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Quantity versus Quality:
The Impact of Environmental Disclosures on the Reputations of UK Plcs

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ABSTRACT

The theoretical framework of this paper integrates quality-signalling theory and the resource based view of the firm to test the differential effects of the quantity and quality of environmental disclosures on the firm's environmental reputation. Uniquely, the study uses a quality-adjusted method of content analysis, so that sentences are not merely counted but also weighted to reflect their likely significance. Investments in research and development and diversification, as potential methods of enhancing of environmental reputation, are also considered. In doing so the paper complements and extends the work of Toms (2002). The results confirm the framework and models tested in the original paper on more recent data and also suggest that quality of environmental disclosure rather than mere quantity has a stronger effect on the creation of environmental reputation amongst executive and investor stakeholder groups. Research and development expenditure, and under certain circumstances, diversification, also add to reputation.

INTRODUCTION

This paper presents a comparison between qualitative and quantitative measures of environmental activity, as disclosed in annual reports and compares their relative impact on the environmental reputation of the company. Such a comparison is useful for the purpose of establishing whether or not managers can use quality signals to create environmental reputation or whether this reputation and intermediate disclosure activities merely follow from the principal objective features of the organisation, such as size, activities and so on. Intuition and theoretical linkages between the intangible resource base of the firm and the ability of the firm to offer genuine qualitative signals to the most powerful stakeholder groups, suggest the qualitative nature of environmental disclosure, as opposed to mere volume, is more likely to enhance the environmental reputation of the firm. This proposition follows from prior survey research reported in this journal by Toms (2002), which established that qualitative disclosures are strongly linked to reputation enhancement. Although Toms (2002) showed that narrative lacking in verifiable content lacked credibility, it did not reveal an impact for the volume of environmental disclosure, regardless of its qualitative content. At the same time, however, it has been recognised that dependence on simple number of disclosures might be misleading (Frost & Seamer, 2002).

The principal objective of this paper is, therefore, to compare the impact of the extent of total environmental responsibility disclosures with the effects of specific quality signals. In an area of financial reporting dominated by voluntarism, these are the generic options available to managers about how to report the impact of organisational activities on the environment. These might range from generalised narrative on the one hand, to highly specific and costly to imitate quality signals on the other. But which type of environmental disclosures should managers select in

order to enhance the environmental reputation of the business? Re-testing the Toms (2002) model with reference to both types of disclosure will provide answers to this question.

A second important justification for the paper is the relative neglect of the relationship between disclosure and reputation. Studies investigating the social disclosure and financial performance relationship are much more common, but in aggregate are inconclusive or neutral (Ullmann, 1985, McWilliams & Siegel, 2001) or where the association appears positive, is mediated by the effects of reputation (Orlitzky *et al*, 2003). Other studies have investigated the reputation and financial performance link and found a stronger association (Herremans *et al*, 1993, Roberts & Dowling, 2002, Toms, 2000). In view of the commonality of the disclosure and reputation link in both these lines of prior research, and the relative lack of evidence on the direct relationship between the two, and the poor performance of financial variables, this study fills a significant gap and extends the research agenda.

An important feature of the Toms (2002) was the use of the Resource Based View (RBV). According to this approach, there are a large number of potentially valuable and difficult to replicate assets that might lead to enhanced reputation, including environmental reputation. The empirical models in the Toms (2002) paper did not attempt to include all possible relevant variables in this respect, and the current paper therefore aims to extend the research by including two that are of potential importance. First, research and development (R&D) has been shown to be important in other aspects of corporate social and environmental responsibility (McWilliams & Siegel, 2000). Second and in similar vein, corporate diversification has been shown to be an important managerial variable affecting competitive advantage (Markides & Williamson, 1996), but has not been incorporated into social

and environmental accounting research. Arguably, it is important to do so, since the more lines of business engaged in, the more likely that the need for social and environmental disclosures will arise. A secondary objective of the current paper is, therefore, to extend the Toms (2002) model to include these potentially relevant variables.

The remainder of this paper is organised as follows. The next section provides a brief outline of the prior literature relating to the relationship between corporate environmental disclosure and corporate environmental performance, as measured by environmental reputation. The research hypothesis is then developed and is followed by a discussion of the samples and tests. The results are then analysed. Finally, a concluding section discusses the implications of the results.

DETERMINANTS OF ENVIRONMENTAL REPUTATION: THEORY AND EMPIRICAL EVIDENCE

Reviewing research into the relationship between social disclosure and social performance, Ullmann (1985) notes the lack of theorising and that the field has been dominated by empirical studies, which has produced inconsistent results. Gray *et al.* (1995) suggest several theoretical perspectives including economic theory studies. Whilst Gray et al suggest some valid criticisms of this approach and in particular the positive accounting approach and specifically the political cost hypothesis (Milne 2002) primarily on methodological grounds, the principal weaknesses highlighted and addressed in our paper are twofold. First, economic theory studies have tested only a narrow range of hypotheses particularly the impact of size and hence public profile. Second, the approach assumes that managers are attempting to stave off the regulatory threat and so avoid political costs. In practice any empirical test of propositions about size, public profile and political costs are difficult to distinguish from tests based on

alternative theoretical positions such as legitimacy theory (Milne, 2002). Instead of basing our hypotheses on what managers are trying to avoid happening, we concentrate instead on what they are actually doing in the firm to create heterogeneous resources to sustain competitive advantage in the form of enhanced reputation. By linking these actions to disclosure strategy, we extend the economic theory approach beyond positive accounting theory and seek to generate new empirical results.[1]

An important aspect linking corporate strategy, and disclosure strategy is a theoretical framework based on quality signalling (Toms, 2002). Stated briefly, this is founded on the notion that managers investing in activities likely to create environmental reputation will not be able to realise the value of reputation assets without making associated disclosures. The likely characteristics of such disclosure follows from the quality signalling literature (Akerlof, 1970; Spence, 1973) which suggests that signals will be of higher quality where costly and difficult to replicate. Toms (2002) uses this approach to link quality signalling using accounting disclosure to the RBV. If the link is to be maintained, it is more likely to exist where shareholders are active in monitoring disclosures. The Toms (2002) framework therefore also included governance variables to examine the inter-mediation of these factors.

Empirical tests of the Toms (2002) framework suggested a positive relationship between disclosure and performance measured by reputation outcome, with mediating variables such as firm size, industry grouping, systematic risk, and diverse institutional share ownership also promoting environmental reputation. To test the quality signalling aspect of the framework the study used a disclosure level scoring system based on a qualitative hierarchy of disclosure adapted from Robertson and Nicholson (1996). The system gives greater weight to quantitative and verifiable

disclosures, which are of higher quality as disclosures in a signalling framework due to the difficulty of replication, and less weight to general rhetoric, which by definition is easier to replicate. Using this system, the hypothesis of a positive relationship between the quality of environmental disclosure and environmental reputation was supported. However, the study ignored the possibility of a similar relationship between quantity of environmental disclosure measured by normal content analysis procedures and environmental reputation. In the context of the earlier study by Toms (2002), the main purpose of this paper is to examine the relative significance of qualitative and quantitative disclosures.

A further objective is to extend the basic model suggested in Toms (2002) to examine whether or not significance can be attributed to variables omitted from that study. There are good reasons to suppose that this might be the case. A recent study (McWilliams & Siegel, 2000, p.605) suggests that R&D and corporate social performance are positively correlated, since many aspects of corporate social responsibility create either a product innovation, or process innovation, or both. It would therefore seem that investment in R&D is likely to assist in the creation of environmental reputation. This may seem counter-intuitive, for example in cases where research-based firms are involved in apparently unethical activities. McWilliams and Siegel suggest that involvement in R&D increases the firm's involvement in social responsibility, for example because there is greater investment in attracting and retaining skilled labour. However, this does not address the question of purely environmental responsibility. Leaving aside managerial motives, ethical or otherwise for investment in R&D, the hypothesis remains, tested below, that the capital intensity that characterises research-based organisations increases relative

environmental responsibility through selection of process technology that is the most modern and therefore more probably environmentally friendly.

Another potentially important variable neglected in the original study is corporate diversification. Diversification may allow a business to obtain privileged access to skills, resources, assets, or competencies that cannot be purchased by non-diversifiers in a competitive market or replaced by some other asset that can be purchased competitively (Markides & Williamson, 1996). Additionally, diversification offers many basic advantages (Mintzberg *et al*., 1995). First, diversification encourages the efficient allocation of capital resources among the divisions. Second, by opening up opportunities to run individual businesses, diversification helps to train general managers. Third, by reducing dependence on one product or market, diversification spreads business risks and the consequences of those risks across different markets. Therefore diversification provides firms with a shield against downturns in single products or markets that some investors might welcome (Bettis & Hall, 1982). Such advantages, if believed by firms' constituents, suggest that related diversification enhances firms' reputations. Where there is less relatedness in diversification the effect is expected to be negative (Rumelt, 1974). Because a measure of relatedness is ideally required rather than a linear or even weighted measure of diversification, it may follow that empirical surveys are unlikely to quantify a precise relationship (Fombrun & Shanley, 1990). Moreover, diversification effects have not been explored hitherto in the environmental-related performance literature. Applying the framework set out by Toms (2002) this factor is important in a quality-signalling context because it widens the resource base and increases the likelihood within the base that managers will invest in reputation creating assets and report them through divisional accountability structures. Also,

from the perspective of quantitative content analysis, the greater the range of the firm's activities the greater is the potential range of activities that must be explained in order to develop and protect environmental reputation. At the same time if the diversification threatens to damage reputation, where it is for example from low to high environmental impact activities, increased accounting disclosures may be required to mitigate the potential impact on reputation.

METHODOLOGY, DATA AND SAMPLE

The methodology adopted in the conduct of this study is the same as outlined in Toms (2002). In order to replicate and extend the study along the lines discussed above, data was collected for the variables common to both studies and measured in the same way. The initial sample population chosen for this study included all companies covered by the *Management Today* Britain's 'Most Admired Companies (MAC)' 2000 survey in terms of 'community and environmental responsibility'. A total of 239 companies were listed in this survey. Financial variables were obtained from *Datastream* and the London Business School *Risk Management Service*. The sample was reduced due to missing data on *Datastream*, and elsewhere for example caused by deletions in cases of subsequent mergers and the inappropriateness of certain ratios in the balance sheets of financial companies. For the latter reason banking and financial sectors were left out of the study. In total therefore, the sample consists of 139 companies, which appeared on MAC published survey of environmental reputation, and for which data was available for all appropriate variables.

Corporate environmental reputation (CER) data was collected from the UK MAC survey for 2001. Each annual survey contains all the FTSE100 British companies and, on average, 90% of the top 200 companies by market capitalisation.

The sample companies are the largest by market capitalisation from each of 26 sectors. Each year Britain's MAC survey asks senior executives from 260 British companies and senior specialist business analysts to give a rating of the performance of each company, other than their own in the case of executives, within their industrial sector. They provide a score of 0 (= poor) to 10 (= excellent) for each of nine characteristics that impact on the major stakeholders, including CER, the variable of interest for this study. The CER variable is the average score derived from the individual ratings of executives and analysts combined.

Following the discussion above, the study also contains additional variables to measure disclosure (DISC). In all three underlying disclosure measures were constructed, a qualitative measure, following Toms (2002), a quantitative measure and a hybrid measure and in all three cases to test the proposed cause and effect relation, disclosure variables were lagged by one year.

Quality scores were identified by sentence according to the scheme described by Toms (2002, p.266). The best example was used to score the signal of each company. As suggested by Toms (2002), because disclosure is quantified, imitation is difficult where commitment to environmental programmes is not genuine and, where quantified, disclosures are more likely to represent actual activities. Further disclosure at lower levels where imitation is possible, is unlikely to add further value to reputation. More rhetorical disclosures tend to mirror activities and are by definition relatively cheaper than disclosures reflecting costly to imitate activities, and can therefore be made in large volume, leading to higher scores using standard content analysis.[2]

The quantitative disclosure score was based on content analysis. This allowed the codification of text into categories based on pre-selected criteria of environmental

disclosure. The number of sentences was used to capture the total amount of environmental information within the corporate annual reports. Sentences are far more reliable as a basis for coding than any other unit of analysis (Milne & Adler, 1999). Sentences are easily identified and less subject to inter judge variation than phrases, clauses, or themes (Ingram & Frazier, 1980, p.617). Sentences overcome the problems of allocation of portions of pages and remove the need to account for, or standardise, the number of words and are a more natural unit of written English to count than words (Hackston & Milne, 1996). The percentage of total amount of environmental disclosure for each company is then obtained by dividing total environmental sentences by approximated total sentences in the corporate annual report. The total number of sentences used to measure disclosure volume in the current paper was the aggregate from the classified sentences used by Salama (2003) following the schematic approach of Hackston and Milne (1996). For the purposes of testing below, two variables were used, the total number of environmental sentences (TES) in each report and the percentage of each report devoted to environmental disclosure, defined as TES divided by the total number of all sentences (TESA).

Finally the data set was extended to create a quality-adjusted measure of disclosure quantity. To do this *all* sentences in each report were coded by each of the three coders using the scheme described by Toms (2002, p.266). The quality score for every sentence in each report was added to compute an aggregate variable. For the purposes of the analysis below the resulting variable is referred to the quality weighted environmental disclosure (QWED).

Each method for measuring disclosure was subjected to testing for inter-coder agreement, using differing alpha co-efficient of agreement according to the underlying data. For QUAL a sample of 60 reports was used with three coders identifying the

best example on the quality scale for each report (similar to the approach in Toms, 2002, p.269, n3). Note at this stage there is no requirement for the sentences selected by each coder to be the same, as it is likely that there are several instances of sentences achieving the same threshold score. The alpha co-efficient was calculated according to the method outlined by Krippendorff (1980, pp.138-139). For the TES variable, reproducibility was tested for a sample of reports on the sentence totals by the three coders using the definition provided by Waltz *et al* (1991, p.166). Finally to validate the coding process for the QWED variable, an alpha co-efficient was calculated according to the method outlined by Krippendorff, (1980, pp.138-139), this time applying it to all the sentences within a single report. For the purposes of reliability testing, single reports containing more than 100 sentences in section headings including the word 'environmental' were selected. Each sentence was coded using the 0 to 5 qualitative scale by each coder.

In all cases alpha values of 85% and above were achieved. In the case of the QWED variable three rounds of testing were required to achieve this level of agreement. As in the Toms (2002, see table 1 for specific examples) survey the following categories were used in the 0 to 5 qualitative scale. No disclosure = 0; General rhetoric = 1; Specific endeavour; policy only = 2; Specific endeavour or intent, policy specified = 3; Implementation and monitoring, use of targets references to outcomes, but quantified results not published = 4; implementation and monitoring; use of targets, quantified results published = 5. Because all sentences were coded to compute the QWED variable, as opposed to identifying the best example in the case of the QUAL variable, some further refinement was necessary. Between the rounds extensive discussions took place to establish precise coding rules. Lead in sentences, without reference to the environment in themselves, but introducing environmental

content, were counted as zeros. Policy specification (3) and implementation and monitoring statements (4) were distinguished further so that statements of intent were scored at 3 and statements of achievement were scored at 4. The 0 to 5 qualitative scale list set out above reflects these refinements and formed the basis of satisfactory levels of agreement at the end of the third round of testing.

In summary, the analysis and coding of the annual reports therefore provided three basic variables. A quality variable, a quantity variable, and QWED, a quality adjusted quantity variable. The quantity variable is measured using TES and TESA as defined above. In all cases there is an expected positive relationship between disclosure and subsequent reputation, although it is also expected that different measures will reveal different effects.

As in the Toms (2002) paper, shareholder power (PSH) is measured using the total % controlled by block shareholders. These blocks typically represent family holdings, trusts or other companies. Their absence is a proxy for the collective influence of institutional investors, who typically hold shares below the disclosure threshold, also reflecting the low level of individual share ownership in the modern UK economy. Because institutional investment is associated with low values for this variable, as in Toms (2002) a negative association with CER is expected. Return on Equity (ROE) was defined as the average ratio of pre-tax profit to equity capital for the period 1998-2000 inclusive. This was an inconclusive variable in the Toms (2002) study and sits alongside inconclusive results from other surveys (Fombrun & Shanley, 1990, Waddock & Graves, 1997). Because the purpose here is partly to compare and replicate Toms (2002) the variable was included in the model, but the relationship with the dependent variable is not specified. Size was defined as the value of sales turnover. It is expected that large firms will invest more in reputation

and that there will be a positive association between this variable and CER. Information for $ROE_{t\ldots t-2,}$ PSH and $SIZE_t$ was obtained from *Datastream* for each company. $BETA_t$ was obtained from the London Business School *Risk Measurement Service*. As in the Toms (2002) study it is expected that firms with lower financial risk will be more successful in creating reputation and that there will thus be a negative relationship between BETA and CER.

Also consistent with the Toms (2002) paper, a proxy for membership of environmentally sensitive industries was used. This was defined by the level of environmental capital expenditure for that industry which, according to a Department of the Environment (1996, p.37) survey 69% of environmental capital expenditure, was accounted for by six industries. These were: chemicals (22%), food processing (7%), paper and pulp (8%), minerals processing, taken for the purposes of this study to include building and aggregates, (13%), energy supply, for the purposes of this study including water and all utilities (7%), metals manufacture (7%) and rubber/plastics (5%). For the purposes of the current study, these industries were defined as environmentally sensitive (ES). Given the levels of expenditure, it is also expected that the level of disclosure should also be high for these industries. Each company in the sample was analysed by sales of product and SIC code taken from *Datastream.* If any of the company's product sales fell under an ES SIC code, ES was set equal to 1 and to 0 otherwise.

In the case of the remaining new variables, R&D is measured by taking R&D expenditure as a percentage of sales. For the reasons discussed earlier, it is hypothesised that R&D will be positively associated with CER. Diversification is measured using the entropy measure assessed at the 3-digit level, using the following formula (Fombrun & Shanley, 1990):

$$\text{Diversification \%} = 1 - \frac{\sum_j Sales_j^2}{(\sum_j Sales_j)^2} \quad (1)$$

Where *j* = the number of segments and Sales refers to the percentage of the firm's total sales in 2000 that are in segment *j*. Following from the earlier discussion, the expected association with CER is not specified at this stage. The empirical form of the model and a summary of defined variables are set out below:

$$\begin{aligned} CER = {} & \beta_0 + \beta_1 DISC + \beta_2 PSH + \beta_3 BETA + \beta_4 ROE + \beta_5 INDUST \\ & + \beta_6 SIZE + \beta_7 R\&D + \beta_8 DIVERS + \varepsilon \end{aligned} \quad (2)$$

Where:

β_0 = Intercept;

β_1 to β_8 = Coefficient of slope parameters;

ε = Error term.

Dependent Variable:

CER = Corporate environmental reputation as measured by the community and environmental responsibility rating for the *Management Today* survey of Britain's MAC 2000.

Independent Variables:

DISC = Environmental disclosure score. Qualitative indicator (QUAL), ranges from 0 = no disclosure to 5 = high quality disclosure, as defined by Toms (2002.p.266) Quantitative indicator is measured by content analysis

sentence counts of 1999 annual reports and uses TES, TESA or QWED as defined above;

PSH = Power of shareholders; the total percentage of shareholders groups with a stake of > 3% plus directors shareholdings;

BETA = Systematic risk as measured by the company's beta factor;

ROE = Average return on equity from 1998-2000 inclusive as a measure of prior economic performance;

INDUST = Industry classification;

LNSIZE = log of sales turnover in 2000 as a measure of corporate size;

R&D = Research and development expenditures, 2000;

DIVERS = Corporate diversification.

Bearing in mind that a substantial sub group of observations of the quantitative disclosure variable (whether measured by TES, TESA or QWED) has a value of zero, corresponding to companies that choose not to disclose environmental information in their annual reports, it is appropriate to employ a square root transformation of this variable to better meet the assumptions of multiple regression analysis (Tabachnick & Fidell, 1996). Square root transformed variables are prefixed SQR. Sensitivity analysis was also performed by re-performing regressions with zero-value observations removed. For certain skewed explanatory variables, in this case size measured by sales, a logarithm transformation is sensible. Log transformed variables are prefixed LN. A summary of means, standard deviations and cross correlations for all interval variables (as transformed where indicated) is shown in Table 1. The QUAL variable is ordinal and its distribution is shown separately in figure 1.

Table 1 about here

Figure 1 about here

Because QUAL was highly correlated with all quantity variables and QWED (table 1), these variables were tested separately in the multiple regression analysis rather than jointly. The QWED variable in any case captures the joint effect of quality and quantity. For all remaining variables, variance inflation factors were within levels of tolerance for multi-collinearity.

To examine the effects of the binary grouping by industry according to environmental sensitivity, the means were compared for high profile and low profile industries using a two tailed independent samples t-test (table 2).

Table 2 about here

The results in table 2 suggest some important industry membership effects, with high levels of significance for the reputation and disclosure variables in particular. Consistent with previous studies (Patten, 1991, Roberts, 1992 and Hackston and Milne, 1996) firms in high profile industries disclose significantly more than firms in low profile industries. Moreover, high CER is associated with high profile industry group membership suggesting that firms engaged in potentially damaging activities are more likely to engage in reputation building activities. Meanwhile, membership of a high profile industry group, as suggested above, is associated with greater diversification.

RESULTS AND DISCUSSION

Quality versus quantity in environmental disclosure

The results of tests using the quality, quantity and QWED measures of disclosure discussed above are shown in Table 3. In Panel A, Models 1.1, 1.2, 1.3 and 1.4 show the results using all co-efficients in (2) above (except R&D and DIVERS, which are analysed separately below). The DISC measurement is varied in each model respectively, to show the results from the 1997 data (QUAL97), and for all other models using 1999 disclosure data (QUAL99, SQRTES99 and SQRQWED99). For comparison purposes Model 1.1 applies the model in (2) to the 1997 data set used by Toms (2002).[3] The model is similar, except for the exclusion of three insignificant variables, and directly comparable to Model 1.1 reported in Toms (2002, p.273). In Panel B, Models 1.5, 1.6, 1.7 and 1.8 show respectively the results for simple regression models using only the variations on the DISC measure explained above, without reference to the mediating and control variables. In this case the results in Model 1.5 are identical to those reported in Model 1.4 Toms (2002, p.273).

Table 3 about here

In tests using the quantitative disclosure variables, SQRTES consistently outperformed SRQTESA in all tests and for brevity, only results using SQRTES are reported. A significant proportion of disclosure scores were zeros (N=28), thereby truncating the distribution of the DISC independent variable set. Therefore all tests were repeated on the data set with all zero observations removed (N=111). This reduced data set corresponded more closely to normality than as shown for the full

data set in table 1. However, the results from these sets did not differ significantly from the tests on the full data set and therefore the latter are reported in Table 3.

For the QUAL variables, the results are comparable with those in Toms (2002) in terms of the signs and significance of the co-efficients in all cases, although in general the level of significance is rather higher (table 3, c/f Models 1.1 and 1.2 and 1.5 and 1.6). These results offer further support for the importance of the quality disclosure variable.

Another important comparison in table 3 is between the significances of the qualitative (Models 1.2 and 1.6), quantitative (Models 1.3 and 1.7) and quality adjusted versions (Models 1.4 and 1.8) of the DISC variable. The significance of the DISC (QUAL) variables in both Panel A and Panel B versions of the model is much better in models than either DISC (SQRTES) or DISC (QWED). This is good evidence that qualitative disclosures have much stronger impact on reputation compared with mere quantity. Indeed, DISC (SQRTES) and DISC (QWED) were not significant at the 0.05 confidence level in the PANEL A models. In sensitivity analysis, this was explained mainly by the inclusion of the SIZE variable. This suggests that large firms, given the scope of their activities, find themselves required to make visible efforts to support environmentally responsible projects and therefore they offer greater description of environmental policies in their annual reports. It is possible that the investment community expects a certain amount of description and that therefore quantitative environmental disclosure has no incremental effect on their perception of corporate environmental reputation. Qualitative disclosures on the other hand are strongly significant in all models and add to reputation over and above any size effects.

A further and complementary effect arises from the greater significance of the TES variable relative to TESA. This suggests that substituting environmental disclosures for other disclosures has less effect on reputation than including environmental disclosures to extend the report so that it complements other disclosures. Put another way, the extent of disclosure, whether environmental or not, improves reputation. However, as concluded above, the overall effect of quantitative disclosures is limited relative to the effect of qualitative disclosures.

Tests using the hybrid QWED variable (models 1.4 and 1.8) confirmed that quantity is not incrementally significant in the presence of quality. In other words, quality environmental disclosures add significantly to environmental reputation, which once achieved will not be supplemented by quantity. Conversely, as noted above, quantitative environmental disclosures are no different from other disclosures in terms of their ability to create environmental reputation.

A final interesting comparison in table 3 is between the levels of significance of the LNSIZE and INDUST variables for the 1997 and 2000 data reported in Panel A, Model 1.1 and 1.2-1.4 respectively. According to Toms (2002), industry effects were significant when tested on 1996 data and the results here provide further evidence that industry membership is a significant control variable in the aggregate. Also as noted above and reported in table 2, there are significant industry impacts on both disclosure levels (however measured) and reputation. The results for size are more contradictory, and size was insignificant for all models tested on 1996 and 1997 data (Toms. 2002, p.275). As noted above there is some evidence of an inverse relationship between size and the choice of disclosure method, with larger firms disclosing a higher volume of, but not necessarily higher quality, disclosures, possibly reflecting an expectational norm for high profile firms.

In general the results suggest support for the model tested by Toms (2002). As noted above, the results in Table 3 for models 1.1, 1.2, 1.5 and 1.6 have similar coefficients with the same signs and levels of significance when compared to the results in Toms (2002, table 4, p.273). This out of sample test provides confirmation of the original model in Toms (2002). The slightly reduced significance of the TES and QWED variables, but otherwise similar results in Table 3 suggest that had the original Toms (2002) test been conducted with reference to quantitative data alone the relationship between disclosure and reputation may have been less clearly apparent. As in these previous tests, BETA and PSH are consistently significant in all models although there is some interaction between PSH and SIZE and INDUST, reflecting the institutional control of larger Plcs in high profile industries.

Extensions to the signalling and RBV framework

Table 4 sets out the results from tests examining the impact of R&D and DIVERS variables. Model 2.1 shows the results for the full model set out in (2), in this case including the R&D and DIVERS variables. In view of the results from the previous sections QUAL99 is used as the DISC variable. Models 2.2 and 2.3 respectively show the separate effects of adding R&D and DIVERS in turn to the same variables as in model 2.1. Finally Model 2.4 shows the results with all insignificant variables removed. All Models were tested for sensitivity using other permutations of the DISC variable.

The additional variables added significant explanatory power to the model. The R&D coefficient was highly significant in all models. Industry norms were important determinants with further sensitivity tests on the model showing that the

industry variable became more significant if the R&D variable was dropped and vice versa. Nonetheless the results on the R&D variable including the industry control showed that specific research-intensive firms are more easily able to create environmental reputation. In contrast, diversification was in most models insignificant and only marginally significant in association with quantitative disclosures. Creation of environmental reputation would therefore appear to be more associated with process than scope of the business. As noted above, table 2 suggests that diversified firms are more likely to be members of high profile industry groups. However the DIVERS variable needs to be treated with caution as the direction of its impact on reputation is uncertain (Fombrun and Shanley, 1990). Further tests (and see also table 1) revealed that diversification is significantly associated and positively correlated with both reputation and especially the QUAL variable. To assess the joint effects an interaction variable was created combining QUAL and DIVERS. This showed DIVERS to be negatively associated with CER at marginal significance with the interaction variable strongly and positively significant. A possible interpretation is that diversification into such industries reduces reputation but also creates the requirement to include more qualitative signals to counter the potential loss of reputation. Diversified firms therefore must report their activities as a consequence of their activities, but are less able to develop reputation than more specialised firms.

Table 4 about here

Taken together these findings suggest that environmental reputation can be created more effectively by qualitative environmental disclosures and also by

investment in R&D. Institutional share ownership helps promote environmental reputation. The results are robust with respect to recent UK data for the sectors analysed here, which exclude banking and other financial firms, and these relationships are therefore likely to reflect the information demanded by the main users of annual reports.

There is still a lack of comparable international evidence, but it is likely that similar relationships may hold to the extent that similar conditions of regulation, governance and financial reporting prevail. Even so, the results from this research might be added to the body of literature investigating the social performance social disclosure relationship, where the results are mixed (Ullmann, 1985, p.545) and surveys comparing actual pollution performance with pollution disclosure, which suggest little correlation (Milne & Patten, 2002, pp.391-2). An important reason for these differences is that the evidence presented in this paper is quite narrowly focused on the motivations of executive and financial market stakeholder groups. Other surveys test the legitimacy of corporate actions against the expectations of environmentalists, regulators and so on. The current paper is limited by its use of the MAC data, which is drawn from a survey of senior executives and sector specific investment analysts, and also by the derivation of its theoretical framework from competitive process and financial market perspectives. A further test of the specific link between reputation resources, quality signalling and disclosure strategy across different stakeholder groups would be difficult insofar as their expectations differ. Only where they coincide, for example if a regulatory intervention affects the competitive process and stock market value, does the current model apply.

Another important context in which these results need to be considered is the recent research by Chan and Milne (1999), consistent with earlier findings (Bowman

& Haire, 1975), which suggests that there is an upper limit beyond which investors are likely to find environmental expenditure undesirable. Whilst the results above are suggestive that there is a qualitative hierarchy of disclosure, the research has not directly tested the existence of an upper limit to environmental expenditure and associated quantified disclosure. However, the apparent lack of further impact in disclosure once a threshold has been reached does suggest some support for this view. In the light of the prior research, it is acknowledged that such a limit does exist and that the results presented here should be considered as strategic options within a normal range of activity dictated by current technology and the regulatory framework.

Further research is also required on the social, as opposed to environmental, elements of accounting disclosure. A limitation of the above results is that the MAC ratings refer to both community and environmental reputation. Further research might also be conducted on the combined effect of multiple signals at any given level vis a vis equivalent single signals. Meanwhile the implication for researchers is that content analysis and the counting of sentences can be complemented and in certain circumstances significantly improved by investigating and comparing the quality of disclosures.

CONCLUSION

Bearing in mind the above caveats, this paper demonstrates significant empirical support for a new theoretical perspective on the corporate social responsibility research agenda. The RBV is in itself not new, although the paper shows that it can only be made meaningful where integrated with quality signalling, thereby showing that RBV researchers can constructively engage with accounting and finance perspectives. Based on this study**,** two important implications for accounting

researchers are that first, content analysis based on the mere volume of disclosures may be insufficient for the purposes of identifying the underlying relationships tested in this paper. Second, signalling theory potentially offers useful theoretical perspectives complementary to those offered elsewhere in the literature.

The clear message to managers seeking to promote the environmental reputation of their firms is that they should pay careful attention to the quality rather than mere quantity of disclosure. This simple prescription is not easy to achieve, however, since disclosure must follow prior investment in environmentally friendly processes that are by definition difficult to imitate and are therefore potential sources of competitive advantage. Once that investment is made, however, disclosure will help secure environmental reputation and firms will find it much easier to protect their reputation from competitors offering up mere rhetoric. Such disclosures may be assisted or complemented by investments in R&D, which provide an opportunity to invest in modern and therefore, more environmentally friendly technology. Whether these activities will ultimately benefit other stakeholder groups or provide any increase in overall environmental protection is an important question, but remains for now a subject of wider debate and further research.

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TABLE 1

Descriptive Statistics and Correlation Matrix for Continuous Variables

Variable	Mean	S.D	A	B	C	D	E	F	G	H	I
A CER	5.533	0.832									
B DISC (QUAL99)	2.388	na	.466a*								
C DISC (SQRTES99)	2.837	2.008	.329*	.721a*							
D DISC (SQRQWED99)	5.076	3.612	.319*	.721a*	.993*						
E PSH	27.116	20.651	-.338*	-.235a*	-.178*	-.179*					
F BETA	0.919	0.245	-.179*	-.049a	.033	-.035	-.002				
G ROCE	30.101	64.043	-.128	-.193a*	-.214*	-.212*	-.003	.045			
H LNSIZE	6.187	0.559	.416*	.342a*	.341*	.345*	-.396*	.158	-.058		
I R&D	0.009	0.028	.221*	.264a*	.037	.023	-.147	.087	-.050	.009	
J DIVERS	0.222	0.240	.266*	.314a*	.185*	.182*	-.292*	.114	-.073	.278*	.034

CER: Corporate environmental reputation; DISC (QUAL99) qualitative disclosure measure, t=1999; DISC (SQRTES99), quantitative disclosure measure using total environmental sentences, t=1999; DISC (SQRQWED99) quality adjusted quantitative disclosure measure using quality adjusted total environmental sentences, t=1999; PSH: Power of shareholders, % of shareholders groups with a stake of > 3% plus directors shareholdings; BETA: Beta; ROE: Return on capital employed; LNSIZE: Log of sales turnover; R&D: Research and development expenditures; DIVERS: Corporate diversification.

a Spearman's rank correlation; Pearson correlation co-efficients are used otherwise

*p < .05

TABLE 2

Mean difference tests for independent samples by industry

	Mean high Profile	*Mean low profile*	*Mean difference*	*SE of diff.*	*t-value*
Dependent variable					
CER	5.813	5.309	0.504	0.136	3.681***
Independent variables					
QUAL99	2.919	1.961	0.958	0.252	3.798***
SQRTES99	3.688	2.152	1.535	0.321	4.782***
SQRQWED99	6.554	3.888	2.669	0.578	4.611***
PSH	23.018	30.416	-7.398	3.380	2.188**
BETA	0.889	0.943	-0.053	0.042	1.251
ROE	19.492	38.644	-19.151	9.748	1.965*
LNSIZE	6.256	6.131	0.124	0.095	1.311
R&D	0.012	0.007	0.005	0.004	1.158
DIVERS	0.315	0.148	0.166	0.039	4.259***

Industry is portioned into 62 high profile and 77 low profile cases

Significance levels (two-tailed test):
*** $p < .01$
** $p < .05$
* $p < .10$

TABLE 3

Determinants of Community and Environmental Reputation: Effects of Qualitative and Quantitative Disclosures

Dependent Variable = CER score

	Panel A Model			
	(1.1)	(1.2)	(1.3)	(1.4)
Independent variable				
CONSTANT	6.710***	3.435***	3.165***	3.148***
	(6.11)	(4.60)	(4.34)	(4.32)
DISC (QUAL97)	0.167***			
	(3.08)			
DISC (QUAL99)		0.153***		
		(3.64)		
DISC (SQRTES99)			0.052*	
			(1.52)	
DISC (SQRQWED99)				0.025*
				(1.41)
PSH	-0.009**	-0.006***	-0.006***	-0.006***
	(1.98)	(2.63)	(2.43)	(2.44)
BETA	-0.828**	-0.687***	-0.731***	-0.730***
	(2.04)	(2.95)	(2.97)	(2.95)
ROE	-0.0005	-0.0002	-0.0007	-0.0007
	(.014)	(0.51)	(1.36)	(1.41)
IND	0.122	0.218**	0.264**	0.273**
	(0.81)	(1.73)	(1.95)	(2.04)
LNSIZE	-0.042	0.396***	0.481***	0.485***
	(0.63)	(3.36)	(4.20)	(4.26)
F	4.55	11.82	10.35	10.29
Adj. R^2	.215	0.375	0.324	0.322
N	126	139	139	139

TABLE 3 (CONT.)

Determinants of Community and Environmental Reputation: Effects of Qualitative and Quantitative Disclosures

Dependent Variable = CER score

	Panel B Model (1.5)	(1.6)	(1.7)	(1.8)
Independent variable				
CONSTANT	5.042	4.952***	5.147***	5.161***
	(42.14)	(45.42)	(48.15)	(48.90)
DISC (QUAL97)	0.204***			
	(4.55)			
DISC (QUAL99)		0.243***		
		(6.13)		
DISC (SQRTES99)			0.136***	
			(4.13)	
DISC (SQRQWED99)				0.073***
				(4.08)
F	20.71	20.52	17.06	16.62
R^2	0.151	0.309	0.108	0.101
N	126	139	139	139

Numbers in parentheses are t-statistics based on White's (1980) heteroscedasticity consistent estimation matrix.
Significance levels (one-tailed test except intercept terms and the ROE variable):
*** $p < .01$
** $p < .05$
* $p < .10$

CER: Corporate environmental reputation; DISC (QUAL99) qualitative disclosure measure, t=1999; DISC (QUAL97), qualitative disclosure measure, t=1997; DISC (SQRTES99), quantitative disclosure measure using total environmental sentences, t=1999; DISC (SQRQWED99) quality adjusted quantitative disclosure measure using quality adjusted total environmental sentences, t=1999; PSH: Power of shareholders, % of shareholders groups with a stake of > 3% plus directors shareholdings; BETA: Beta; ROCE: Return on capital employed; INDUST: Industry classification; LNSIZE: Log of sales turnover.

TABLE 4

Determinants of Community and Environmental Reputation: R&D and Diversification

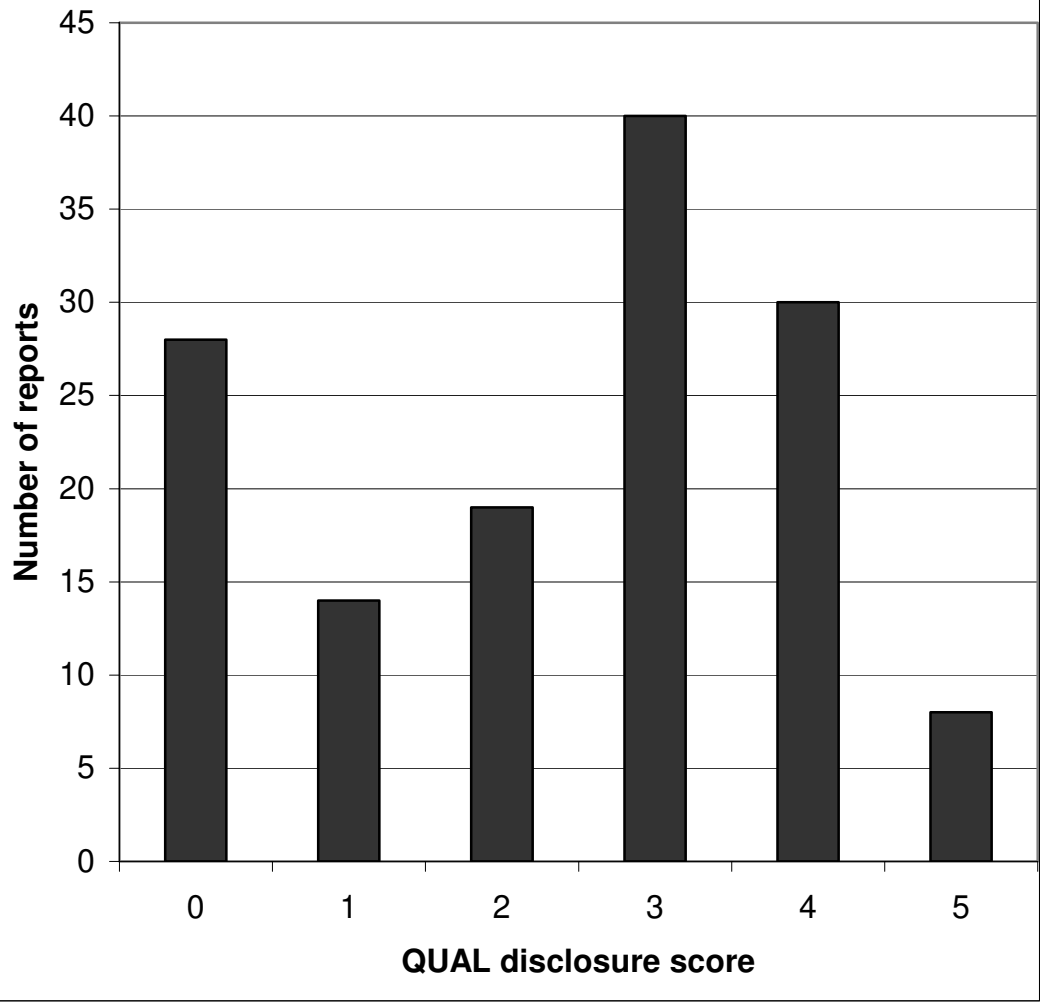
Dependent Variable = CER score

	Model			
	(2.1)	(2.2)	(2.3)	(2.4)
Independent Variable				
CONSTANT	3.319***	3.273***	3.476***	3.268***
	(4.73)	(4.70)	(4.63)	(4.73)
DISC (QUAL99)	0.157***	0.161	0.149***	0.162***
	(3.74)	(3.88)	(3.52)	(4.02)
PSH	-0.004**	-0.005**	-0.006***	-0.005***
	(1.93)	(2.07)	(2.51)	(2.08)
BETA	-0.793***	-0.767***	-0.708***	-0.768***
	(3.49)	(3.39)	(3.02)	(3.40)
ROE	-0.001	-0.001	-0.002	
	(0.14)	(0.15)	(0.50)	
INDUST	0.155	0.182*	0.195*	0.183*
	(1.23)	(1.49)	(1.49)	(1.51)
LNSIZE	0.407***	0.417***	0.338***	0.416***
	(3.70)	(3.81)	(3.27)	(3.83)
R&D	6.339***	6.290***		6.302***
	(3.78)	(3.65)		(3.72)
DIVERS	0.202		0.174	
	(0.86)		(0.72)	
F	13.29	15.02	10.07	17.26
Adj. R^2	0.42	0.42	0.37	0.42
N	139	139	139	139

Numbers in parentheses are t-statistics based on White's (1980) heteroscedasticity consistent estimation matrix.
Significance levels (one-tailed test except intercept terms and the ROE variable):
*** $p < .01$
** $p < .05$
* $p < .10$

CER: Corporate environmental reputation; DISC (QUAL99) qualitative disclosure measure, t=1999; PSH: Power of shareholders; BETA: Beta; ROCE: Return on capital employed; INDUST: Industry classification; LNSIZE: Log of sales turnover; R&D: Research and development expenditures; DIVERS: Corporate diversification.

Figure 1: Distribution of QUAL variable



NOTES

[1] As argued elsewhere (Toms, 2004), the RBV approach is consistent with classical political economy and associated theories of value. We agree with Gray et al (1995) that assumptions about self-interest are required and acknowledge that some may find them offensive, but consider them nonetheless accurate descriptors of constrained managerial behaviour in the context of a capitalist economy.

[2] We are grateful for a referee's comment that in some cases expenditure on disclosure may nonetheless be greater than expenditure on the activities themselves, with other firms engaging expensive public relations firms for reputation management purposes. For examples see www.corpwatch.org

[3] For the purposes of comparison, as in Toms (2002), the QUAL variable is not transformed. The models were tested using SQRQUAL on 1997 and 1999 data, but there were no significant differences between these results and the results as reported using untransformed data.