analyst EPS forecasts is earnings variability (E-SURP), suggesting that dispersion among analysts increases when changes in EPS increase. With respect to common uncertainty in analyst information environment ($\text{UNCERT}_{\text{COMMON}}$), results in appendix E show that OCR variables have no relationship with common uncertainty except for accessibility which has a negative

coefficient that is significant at .01 level. As expected, the number of analysts following the firm and firm size are found to have a negative significant association with common uncertainty. However, opposite to the hypothesized relation, trading volume is found to be positively related to common uncertainty. Earnings surprise has a positive significant relationship with common uncertainty, again with large coefficients and significant at 1%. Finally, cross listing and negative earnings are found to be insignificantly related to common uncertainty.

In general, we find that OCR quality has no influence on properties of their EPS forecasts. Consequently, hypotheses H_2, H_3 and H_4 are rejected. Although this finding is against expectation, it is consistent with studies providing evidence on the insignificant relation between different types of disclosure and properties of analyst EPS forecasts (Lang & Lundholm, 1996; Eng & Teo, 2000; Hope *et al.*, 2006; Bugeja *et al.*, 2015; Buchman & Fort, 1996).

As a sensitivity analysis, a different set of control variables were used and the same results were obtained, therefore, only results based on main control variables are presented in the study. Control variables of sensitivity analysis included: Size (measured as total sales), profitability (measured as return on equity), institutional ownership (measured as % of shares held by institutions, management ownership (measured as % of shares held by insiders, and variability of return (measured as standard deviation of daily stock returns). Furthermore, we examined whether the way the OCR variable has been disaggregated has caused the insignificant relationship between OCR components and properties of EPS forecasts. To do so, an exploratory factor analysis (EFA) by principal component was used to reclassify the content and accessibility constructs into seven and five constructs, respectively. However, the multivariate analysis (not presented in the study) resulted in an insignificant relationship between the constructs and properties of analyst EPS forecasts.

Prior studies provided evidence that herding behavior increases with the degree of difficulty of the forecasting task (Lakonishok *et al.*, 1992; Christie & Huang, 1995). Given that Earnings Surprise is the only control variable that is consistently positively significant with all properties of EPS forecasts variables, combined with the very narrow range of dispersion, we examine whether herding behavior by financial analysts in the UK has caused the insignificant relationship between OCR quality and properties of EPS forecasts. However, we find no evidence of herding behavior by financial analysts[4].

These insignificant results between OCR quality and properties of EPS forecasts could be due to the star status of financial analysts. Previous studies showed that star analysts provide more accurate earnings forecasts than non-star analysts due to

greater experience and reputation (Stickel, 1992; Bonner *et al.*, 2007) which might have affected the association between analysts following and accuracy[5].

5. Conclusion

This study examined the impact of OCR quality on two aspects of analyst behavior, their choice of which firms to follow and characteristics of their EPS forecasts as measured by error in forecasts, the degree of dispersion among forecasts and common uncertainty in the information environment. The quality of OCR is measured using a new proposed multidimensional index that focuses on both the quality and quantity of OCR.

We find that higher quality of OCR is related to increased analyst following suggesting that firms can attract analysts and reduce agency costs. Furthermore, we find that the main driver of analyst behavior financial information content provided on corporate websites. With respect to the effect of OCR quality on properties of analyst EPS forecasts, we find no association between the quality of OCR and properties of analyst EPS forecasts. Using Olsen's (1996) Herding Index, we examined whether herding behavior by financial analysts in the UK has interrupted the relationship between the quality of OCR and forecast properties and we find no evidence of such behavior.

Our findings still are subject to a number of limitations. First, the sample is limited to firms to FTSE 350 index, hence, affecting the generalizability of the results to smaller firms. Second, the study uses a self-built OCR index to measure the quality of OCR and by firms listed on FTSE 350 index. Although steps were undertaken to alleviate the subjectivity in determining the items of the checklist, it cannot be argued that the study is free of subjectivity.

References

Aerts, W., Cormier, D. & Magnan, M. (2007) "The association between web-based corporate performance disclosure and financial analyst behavior under different governance regimes", *Corporate Governance: An International Review*, vol. 15, no. 6: 1301-1329

Alford, A.W. & Berger, P.G. (1999) "A simultaneous equations analysis of forecast accuracy, analyst following, and trading volume", *Journal of Accounting, Auditing and Finance,* vol. 14, no. 3: 219-240

Andre, P., Filip, A. & Moldovan, R. (2016) "Segment disclosure quantity and quality under IFRS 8: Determinants and effect of financial analysts' earnings forecast errors", *The International Journal of Accounting, in press*

Bagnoli, M., Wang, T. & Watts, S.G. (2014) "How do corporate websites contribute to the information environment? Evidence from the US and Taiwan", *Journal of Accounting and Public Policy,* vol. 33, no. 6: 596-627

Banerjee, A.V. (1992) "A simple model of herd behavior", *The Quarterly Journal of Economics,* vol. 107, no. 3: 797-817

Barron, O.E., Byard, D., Kile, C. & Riedl, E.J. (2002) "High- technology intangibles and analysts' forecasts", *Journal of Accounting Research,* vol. 40, no. 2: 289-312

Barron, O.E., Kim, O., Lim, S.C. & Stevens, D.E. (1998) "Using analysts' forecasts to measure properties of analysts' information environment", *The Accounting Review,* vol. 73, no. 4: 421-433

Barth, M.E., Kasznik, R. & McNichols, M.F. (2001) "Analyst coverage and intangible assets", *Journal of Accounting Research,* vol. 39, no. 1: 1-34

Beattie, V. & Pratt, K. (2003) "Issues concerning web-based business reporting: An analysis of the views of interested parties", *The British Accounting Review,* vol. 35, no. 2: 155-187

Bernhardt, D., Campello, M. & Kutsoati, E. (2006) "Who herds?", *Journal of Financial Economics,* vol. 80, no. 3: 657-675

Bhushan, R. (1989) "Firm characteristics and analyst following", *Journal of Accounting and Economics,* vol. 11, no. 2: 255-274

Bollen, L., Hassink, H. & Bozic, G. (2006) "Measuring and explaining the quality of internet investor relations activities: A multinational empirical analysis", *International Journal of Accounting Information Systems,* vol. 7, no. 4: 273-298

Bonner, S.E., Hugon, A. & Walther, B.R. (2007) "Investor reaction to celebrity analysts: The case of earnings forecast revisions", *Journal of Accounting Research,* vol. 45, no. 3: 481-513

Botosan, C.A. & Harris, M.S. (2000) "Motivations for a change in disclosure frequency and its consequences: An examination of voluntary quarterly segment disclosures", *Journal of Accounting Research,* vol. 38, no. 2: 329-353

Botosan, C.A. & Stanford, M. (2005) "Managers' motives to withhold segment disclosures and the effect of SFAS No. 131 on analysts' information environment", *The Accounting Review,* vol. 80, no. 3: 751-772

Bowen, R.M., Davis, A.K. & Matsumoto, D.A. (2002) "Do conference calls affect analysts' forecasts?", *The Accounting Review,* vol. 77, no. 2: 285-316

Bozzolan, S., Trombetta, M. & Beretta, S. (2009) "Forward-looking disclosures, financial verifiability and analysts' forecasts: A study of cross-listed European firms", *European Accounting Review,* vol. 18, no. 3: 435-473

Brown, L.D. (1993) "Earnings forecasting research: Its implications for capital markets research", *International Journal of Forecasting,* vol. 9, no. 3: 295-320

Buchman, T.A. & Fort, C.P. (1996) "Alternative disclosure methods for accounting changes and analysts' earnings forecasts", *Journal of Applied Business Research,* vol. 12, no. 3: 48-59

Bugeja, M., Czernkowski, R. & Moran, D. (2015) "The impact of the management approach on segment reporting", *Journal of Business Finance & Accounting,* vol. 42, no. 3-4: 310-366

Christie, W.G. & Huang, R.D. (1995) "Following the pied piper: Do individual returns herd around the market?", *Financial Analysts Journal,* vol. 51, no. 4: 31-37

Clement, M.B. & Tse, S.Y. (2005) "Financial analyst characteristics and herding behavior in forecasting", *The Journal of Finance,* vol. 60, no. 1: 307-341

Conrad, J., Cornell, B., Landsman, W.R. & Rountree, B.R. (2006) "How do analyst recommendations respond to major news?", *Journal of Financial and Quantitative Analysis,* vol. 41, no. 1: 25-50

Cooke, T.E. & Wallace, R. (1989) "Global surveys of corporate disclosure practices and audit firms: A review essay", *Accounting and Business Research,* vol. 20, no. 77: 47-57

Debreceny, R., Gray, G.L. & Mock, T.J. (2001) "Financial reporting websites: What users want in terms of form and content", *The International Journal of Digital Accounting Research,* vol. 1, no. 1: 1-23

Dhaliwal, D.S., Radhakrishnan, S., Tsang, A. & Yang, Y.G. (2012) "Nonfinancial disclosure and analyst forecast accuracy: International evidence on corporate social responsibility disclosure", *The Accounting Review,* vol. 87, no. 3: 723-759

Eng, L.L. & Teo, H.K. (2000) "The relation between annual report disclosures, analysts' earnings forecasts and analyst following: Evidence from Singapore", *Pacific Accounting Review,* vol. 11, no. 1/2: 219-239

Fama, E.F. (1980) "Agency problems and the theory of the firm", *The Journal of Political Economy,* vol. 88, no. 2: 288-307

Francis, J. & Willis, R. (2000) "A multivariate test of incentive, selection and judgmental explanations for analyst bias", *working paper, Duke University*

Gentry, R.J. & Shen, W. (2013) "The impacts of performance relative to analyst forecasts and analyst coverage on firm R&D intensity", *Strategic Management Journal,* vol. 34, no. 1: 121-130

Hausman, J.A. (1978) "Specification tests in econometrics", *Econometrica: Journal of the Econometric Society,* vol. 46, no. 4: 1251-1271

Healy, P.M., Hutton, A.P. & Palepu, K.G. (1999) "Stock performance and intermediation changes surrounding sustained increases in disclosure", *Contemporary Accounting Research,* vol. 16, no. 3: 485-520

Healy, P.M. & Palepu, K.G. (2001) "Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature", *Journal of Accounting and Economics,* vol. 31, no. 1: 405-440

Hodder, L., Hopkins, P.E. & Wood, D.A. (2008) "The effects of financial statement and informational complexity on analysts' cash flow forecasts", *The Accounting Review*, vol. 83, no. 4: 915-956

Hodge, F. & Pronk, M. (2006) "The impact of expertise and investment familiarity on investors' use of online financial report information", *Journal of Accounting, Auditing & Finance*, vol. 21, no. 3: 267-292

Hope, O.K. (2003a) "Accounting policy disclosures and analysts' forecasts", *Contemporary Accounting Research*, vol. 20, no. 2: 295-321

Hope, O.K. (2003b) "Disclosure practices, enforcement of accounting standards, and analysts' forecast accuracy: An international study", *Journal of Accounting Research*, vol. 41, no. 2: 235-272

Hope, O.K., Thomas, W.B. & Winterbotham, G. (2006) "The impact of nondisclosure of geographic segment earnings on earnings predictability", *Journal of Accounting, Auditing & Finance*, vol. 21, no. 3: 323-346

Irvine, P.J. (2000) "Do analysts generate trade for their firms? Evidence from the Toronto stock exchange", *Journal of Accounting and Economics*, vol. 30, no. 2: 209-226

Jensen, M.C. & Meckling, W.H. (1976) "Theory of the firm: Managerial behavior, agency costs and ownership structure", *Journal of Financial Economics*, vol. 3, no. 4: 305-360

Krishnan, M., Lim, S. and Zhou, P. (2005) "Who Herds? Who Doesn't?", Available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=850625 (last accessed 21 August 2013)

Lakhal, F. (2009) "Does corporate disclosure policy change financial analysts' behavior? Evidence from France", *Journal of Accounting & Organizational Change*, vol. 5, no. 3: 344-361

Lakonishok, J., Shleifer, A. & Vishny, R.W. (1992) "The impact of institutional trading on stock prices", *Journal of Financial Economics*, vol. 32, no. 1: 23-44

Lang, M.H., Lins, K.V. & Miller, D.P. (2003) "ADRs, analysts, and accuracy: Does cross listing in the United States improve a firm's information environment and increase market value?", *Journal of Accounting Research*, vol. 41, no. 2: 317-345

Lang, M.H. & Lundholm, R.J. (1996) "Corporate disclosure policy and analyst behavior", *The Accounting Review*, vol. 71, no. 4: 467-492

Lehavy, R., Li, F. & Merkley, K. (2011) "The effect of annual report readability on analyst following and the properties of their earnings forecasts", *The Accounting Review*, vol. 86, no. 3: 1087-1115

Liu, C., Wang, T. & Yao, L.J. (2014) "XBRL's impact on analyst forecast behavior: An empirical study", *Journal of Accounting and Public Policy*, vol. 33, no. 1: 69-82

Lobo, G.J., Song, M. & Stanford, M. (2012) "Accruals quality and analyst coverage", *Journal of Banking & Finance*, vol. 36, no. 2: 497-508

LSE (2010) *Investor relations: A practical guide*, London Stock Exchange, London

Marston, C.L. & Shrives, P.J. (1991) "The use of disclosure indices in accounting research: A review article", *The British Accounting Review*, vol. 23, no. 3: 195-210

McNichols, M. & O'Brien, P.C. (1997) "Self-selection and analyst coverage", *Journal of Accounting Research*, vol. 35: 167-199

Moore, G.C. & Benbasat, I. (1991) "Development of an instrument to measure the perceptions of adopting an information technology innovation", *Information Systems Research*, vol. 2, no. 3: 192-222

Olsen, R.A. (1996) "Implications of herding behavior for earnings estimation, risk assessment, and stock returns", *Financial Analysts Journal*, vol. 52, no. 4: 37-41

Pirchegger, B. & Wagenhofer, A. (1999) "Financial information on the internet: A survey of the homepages of Austrian companies", *European Accounting Review*, vol. 8, no. 2: 383-395

Plumlee, M.A. (2003) "The effect of information complexity on analysts' use of that information", *The Accounting Review*, vol. 78, no. 1: 275-296

Quagli, A. & Riva, P. (2005) *Do financial websites meet the users' information needs? a survey from the Italian context*, Available at SSRN: http://ssrn.com/abstract=863744 (last accessed 1 June 2011)

Ramnath, S., Rock, S. & Shane, P. (2008) "The financial analyst forecasting literature: A taxonomy with suggestions for further research", *International Journal of Forecasting*, vol. 24, no. 1: 34-75

Rogers, R.K. & Grant, J. (1997) "Content analysis of information cited in reports of sell-side financial analysts (digest summary)", *Journal of Financial Statement Analysis*, vol. 3, no. 1: 17-30

Rowbottom, N. & Lymer, A. (2009) "Exploring the use of online corporate reporting information", *Journal of Emerging Technologies in Accounting*, vol. 6, no. 1: 27-44

Scharfstein, D.S. & Stein, J.C. (1990) "Herd behavior and investment", *The American Economic Review*, 80(3): 465-479

Schipper, K. (1991) "Analysts' forecasts", *Accounting Horizons*, vol. 5, no. 4: 105-121

Stickel, S.E. (1992) "Reputation and performance among security analysts, *Journal of Finance*, vol. 47, no. 5: 1811-1836

Stickel, S.E. (1990) "Predicting individual analyst earnings forecasts", *Journal of Accounting Research*, vol. 28, no. 2: 409-417

Trueman, B. (1994) "Analyst forecasts and herding behavior", *Review of Financial Studies*, vol. 7, no. 1: 97-124

Xiao, J.Z., Yang, H. & Chow, C.W. (2004) "The determinants and characteristics of voluntary internet-based disclosures by listed Chinese companies", *Journal of Accounting and Public Policy*, vol. 23, no. 3: 191-225

Appendices

Appendix A. Variables Definition

OCR	=	Total online corporate reporting index.
Content	=	Online corporate reporting information content index.
Accessibility	=	Online corporate reporting accessibility index.
Financial	=	Online corporate reporting financial information index.
Nonfinancial	=	Online corporate reporting nonfinancial information index.
# ANAL	=	The number of analyst following the firm at fiscal year-end three months after the measurement of online corporate reporting quality, obtained from I/B/E/S.
ERROR	=	Error in the analysts' EPS forecasts at fiscal year-end three months after the measurement of online corporate reporting quality, measured by the absolute value of the analyst forecast error, deflated by stock price (i.e., (|EPSt – AFt|)/Pt, where EPSt, AFt and Pt are earnings per share the median analyst forecast of earning per share obtained from I/B/E/S and price per share in period t, respectively).
DIS	=	Dispersion in analysts' EPS forecasts at fiscal year-end three months after the measurement of online corporate reporting quality, measured as the analyst forecast standard deviation deflated by stock price, obtained from I/B/E/S.
$UNCERT_{COMMON}$	=	Common uncertainty in analysts' information environment at fiscal year-end three months after the measurement of online corporate reporting quality, defined using the following equations derived by Barron *et al.* (1998).
MV	=	Firm size, proxied by the market value of equity in £ millions and is measured as the number of shares outstanding times the share price as at fiscal year-end prior to the measurement of online corporate reporting quality.
LIST	=	US listing that is measured by a dummy variable that is equal to 1 if the firm is listed on a US market (NYSE or NASDAQ) and 0 to otherwise.
NEG-E	=	Negative earnings variable that is measured by a dummy variable that is equal to 1 if the annual EPS is negative and to 0 otherwise.
VOL	=	The log of trading volume at fiscal year-end prior to the measurement of online corporate reporting quality, measured as the annual number of shares traded in millions.
E-SURP	=	Earnings surprise at fiscal year-end prior to the measurement of online corporate reporting quality, measured as the absolute value of the difference between the current year's EPS and last year's EPS, divided by the price at the beginning of the fiscal year.

Appendix B. Thematic multidimensional OCR index

Date	Company	Richness	Content	Presentation	Accessibility	Language And currency	Total score
Main category	Subcategories						
About us	Strategy	• A Clear statement of the company's strategy which explains how the company generates or preserves value over the longer term • The order in which the company prioritize their strategic objectives. • A review of achievement of strategic objectives • disclosure of any failure to meet objectives and reasons why, or any changes in strategy and the reasons why the Board has made these changes • Support qualitative statements with quantitative evidence (e.g., Key performance indicators KPI).					
	Company history	• Detailed Information or General Outline					
	Product or service information	• Description of products or services provided • Clear statement of the company's future products or services, supported by quantitative evidence (e.g., R&D cost, return on R&D, number of products or services approved by)					
	Information about markets	• Description of the company's markets, and competitive position (Drivers, trends, competitors). • Identification of growth opportunities. • Support qualitative statements with quantitative evidence.					
	Fact sheet	• Key information at a glance or company statistics.					
Corporate Governance	UK corporate governance code compliance	• A clear statement of the company's corporate governance framework • Statement of compliance, where there has been non-compliance, a clear statement of the reasons why the Board decided not to comply.					
	Board of Directors	• Chairman's message • Photos • Biographies • Interviews • Roles and responsibilities • How performance evaluation of the board, its committees and its individual directors has been conducted					
	Board committees	• Roles and responsibilities • Attendance of meetings and activities performed					

Date / Main category	Company / Subcategories	Richness	Content	Presentation	Accessibility	Language And currency	Total score
	Senior Management	• Photos • Biographies. • Roles and responsibilities					
	Risk management	• Discussion of the key risks and uncertainties • Identify external risks (which may not be controllable by management) and internal risks (which should be controllable) • How management have addressed key risks in order to minimize their impact on performance, or to exploit them to gain competitive advantage					
News &Events	News releases		+ archival record		search tools (by date, category, search engine) • e-mail registration for latest news		
	Regulatory (stock exchange) announcements		+ archival record		Search tools (by date, category, search engine)		
	Financial calendar				An event reminder signup facility so users can be notified by e-mail. downloadable to personal calendars		
Share and Dividends Information	Detailed share information	• Listing information • Latest price • trading volume • Day high • Day low • Year/Month high • Year/Month low • Day change • Dividend yield ratio • P/E ratio • Market capitalization • Other share information • Share price through the day (every 30 minutes)	+ archival record		Interactive charts (Allow comparison with peers, indices, different listing, control of time frame) Share price calculator (Current value calculator, Historic Share price calculator, change in value of your holding calculator)		
	Dividends information	• Policy • Latest payment	+ archival record		Dividends calculator		
d e r	AGM information	• Chairman's AGM speech	+		e-voting		

Date	Company	Richness	Content	Presentation	Accessibility	Language And currency	Total score
Main category	Subcategories						
		• Notice of meeting • Voting poll results • Frequently asked questions	archival record				
	Shareholder profile	• Analysis of shareholders by category • Analysis of shareholders by range of shareholdings • Analysis of shareholders by geographical region • Analysis of shareholders by substantiality of shareholding in the company					
	Registrar contact details	• Contact details, forms and links to sites					
	Analyst information	• Names of analysts following the firm • Consensus figures for analysts forecasts • Contacts					
	Investor FAQ						
	IR contact details	• Investor relations personnel • Address • E-mail address • Phone number					
	Detailed debt information	• Outstanding debts (Issuer, issue date, currency, amount, coupon rate, and maturity date) • Debt bank facilities • Credit ratings					
Corporate responsibility		• Corporate responsibility report • Corporate responsibility review • Standalone corporate responsibility reports (environment, people safety and health, society) • Details of the scope, membership, and activities of the corporate responsibility committee reporting to the board. • A statement of company policy (guidelines or approach) covering areas such as energy consumption, employment, recycling waste, carbon emissions, water consumption, human rights, product responsibility, bribery, corruption, and sponsorship. • A statement of management objectives and performance targets (e.g. reduce water consumption by x %, increase key staff retention by y %) • A detailed review of how the relevant policies are linked to environmental and social performance (programmes, affiliations and engagements with organizations, sponsorships).					

Date / Main category	Company / Subcategories	Richness	Content	Presentation	Accessibility	Language And currency	Total score
		• A note on any pending litigation/fines on environmental, health and safety issues or any other matter by amounts • Indices and benchmarks to help recognize performance against key criteria • Business code of conduct • Independent assurance on corporate responsibility report • CR Contacts.					
Published reports and results		• Annual review, including Key performance indicators and ratios • Preliminary results • Annual report • Half yearly report • Quarterly reports • Financial statements • Other stock exchanges filings (listed on LSE only = 1) • Presentations to investors and analysts • Other standalone reports.	+ archival record				
Website Accessibility		• Website in multiple languages • Tracking navigation at the top of the page to provide visitors with an easy reference for the current position on the site. Users should be able to see where they are on the website at all times.(e.g., Home>investor relations>corporate Governance). • A mobile version of the company's website. • Social media interaction. • Sharing technology on key pages which allows users to select information they wish to share widely through social media bookmarking or individually via email • Flag latest updates on homepage. • Provide multiple points of entry to investor information (navigation, related information, useful links, etc.). • SSR content feeds tool.					
		• Content personalization gives users the ability to create tailored pages, move content elements around, create their own menu structure or add electronic notes to pages. • Bookmarking pages • Online Information request service					

Date / Main category	Company / Subcategories	Richness	Content	Presentation	Accessibility	Language And currency	Total score
		• Shareholder e-communication (Access details of individual shareholding quickly and securely online; Change details online; receive important shareholder communications by e-mail or on the website; Arrange for any dividend payments) • Internal search engine on home page • Site map					

Appendix C: Correlations among OCR variables, dependent variables and control variables

	OCR	Content	Accessibility	Financial	Non-financial	# ANAL	ERROR	DIS	UNCERT COMMON	MV	LIST	NEG-E	VOL
OCR													
Content	.904**												
Accessibil	.711**	.687**											
Financial	.827**	.945**	.616**										
Non-financial	.840**	.854**	.816**	.659**									
# ANAL	.488**	.531**	.343**	.520**	.430**								
ERROR	.091	.070	.009	.019	.102	-.001							
DIS	.078	-.004	.011	-.064	.075	.002	.644**						
UNCERT COMMON	-.046	-.063	-.116	-.084	-.054	-.174**	.508**	.186**					
MV	.473**	.505**	.320**	.491**	.417**	.605**	-.007	-.018	-.201**				
LIST	.429**	.468**	.281**	.473**	.354**	.546**	-.041	-.062	-.104	.597**			
NEG-E	.032	-.055	-.039	-.069	-.027	-.092	.273**	.348**	.184**	-.082	-.044		
VOL	.495**	.516**	.356**	.491**	.446**	.625**	.083	.131*	.161**	.502**	.523**	.105	
E-SUR	.018	.037	-.036	.015	.028	-.007	.610**	.443**	.363**	-.072	-.102	.254**	.135*

*, **, *** p <0.10, p <0.05 and p <0.01, respectively.

Appendix D: Regression of the number of analysts following the firm and error in analysts' EPS forecasts on OCR variables and control variables

	Analyst following			Error in analyst EPS forecasts		
	1	2	3	1	2	3
	OCR model	Content and Accessibility model	Financial and Nonfinancial model	OCR model	Content and Accessibility model	Financial and Nonfinancial model
Intercept	-- (-3.958)***	-- (-3.891)***	-- (-3.986)***	-- (-7.966)***	-- (-8.068)***	-- (-7.857)***
OCR	.135 (2.626)***			.032 (.485)		
Content		.170 (2.679)***			.168 (2.073)**	
Accessibility		-.013 (-.239)			-.192 (-2.712)***	
Financial			.141 (2.243)**			-.002 (-.026)
Non-financial			.032 (.517)			.015 (.183)
# ANAL				-.065 (-.830)	-.069 (-.887)	-.061 (-.772)
MV	.268 (4.745)***	.264 (4.716)***	.265 (4.730)***	.097 (1.299)	.095 (1.290)	.101 (1.350)
LIST	.130 (2.348)**	.119 (2.139)**	.118 (2.112)**	-.063 (-.878)	-.074 (-1.038)	-.061 (-.842)
NEG-E	-.112 (-2.610)**	-.098 (-2.289)**	-.095 (-2.226)**	-.085 (-1.504)	-.083 (-1.488)	-.084 (-1.483)
VOL	.368 (6.770)***	.360 (6.614)***	.361 (6.654)***	.089 (1.156)	.103 (1.360)	.093 (1.199)
E-SURP				.554 (9.857)***	.544 (9.792)***	.554 (9.824)***
N	267	267	267	249	249	249
Adj. R2	0.541	0.546	0.548	.314	.335	.314
**, *** p <0.05 and p <0.01, respectively.						

Appendix E: Regression of dispersion in analysts' EPS and common uncertainty in analyst information environment on OCR variables and control variables

	Dispersion in analyst EPS forecasts			Common uncertainty in analyst information environment		
	1	2	3	1	2	3
	OCR model	Content and Accessibility model	Financial and Nonfinancial model	OCR model	Content and Accessibility model	Financial and Non-financial model
Intercept	-- (-13.715)***	-- (-13.560)***	-- (-13.408)***	-- (-3.676)***	-- (-3.771)***	-- (-3.777)***
OCR	.092 (1.371)			-.058 (-.860)		
Content		.024 (.288)			.101 (1.205)	
Accessibility		.017 (.234)			-.195 (-2.645)***	

	Dispersion in analyst EPS forecasts			Common uncertainty in analyst information environment		
	1	2	3	1	2	3
	OCR model	Content and Accessibility model	Financial and Nonfinancial model	OCR model	Content and Accessibility model	Financial and Non-financial model
Financial			-.027 (-.322)			.037 (.452)
Non-financial			.068 (.824)			-.100 (-1.200)
# ANAL	-.036 (-.454)	-.027 (-.330)	-.026 (-.321)	-.312 (-3.859)***	-.316 (-3.940)***	-313 (-3.851)***
MV	-.015 (-.201)	-.003 (-.038)	-.005 (-.069)	-.209 (-2.705)***	-.218 (-2.869)***	-.208 (-2.698)***
LIST	-.090 (-1.223)	-.086 (-1.159)	-.082 (-1.108)	-.001 (-.011)	-.011 (-145)	-.005 (-.066)
NEG-E	.019 (.331)	.022 (.372)	.022 (.377)	-060 (-1.031)	-.060 (-1.045)	-.062 (-1.066)
VOL	.259 (3.314)***	.272 (3.460)***	.268 (3.403)***	.459 (5.812)***	.467 (5.968)***	.466 (5.868)***
E-SURP	.425 (7.443)***	.425 (7.384)***	.424 (7.389)***	.295 (5.089)***	.286 (4.983)***	.296 (5.110)***
N	250	250	250	248	248	248
Adj. R2	.288	.283	.285	.275	.294	.277
**, *** p <0.05 and p <0.01, respectively.						

[1] 51 investment trusts and 10 real estate investment trusts were excluded at the beginning of the sampling process to leave a sample of 290 firms. During measurement of OCR period (12 months) 17 firms were eliminated from the list (5 firms demerged to form new firms, 5 firms were acquired and ceased to exist, 5 firms were delisted from the 350 FTSE index and 2 firms listed their voting shares in addition to their no-vote shares. Finally, data for 2 firms were unavailable and consequently were eliminated; resulting in a final sample size of 270 firms representing 35 different industries.

[2] To obtain weights attached to individual disclosure items, an online questionnaire was sent to 631 financial analysts. A list of analysts in the UK was obtained by scanning websites of FTSE All-Share listed firms during February 2012. The first e-mail invitation was sent on 29 May 2012, followed by two fortnightly reminders to individuals who had not yet submitted a response. So, the survey link was closed on 15 July 2012. The questionnaire primarily used closed-ended questions; composed of 5 points Likert-style rating scale questions, where very useful were rated "5" and Not at all useful rated "1". A total of 39 usable responses were received representing a response rate of 6.18%.

[3] A relative score means that the denominator in equations 1 and 2 (the maximum total OCR score to be obtained by a firm) are different to reflect the fact that some firms are US listed and others are not. While firms that are listed on US stock exchange market have a maximum total OCR score of 123, compared to 122 for firms listed on London stock exchange only. This is to prevent firms that are not listed on US stock exchange from being penalised for nondisclosure of "other stock exchange fillings" item.

[4] Many studies documented the existence of a practice whereby analysts issuing a forecast after other analysts tend to drift towards the consensus in order to conform (Scharfstein & Stein, 1990; Stickel, 1990; Banerjee, 1992; Trueman, 1994; Krishnan *et al.*, 2005; Clement & Tse, 2005; Bernhardt *et al.*, 2006). Herding is expected to increase with the increase in earnings forecasting difficulty. Using Olson's (1996) herding index, herding index values were generated by separating the sample firms into two equally weighted groups on the basis of EPS stability index (I/B/E/S provides a measure of

stability of the last five years actual EPS values. This was used as a proxy for earnings predictability). Analyst estimates of annual EPS forecasts for the sample were obtained from I/B/E/S from 2004 to 2013, yielding 2,700 firm-year observations. Two mean t-test provided evidence that the two herding index of groups 1 and 2 are not significantly different at 5% level indicating that no existence of herding behaviour by analysts following UK listed firms.

[5] Data on star status of financial analysts were not available; therefore, we could not examine this assumption.