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Investor Influence on Firms' Environmental, Social and Governance Performance.

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This paper demonstrates that strategic equity holdings by employees and family or by corporations discourage investment in environmental, social and governance (ESG) activities as measured by ASSET4 performance scores. Conversely, debt or government equity finance is positively associated with ESG scores. The results are based on a large, recent and international sample and are generally consistent across conventional pooled cross-sectional and time-series regression models and propensity score matching experimental techniques. However the regression results for investment institutions are inconsistent with those from propensity score matching. The paper adds to our understanding of investor influence over firm management in general, over governance and environmental and social performance in particular and the way in which institutional arrangements might stimulate ESG investment.

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Investor Influence on Firms' Environmental, Social and Governance Performance.

1. Introduction

This paper examines the impact of strategic equity holdings and debt finance on ASSET4's assessment of the environmental, social and governance (ESG) performance of firms. Whilst corporate social responsibility has been much studied there is little evidence concerning the factors that encourage or hinder environmental, social and governance investment (Margolis and Walsh, 2003). This paper takes the view that climate change, the failure of corporate governance contributing to the financial crisis and problems with the ethical approach of firms and wealth inequalities, particularly in developing economies, all point to the importance of corporate social responsibility in general and ESG in particular. Whilst the costs attributable to ESG investment may be presumed to fall on the firm and its owners, the benefits may largely fall on other stakeholder, including employees, customers, firms, society and the state. This could lead to underinvestment in ESG, at least as perceived by stakeholders other than investors. If so, an understanding of those factors which impact on ESG investment, here assumed to be reflected in ESG scores, may be important.

The sample consists of 19,360 firm/years drawn from 2002-2010 for 58 countries, mainly representing developed economies. For each case we match the social, environmental and governance scores provided by ASSET4 with debt and equity strategic holdings available from Worldscope together with financial controls and firm characteristics. The ESG scores, used as the dependent variable, no doubt measure underlying ESG performance with error. However, ASSET4 scores are positively and significantly associated with similar scores that are available from FTSE4Good and it is not obvious why any error in the ESG scores would be systematically associated with the independent variables. Equally, the strategic equity holdings recorded by Worldscope may measure equity holdings with error but the analysis is largely based on simply identifying those firms that have large i.e. greater than 10% holdings.

It is not obvious what the best measure of strategic equity holdings should be. The analysis assumes that, for example, employee/family or investment institutions' equity

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holdings are best measured as the total for each category. It is certainly quite possible that members of a family, or like-minded institutions, will act in concert or simply have the same incentives and constraints. It is also possible that a measure of the total family equity holding is a misleading measure. For that reason much of the analysis is based on a simple categorisation: does the firm have a substantial equity holding, designated as a strategic equity holding, attributable to a type of shareholder? Thus the analysis investigates whether firms with large government equity holdings, or substantial leverage, act differently from those with substantial family or corporate cross-holdings.

The first results are based on conventional regression techniques where the social, environmental or governance score is modelled against the test variable identifying the source of finance and a set of control variables accounting for industry, country, profitability and market-to-book. The analysis is conducted on the full sample and sub-samples classified as liberal market economies (LMEs) or coordinated market economies (CMEs). The results are based on two measures of strategic equity holdings and its components. The variables are expressed both as percentages of equity and dummy variables identifying significant holdings. The results are largely consistent: entrenched equity holders from corporations or employees/family are associated with lower ESG scores whilst government or debt finance is associated with higher scores.

Additional results are derived from propensity score matching (PSM) approach that attempts to resolve the causal difficulty inherent in conventional regression modelling (Rosenbaum and Rubin, 1983). If the regression model apparently demonstrates that an independent variable, X, is significantly associated with the outcome variable, Y, this may be because both X and Y are "caused" by Z. It is only under particular circumstances that including Z on the right hand side will fix this problem (Armstrong et al. 2009). Instead PSM models the probability that a particular case will be treated i.e. X=1 assuming a zero-one categorisation, and matches cases with similar probabilities of X=1, where one case is treated and the other not. The difference in the outcome variable, Y, can then be assessed. In the main our results based on PSM are consistent with the regression models. However, the regression models suggest that investment institution equity holdings are associated with lower ESG scores, especially in liberal market economies. This result cannot be replicated using PSM, which suggests that institutional block holdings are not significantly associated with ESG scores.

This study adds to a limited set of recent, and mostly still developing, research papers that attempt to explain what affects ESG performance in firms (Barnea and Rubin (2010, Ioannou and Serafeim, 2010, Mackenzie and Rees, 2011). These papers have focused on institutional and/or international dimensions and have incorporated financing largely as a marginal item of interest. The results in prior research relevant to financing are also inconsistent, particularly with regards to debt finance. This study focuses on financing and controls for international and institutional issues. The underlying assumption is that managers are sympathetic to ESG investment but investors may not be, particularly if undiversified (Barnea and Rubin, 2010). Whilst the results are particular to the ESG investment context they also shed light on the real impact that ownership structure can have on managerial decision-making. The paper also makes use of propensity score matching. This is a useful technique when applied to natural experiments but has not been extensively employed in business research to date.

The results robustly indicate that corporate and employee/family equity holdings tend to be associated with lower ESG scores whereas debt and government equity holdings are associated with higher scores. Evidence with regards to strategic equity holdings by institutional investors and pension funds is inconclusive, which is consistent with diversified strategic equity holders behaving similarly to diversified investors without strategic holdings. Given the large impact financing attributes appear to have on ESG performance scores, the implications for policy makers intending to promote ESG investment are potentially important.

The paper firstly sets out the background and prior research including sections on the ESG rating process, prior research on ESG and hypothesis development based on that prior research. The research method is then outlined, followed by the results and conclusion.

2. Background and Prior Research

2.1 ESG ratings

ASSET4 is one of a growing set of ESG ratings organisations. For some time Kinder, Lyndenberg and Domini (KLD) have been providing an assessment of the CSR performance of US firms. FTSE4Good have also been categorising firms as complying or not with ESG criteria to become listed in their index since 2002, and since 2010 they calculate a performance score based on six categories for each of the environmental, social and governance pillars. Despite some early scepticism the organisations have gradually refined their techniques and have gained some credibility in the financial and investment world (Collinson et al. 2009, Slager, 2009, Slager et al. 2012). In most cases financial institutions are closely involved in the development of the scoring systems. ASSET4, now a part of the Thomson Reuters conglomerate, have been publishing their scores since 2002. They calculate four scores: the usual environmental, social and governance scores plus an economic score. The economic score is based on client loyalty, performance and shareholder loyalty. Environmental performance incorporates resource reduction, emission reduction and product innovation. Social performance includes employment quality, health and safety, training and development, diversity, human rights, community and product responsibility. Corporate governance is assessed on board structure, compensation policy, board functions, shareholder rights and vision and strategy. ASSET4 report that these scores are based on 250 indicators calculated from 750 publicly available data items.

As with all such scoring systems it is difficult to tell to what extent the score measures genuine CSR activity and to what extent that CSR activity benefits stakeholders. Mackenzie and Rees (2011) note that in 2010 the FTSE4Good and ASSET4 scores are significantly positively correlated. This is consistent with two expert systems evaluating the same underlying phenomena. They report the scores for five dimensions but where like is being compared with like the raw correlations are marginally over 0.50. Some of the remaining disagreement will be explained by explicit differences in the scoring system – FTSE4Good downgrade firms exposed to high risk whereas ASSET4 do not. However, there is a significant level of agreement between the two sets of scores.

There is also some limited American evidence suggesting that ESG scores reflect an underlying reality and impact on performance. Chatterji et al. (2009) relate a KLD assessment of 588 firms' environmental performance and demonstrate that this related to past environmental events such as toxic emissions, environmentally related fines etc. The

score appears to be a better assessment of past than future performance. However, Chatterji and Toffel (2010) have also demonstrated that poor KLD environmental scores have stimulated firms to improve their toxic emissions faster than firms that scored well. Thus there is some preliminary evidence that ESG scores can reflect an underlying reality and can lead to genuine benefits. There is some way to go before we can conclude that these benefits are pervasive.

Much of the analysis of ESG scoring systems and the related socially responsible investment indices has concentrated on the link between financial performance and ESG scores or index membership. If ESG investment is costly we might expect firms with high levels of performance to have lower profitability or growth. A case has been made above that investment in environmental and social management and good governance has a positive impact on performance. Yet it is not clear why over or under financial performance should necessarily lead to better performance (McWilliams and Siegal, 2001) or thence to abnormal returns, unless the market has collectively misunderstood the implications. In general the results are weak and mixed (Margolis et al., 2007, Renneboog et al. 2008). It is safe to conclude that as yet we have little robust evidence on the relationship between ESG scores and financial performance.

2.2 Explanations of ESG performance.

Barnea and Rubin (2010) analyse 2,292 US firms that are categorised as socially responsible or irresponsible in 2003 by KLD and conclude that leverage and inside ownership inhibit corporate social responsibility. The analysis is constrained by a blunt two-way graduation of CSR and by a sample limited to the US but it is influential as one of the first papers to try and explain differences in CSR across firms. It is also useful for the development of the thesis that managers will prefer to invest in CSR for the "warm-glow" effect, and that investors with influence will attempt to constrain that impulse.

International studies of ESG performance include Ioannou and Serafeim (2010) based on ASSET4 data and Mackenzie and Rees (2011) using FTSE4Good. In the first paper the authors are primarily interested in the institutional factors and in a pooled cross-section and time-series analysis (7 years and an average 1,827 firms per year) with year and industry effects they incorporate 35 characteristics. These include leverage and

closely held stock as explanatory variables. The first is insignificant and the second is significantly negative, although it is not clear whether the estimation technique has reliably controlled for the clustered error terms inherent in a pooled time-series and cross-sectional model. Whilst the model attempts to capture country differences it does so indirectly and given that financing characteristics differ considerably across national boundaries any result on financing may be mixed with international differences. Finally, closely held stock includes types of investors who may encourage ESG and others who will resist it, so the Ioannou and Serafeim (2010) result will necessarily measure the net effect. The paper is focused on international institutional differences, and hence does not focus on investors, but the significant negative impact on closely-held stock is indicative that the structure of equity investors may be important. In the second paper Mackenzie and Rees (2011) use one cross-section of 1,825 internationally diverse firms in 2010. Their analysis is based on FTSE4Good 6 point classification of ESG. They examine country characteristics specifically examining the thesis that open societies stimulate ESG investment. However, they also analyse investor characteristics and conclude that entrenched undiversified owners resist ESG investment and, contrary to earlier results, tentatively suggest that leverage is positively associated with ESG scores.

Mackenzie et al. (2011) show how financial institutions may influence CSR practices in their analysis of the impact of FTSE4Good engagement on firms in danger of being deleted from the FTSE4Good index when the environmental management criteria were upgraded. This represents a more pervasive style of engagement than the apparently effective, but more localised, direct contact documented in Becht et al. (2009). Mackenzie et al. conclude that for an international sample of firms FTSE4Good engagement significantly increased the probability of meeting the new criteria when implemented in 2005. They report that they examined the influence of financial controls including ownership but found no effect. They do report a strong positive effect on firms that would expect to be in the FTSE4Good index and also that their results are robust to the choice between regression models and propensity score matching.

The evidence that ownership structure influences ESG practices is limited to a few papers. For the US (Barnea and Rubin 2010), evidence suggests that leverage and insider ownership have a negative effect. For international results Ionnou and Serafeim (2011) report no effect for leverage and a tentative negative effect for closely held stock, whilst

Mackenzie and Rees (2011) suggest a positive impact for leverage and a negative impact for entrenched undiversified equity. All of these studies use linear regression models rather than propensity score matching.

An alternative approach, taken by Cox et al. (2004), is to examine the impact of CSR performance on the demand for equity from different categories of investors. Their evidence suggests that for a UK sample of FTSE All-Share index constituents during 2002-3 long-term investors, pension funds and life assurance firms tend to invest in firms with high CSR ranks but charities, short-term investors, investment trusts and unit trusts do not. Although based on UK data only this suggests that the direction of causality is not obvious and that the link between CSR and investment institutions may be complex. However, whilst credible for investment institutions this result has no obvious link to corporations, employees and family or government who drive the key conclusions in the results presented below.

2.3 Hypotheses.

Barnea and Rubin (2010) assume that managers are well disposed towards CSR investment due to the "warm-glow effect", but Mackenzie and Rees (2011) also point out that it is tempting to acquiesce to the demand of stakeholders seeking CSR investment and that a reputation as a responsible manager may benefit managers' careers. Barnea and Rubin argue that insider ownership may either permit insiders to "*promote non-value maximising activities*" as they are strong enough to resist pressure of other investors to prioritise wealth maximisation or alternatively they may resist such investment as it will be personally costly. In our study we are able to identify groupings of strategic equity holdings that are likely to have an incentive to maximise wealth, such as employees and family owners and others that may be less focused on wealth maximisation, such as the government.

Hypothesis 1: There is a negative relationship between strategic equity holdings and ESG scores of firms.

However, some investors will be more diversified than others. Lyndeberg (2007) argues that narrowly rational investors will oppose ESG investment. Where investors realise that the external benefits from ESG investment may be captured by other firms in their

portfolio investors will be more accepting of ESG investment. Finally, the "*universal investor*", normally characterised as pension funds (Kierman, 2007), or alternatively sovereign wealth funds (Gjessing and Syse, 2007), appreciate that they have a long-term investment in society so any external benefits, even those that do not fall immediately on the remainder of their portfolio, is welcome (Hawley and Williams (2007). That apart, a diversified investor may have less incentive to incur the monitoring and supervision costs associated with tempering managers' inclination to incur ESG investment. Government held equity could also justifiably be used to encourage ESG investment.

Hypothesis 2: Less diversified investors, employee/family or corporations will exhibit a stronger negative relationship with the ESG score of firms than other strategic equity holders, and government strategic holdings will be least negatively or positively associated with ESG scores of firms.

Barnea and Rubin (2010) also suggest that funds from debt holders could either provide the surplus cash needed to invest in negative NPV ESG investment or conversley the monitoring activities of debt holders will prevent wealth destroying ESG investment. They expect the latter case to be the stronger. However, debt holders are interested in the security of interest and capital, which will only be directly related to wealth maximising activities in circumstances that threaten a company's survival. Indeed risky, but wealth increasing investments, may be against debt holders interests. Thus funds provided by debt holders could replace funds from wealth maximising equity holders and reduce the constraints on ESG investment.

Hypothesis 3: There is a negative or positive relationship between leverage and firms' ESG scores.

Campbell (2007) suggests that there is a complex set of economic and institutional factors that will affect a firm's enthusiasm for ESG investment. Many of these relate to the competitive environment, industrial and institutional norms and government activity that is impossible to measure for individual firms and difficult for countries. However, the "varieties of capitalism" approach presents a simple dichotomy between liberal market economies (LMEs) and coordinated market economies (CMEs) that captures many of the differences suggested by Campbell (Hall and Soskice 2003). More recently authors have developed more sophisticated divisions of countries. In particular Kang and Moon (2012) analyse of the impact of government on CSR and further divide CMEs into

those which can be characterised as state-led and others. However, this requires knowledge of each country to determine the classification and the analysis presented here retains the original dichotomy. As LMEs tend to be countries with high levels of equity market capitalisation to GDP and are typically characterised as having legal systems based on common law the LME versus CME dichotomy is consistent with the mainstream of accounting and finance theory.

Hypothesis 4: The impact of leverage and strategically held equity will differ between liberal market economies and coordinated market economies.

3. Research Method

3.1 Regression models

The initial results are based on a pooled time-series and cross-sectional sample of international firms where country and industry differences are accounted for by including the sample averages of the dependent variable for those dimensions and the statistical significance tests incorporate adjustment for errors clustered by firm and year (Petersen, 2008). The results are robust to alternative model specifications and definitions of the control variables. In equation one the test variables are the percentage of strategic equity holdings and the leverage calculated as the sample decile of debt over equity plus debt. Control variables are a) deciles of return on equity b) deciles of the market value of equity plus debt over book value of equity plus debt c) mean ESG performance scores by country and d) mean ESG performance scores by industry. As the model is estimated as a pooled cross-section and time-series standard errors are corrected for clustering by firm and year.

Equation 1a

$$Score_{it} = a_0 + a_1SEH_{it} + a_2LEV_{it} + a_3ROE_{it} + a_4FMB_{it} + a_5C_{it} + a_6I_{it} + e_{it}$$

The model has been tested in a number of different specifications. $Score_{it}$ is one of the social, environmental or governance scores provided by ASSET4 for firm *i* year *t*. This variable is a score from zero to 100. The strategic equity holding variable SEH_{it} is the

Worldscope measure of strategic holdings, which ranges from 0 to 100. The leverage variable LEV_{it} is expressed in deciles to avoid the need to trim outliers. The results are robust to using the raw data if outliers are removed. The underlying leverage variable has been calculated as total debt over total debt plus equity, long-term debt to long-term debt plus equity and total debt over total debt plus the market value of equity and the results are robust to the alternatives. Return on equity, ROE_{it}, also expressed as a decile, was replaced by return on assets with no clear impact on the results. Firm market to book, FMB_{it}, is calculated as debt plus market value of equity over debt plus equity and is intended to measure growth opportunities. Alternatives were run using market value to book of equity and deciles of predicted long run growth of earnings from IBES analysts. The central results remained unchanged. The country, C_{it}, and industry, I_{it}, means were also replaced by dummy variables identify each industry and country. Again there was no substantive change to the test results. In each case the most effective control variables were employed – measured by statistical significance – with the exception of predicted long run growth, which is a more powerful control variable but was only available for approximate three-quarters of the sample. Again the test results were unchanged when this control was employed.

Equation 1b

$$Score_{it} = a_0 + a_{11}COR_{it} + a_{12}EMP_{it} + a_{13}GOV_{it} + a_{14}INV_{it} + a_{15}PEN_{it} + a_{16}OTH_{it} + \ldots$$
$$a_2LEV_{it} + a_3ROE_{it} + a_4TQ_{it} + a_5C_{it} + a_6I_{it} + e_{it}$$

In the second version of equation one the strategic equity holding variable is decomposed into its six elements identifying corporate cross-holdings, COR_{it}, employee of family holdings, EMP_{it}, government equity holdings, GOV_{it}, investment institutions, INV_{it}, pension fund holdings, PEN_{it}, and unclassified holdings, OTH_{it}. The leverage and control variables are unchanged.

Equation 1a and 1b are estimated in an alternative format where the test variables are zero-one dummies where one represents firms with 20% strategic equity shareholdings, or 10% block holdings in any of the components of SEH, or firms falling in the top 20% of leverage.

3.2 Propensity Score Matching.

Equation two is used to estimate a probability that a firm will be identified as receiving treatment i.e. categorized as having high leverage, or strategic equity holdings or any of its components. In equation 2 TRT_{it} represents the zero-one variable where one indicates that the case receives treatment and zero that it does not. The control variables for leverage, return on equity and firm market to book are calculated as in equation one. The year, country and industry variables are a vector of dummies identifying each firm's membership of each category. The equation is estimated as a probit model. In this case the results for probit or logit estimation are virtually indistinguishable.

Equation 2

$$TRT_{it} = b_0 + b_2 LEV_{it} + b_3 ROE_{it} + b_4 FMB_{it} + \Sigma y.YR_{it} + \Sigma c.CO_{it} + \Sigma i.IND_{it} + e_{it}$$

The cases that received treatment, i.e. TRT_{it} equals one, are then matched with a case, or a sample of cases, that did not receive treatment but where the probability of being classified as treated is approximately similar, defined as pr(TRT),Y ≈ pr(TRT),N, where pr(PRT) is the predicted value from equation two. The treatment effect is then the difference in $Score_{it}$ between the two cases. There are a number of ways in which cases may be matched and the statistical significance of the treatment effect estimated (Caliendo and Kopeining, 2008). The results reported in this paper are based on the simplest approach where firms are matched with their nearest neighbour by pr(TRT), with replacement, and using the normal T-test of difference between two matched samples (Leuvan and Sianesi, 2010). This implies that an untreated case can be matched with more than one treated case but obviously no case will include the same matched pair. The T-test also makes no allowance for the fact that the matching probabilities are estimated.

Matching was also conducted using a group of neighbours, n=3 and n=5, with and without replacement, and matching within a radius of probabilities (r=0.001, r=0.005). A bootstrapping approach was also used to compute alternative tests of significance. The tests were not sensitive to different matching approaches but were sensitive to bootstrapping alternatives in 6 out of 72 tests. Three applied to the unclassified equity holding which is not tested as part of any hypothesis. Two implied significance that was not suggested by the regression model and only one out of six disputed cases suggested

that an apparently statistically significant result was in fact not significant. All six cases are identified in the results.

4. Results.

4.1 Sample Description.

The sample is derived from 20,146 firm/years from 2002 to 2010 for which ESG scores are available from ASSET4, ranging from 961 cases in 2002 to 3353 in 2009. Of these strategic equity holding data is available for 19,726 cases and financial variables, including market capitalisation, are available for 19,588 cases. When the datasets are combined we are left with a sample of 19,360. These are split between 11,670 cases based in countries classified as LMEs and 7,690 in CMEs. The distribution of cases across countries and industries is given in the appendices 1 and 2 together with the classification of countries into the two designations.

Descriptive statistics for the test variables are given in table 1. As a) the ESG scores and equity ownership variables range from 0 to 100, b) the financial control variables are incorporated in the model as deciles, and c) the country and industry variables are averages of the original ESG scores, the table doesn't contain extreme values. It is clear that the countries and, to a lesser extent, industries explain considerable diversity in ESG scores. Strategic equity holdings, averaging 26.7 percent, are largely composed of holdings by investment institutions (11.2%), corporate cross-holdings (8.2%), and employee/family holdings (3.4%), but in all categories there are some firms which are classified as having over 90 strategic holdings. As the financial deciles are uninformative appendix 3 contains means and medians for each decile.

Table one about here.

The cross-correlations of all the variables used in the analysis are given in table 2. Firm measures of environmental and social performance are highly correlated at 0.749 but corporate governance has a relatively low correlation with the other two at 0.141 and 0.302 respectively. The ESG scores are reasonably highly correlated with the country or

industry averages but it is only for country level governance that the correlation exceeds 0.5 at 0.769. Otherwise the ESG scores have modest correlations with other variables, the highest being governance, correlating at 0.298 with institutional investment, negatively -0.292 with corporate cross-holdings and positively 0.226 with firm level market to book. As would be expected total strategic equity holdings correlate positively with its components and return on equity correlates positively (0.428) with firm market to book.

Table two about here.

4.2 Regression models of total strategic equity holdings and debt.

Table 3 contains the results from pooled time-series and cross-sectional models of the ESG scores from 2002 to 2010 for the full sample and the sample split between LME and CME countries. The test variables are for the strategic equity holding expressed as a percentage of total equity (SEH) and leverage calculated as the deciles of total debt over total debt to equity (LEV). The control variables for profitability (ROE), industry averages (IND) and country averages (CTY) are always statistically significant, and firm market to book is always negative, save for corporate governance for LME firms, but only statistically significant for social and environmental scores for CME firms. The explanatory power of the models is in the range 16% to 19% for the social score, 16% to 23% for the environmental score and 32% to 61% for the governance score.

Table three about here.

We see that for all models the slope coefficient on the strategic equity holdings are significantly negative whilst those on gearing are significantly positive. As hypothesised our initial results strongly support the case that equity block holdings tend to discourage ESG investment. The impact on the social and environmental score is significantly stronger in LME countries whereas that for governance appears to be consistent across the two samples. However, we expect the components of strategic equity holdings to have different impacts on ESG scores. The distribution of these components differs between LME and CME countries. It would be potentially misleading to conclude at this stage that the economic system is influential without further analysis. The hypothesis

regarding the impact of debt holdings did not specify whether a positive or negative impact would be found, but only that it may be significant. It appears that high debt levels are associated with high ESG scores, which is inconsistent with Barnea and Rubin (2010) but consistent with Mackenzie and Rees (2011). There is no statistically significant difference between the impact of debt across the two sub-samples.

Table four about here.

In table 4 the analysis is repeated with a dummy identifying strategic equity holding of greater than 20% and a dummy identifying the highest 20% of leverage scores for the sample. The results for the SEH are entirely consistent with the previous results and the SEH coefficient is significantly negative for all models. However, whilst the leverage dummy coefficient is positive in all cases it is not significantly so for either of the sub-samples for governance nor for the social score model for CME firms. This suggests that the impact of debt is less clear-cut than that for equity and this is investigated later.

4.2 Regression models of classified strategic equity holdings and debt.

The hypotheses regarding segmentations of the strategic equity holdings are that entrenched block holders, such as other companies and employees/family, will strongly resist ESG investment, governmental block holdings will support ESG investment and that the expected impact of diversified shareholder, pension funds and investment institutions is unclear. The results show that corporate block holdings have a negative impact on social, environmental and governance scores for the full and LME samples and a negative impact on all ESG scores for the CME sample, but only significantly so for governance. The employee/family result is even stronger with a significant negative coefficient observed for all three categories on the full and both sub-samples.

Table five about here.

Conversely, government block holdings have a significant positive impact on social and environmental scores for all three samples, a significant positive impact for the

governance score in LMEs and insignificant positive impacts for governance in CMEs and in the full sample.

The regression model results for investment trusts and pension funds appear initially intriguing. Investment institution holdings have a negative impact on the full sample results for social, environmental and governance scores but this is driven by the LME sample. The influence of investment institutions on the CMEs is apparently trivial. Conversely, pension fund holdings impact significantly negatively for social, environmental and governance scores for CMEs but only for governance for LMEs and for the full sample.

However, when percentage strategic holdings are replaced by dummies indicating 10 percent holdings or greater the results appear somewhat more robust. For all models of social, environmental and governance scores corporate cross-holdings are significantly negative as are employee/family block holdings. The government block holding dummy is significantly positive for all models save for governance scores in CMEs, and that only fails conventional significance tests by a whisker. However, when using dummy rather than continuous variables we again find that investment institutions' holdings are associated with reduced ESG investment for the full sample and the LME sample whereas pension fund holdings are significantly negative for the full sample and the CME sample.

Table six about here.

Thus the regression models are consistent with the second hypothesis. They confirm that there are clear differences between the impact of different types of strategic equity holdings with the presumably undiversified corporate and employee/family holdings strongly associated with lower ESG scores and government holdings with higher ESG scores. The impact of institutional investors, both pensions and investment institutions, remains unclear, although generally negative, with the results fluctuating between economic regimes. This is considered later.

4.2 Propensity score matched analysis of block holdings impact on ESG.

The results from propensity score matching strongly confirm three important results. Firstly, employee/family block holdings are significantly associated with reduced social, environmental and governance scores for the full sample and both sub-samples. The impact of "treatment" is estimated at similar levels across all samples, and indeed across all three ESG measures. Firms where employees or family collectively own 10% or more of equity score approximately 10 points lower on the ASSET4 scores. Secondly, where the government has a block holding this is significantly positive for social, environmental and governance scores in all cases save for governance in CMEs, which has a positive but insignificant effect. The effect is the strongest of our estimates and the results suggest a 16-point improvement where government has a block holding for social and environmental scores and 5 points for governance. Thirdly the impact of debt holdings is consistently and significantly positive on all three measures of ESG and for all three samples.

Table seven about here

The propensity scores also support the earlier analysis for the impact of pension fund holdings. These are significantly negative for the full sample but only because they are also significantly negative for the firms located in CMEs. Indeed the scores for environment and social performance are positive in the LMEs. Whilst interesting, and worthy of further investigation, these results are based on only 78 out of 11,670 LME firm/years and 86 out of 7,690 CME firm/years having pension fund holdings recorded as greater than 10%.

In one further instance the propensity score results are supportive but not identical to the regression models. For corporate holdings the regression results were consistently significant and negative across all nine tests where dummies were used and for seven of the nine tests where continuous measures of strategic holdings were used. The impacts on social and environmental scores in CMEs were negative but not significant. When using matching techniques we again estimate seven significantly negative results and two negative and insignificant results for social and environmental scores in LMEs. The overall result is clear. Corporate cross-holdings are generally negatively associated with ESG scores but given the instability across the different estimation techniques it is conservative to draw no further conclusions.

Finally, we have one clear dispute between the regression model results and those from propensity score matching. The regression models with continuous variables showed significant negative results for all three scores at the full sample level and for social and environmental for the LME firms. All other estimates were negative and insignificant. When using dummy variables to identify equity holdings the results were significantly negative for all three scores for the full sample and LME firms but insignificantly positive for all three measures for CME firms. The results from propensity score matching are more equivocal with negative and insignificant results for the full sample social and environmental scores and all three scores for LME, positive and insignificant for full sample corporate governance and social and environmental scores and significantly positive for the governance in the CMEs. Clearly, it is difficult to draw a robust conclusion regarding the impact of investment institutions block holdings.

It should be noted that there are only 911 firms identified as having institutional block holdings in the CMEs and 6,107 in the LMEs. Even so apparently robust results have been found with government and pension block holdings even where the numbers of firms so identified is relatively low. Of course the results show some instability between the regression models for institutional block holding results. This might be expected when there is non-linearity in the relationship i.e. the first 10 percent having a significantly higher or lower influence than higher bands of 10 percent. When the underlying relationships are non-linear we may well expect traditional regression models to struggle to produce robust results.

5. Conclusion.

This paper reports the results of an analysis of 19,360 firm years drawn from 2002-2010 and from 56 different countries and assumes that the scores of environmental, social and governance performance reflect underlying commitment to ESG. They measure dimensions of considerable importance to climate change, social inequalities and poor governance of commercial and financial firms. Using a variety of estimation techniques the results robustly suggest that government block-holdings and higher levels of debt are positively associated with environmental, social and governance performance. The results are also strongly consistent with entrenched equity holders, be they employees/family or

corporate cross-holdings, being negatively associated with scores. Although the results also suggest that pension fund based block holdings have a negative effect in CMEs the result is based on a small sample of firms and the impact will be modest. The results on block-holdings held by financial institutions are inconsistent but given the prevalence of such block-holdings and the consequent impact of any influence they would have the topic is surely worthy of further investigation.

In contrasting the results of conventional linear regression models with those from propensity score matching experimental techniques, the paper also adds to the refinement of experimental techniques. In five cases, for leverage, corporate cross-holdings, employee/family holdings, government holdings and pension fund block holdings, the results are broadly similar whether based on regression models or propensity score matching. However, the results for investment institution block holdings differ widely between the two approaches. There is no obvious reason to identify either as necessarily preferable, but there is a clear case for not concluding on the impact of institutional investment holdings on ESG scores without further work.

Conventional agency theory suggests that the separation of ownership from control or the exploitation of minority shareholdings by entrenched blocks will lead to sub-optimal performance – where optimal is assumed to be wealth maximisation. However, where the economic system internalises costs but leaves benefits as externalities, as can be argued is the case with corporate social responsibility investments, then wealth maximisation for equity holders is no longer a uniquely desirable objective. In such circumstances we can expect firms to under-invest in ESG, at least from the point of view of many non-investor stakeholders. If we assume that better ESG performance is desirable then the results presented above suggest how better performance might be achieved. Firstly, debt finance, which only requires repayment of interest and principal rather than wealth maximisation, might be encouraged as might government equity holdings which are also associated with better ESG scores. Both of these characteristics are more common in the CMEs than in LMEs. Secondly, large corporate cross-holdings and employee/family ownership are also seen to be associated with poorer ESG performance. These characteristics are more prevalent in the CMEs, and whilst it may be unrealistic to suggest these equity holdings should be discouraged it is clear that an

agency problem, between entrenched equity holders and non-equity stakeholders, may exist. The traditional approach to such agency problems is monitoring and contracting.

References

Armstrong, C. A., A. D. Jagolinzer, and D. F. Larcker: 2010, 'Chief Executive Officer Equity Incentives and Accounting Irregularities', Journal of Accounting Research 48(2), 225-271.

Barnea, A. and Rubin, A.: 2010, 'Corporate Social Responsibility as a Conflict between Shareholders', Journal of Business Ethics 97, 71-86.

Becht, M., J. Franks, C. Mayer, and S. Rossi: 2009, 'Returns to Shareholder Activism: Evidence from a Clinical Study of the Hermes UK Focus Fund', The Review of Financial Studies, 22(8), 3093-3129.

Caliendo, M. and S. Kopeinig: 2008, 'Some Practical Guidance for the Implementation of Propensity Score Matching', Journal of Economic Surveys, 22(1), 31-72.

Campbell, J. L.: 2007, 'Why Would Corporations Behave in Socially Responsible Ways? An Institutional Theory of Corporate Social Responsibility', Academy of Management Review 32(3), 946-967.

Chatterji AK, Levine DI, Toffel MW. 2009. How well do social ratings actually measure corporate social responsibility? *Journal of Economics and Management Strategy* **18**(1): 125–169.

Chatterji, A. K. and M. W. Toffel: 2010, 'How Firms Respond to Being Rated', Strategic Management Journal 31(9), 917-945.

Collison, D., G. Cobb, D. Power, and L. Stevenson: 2009, 'FTSE4Good: Exploring Its Implications for Corporate Conduct', Accounting, Auditing & Accountability Journal 22(1), 35-58.

Cox, P., S. Brammer, and A. Millington: 2004, 'An Empirical Examination of Institutional Investor Preferences for Corporate Social Performance', Journal of Business Ethics 52(1), 27-43.

Gjessing, O.P.K. and H. Syse: 2007, 'Norwegian Petroleum Wealth and Universal Ownership', Corporate Governance: An International Review 15, 427-437.

Hall P. and D. Soskice, 2001, Varieties of Capitalism — The Institutional Foundations of Comparative Advantage, Oxford Scolarship Online.

Ioannou I. and Serafeim, S. (2010). What Drives Corporate Social Performance? International Evidence from Social, Environmental and Governance Scores. Harvard Business School, Working Paper, 11-016.

Kang, N.; Moon, J.(2012)., "Institutional Complementarity between Corporate Governance and Corporate Social Responsibility: A Comparative Institutional Analysis of Three Capitalisms", *Socio-Economic Review*, Vol.10 (1), forthcoming 2012, January 2012.

Kiernan, M. J.: 2007, 'Universal Owners and ESG: Leaving Money on the Table?', Corporate Governance: An International Review 15, 478-485.

Leuven, E. and B. Sianesi: 2010, 'PSMATCH2: Stata Module to Perform Full Mahalanobis and Propensity Score Matching, Common Support Graphing, and Covariate Imbalance Testing', http://ideas.repec.org/c/boc/bocode/s432001.html. This version 4.0.4.

Lydenberg, S. (2007), Universal Investors and Socially Responsible Investors: a tale of emerging affinities. Corporate Governance: An International Review, 15: 467–477.

Mackenzie, C., Rees, W. and T. Rodionova (2011), The FTSE4Good Effect: The Impact of Responsible Investment Indices on Environmental Management (November 30, 2011). Available at SSRN: http://ssrn.com/abstract=1966474

Mackenzie, C. and W. Rees (2011), Corporate Social Responsibility and the Open Society (November 29, 2011). Available at SSRN: http://ssrn.com/abstract=1966030

Margolis, J., and J. Walsh, (2003), 'Misery Loves Companies: Rethinking Social Initiatives by Business' Administrative Science Quarterly, 48(2), 268-305

McWilliams, A. and D. Siegel: 2001, 'Corporate Social Responsibility: a Theory of the Firm Perspective', The Academy of Management Review 26(1), 117-127.

Petersen, M. A. (2009), 'Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches', Review of Financial Studies, Vol. 22, No. 1, pp. 435-480.

Renneboog, L., J. Ter-Horst, and C. Zhang: 2008, 'Socially Responsible Investments: Institutional Aspects, Performance, and Investor Behaviour', Journal of Banking and Finance 32, 1723-1742.

Rosenbaum, P. and D. Rubin: 1983, 'The Central Role of the Propensity Score in Observational Studies for Causal Effects', Biometrika 70(1), 41-55.

Slager, C. (2009). What Gets Measured Gets Managed? Responsible Investment Indices and Responsible Corporate Behaviour. Available at http://www.unpri.org/academic10/Paper_15_Rieneke_Slager_What gets measured gets managed.pdf

Slager, C., Gond, J.-P. and Moon, J.(2012). Standardization as Institutional Work: The Regulative Power of a Responsible Investment Standard, *Organization Studies*, forthcoming 2012.

Table 1. Descriptive Statistics

	SOC	ENV	CG	SEH	COR	EMP	GOV	INV	PEN	OTH
Mean	49.724	49.296	52.026	26.702	8.216	3.388	1.112	11.184	0.760	0.977
Median	47.610	44.340	59.415	20.000	0.000	0.000	0.000	6.000	0.000	0.000
Std. Dev.	30.829	31.913	30.024	23.276	17.661	10.923	7.271	15.346	2.750	6.209
Max	98.950	97.170	98.100	100.000	100.000	93.000	91.000	95.000	90.000	97.000
Min	3.300	8.800	1.150	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	LEV	ROE	FMB	SOC,I	SOC,C	ENV,I	ENV,C	GOV,I	GOV,C
Mean	5.622	5.519	5.580	49.464	49.586	49.009	49.111	51.902	51.790
Median	6.000	6.000	6.000	48.026	43.955	47.640	45.770	50.423	62.206
Std. Dev.	2.795	2.812	2.899	5.032	11.413	9.267	12.153	4.086	23.048
Max	10.000	10.000	10.000	58.113	85.679	65.862	76.332	60.357	74.350
Min	1.000	1.000	1.000	24.998	12.095	21.328	12.417	25.634	3.432

The descriptive statistics refer to the full test sample of 19,360 firm/years drawn from 2002-2010. The sample is derived from 20,146 firm/years for which ASSET4 had available ESG scores, 19,588 from the ASSET4 sample for which Worldscope provided a breakdown of strategic equity holdings and 19,588 for which Worldscope provided financial data. SOC, ENV and CG are the ASSET4 scores for social, environmental and governance performance, ranging from 0 to 100, SEH is the strategic equity holding percentage and COR, EMP, GOV< INV, PEN and OTH the segmentation of SEH into corporate, employee/family, government, investment institution, pension funds and other. LEV, ROE and FMB are deciles estimated from the full sample for leverage, measured as total debt/(equity + total debt), return on equity, measured as net income over equity, and firm market to book, measured as market value of equity plus total debt over book value of equity plus total debt. The distribution of the underlying measures on which the deciles were based is given in the appendix. SOC,I though GOV,C are the mean industry and country measures of the social environmental and governance variables respectively.

Table 2. Correlation Matrix For All Variables Used In The Regression Models.

Panel 1.

	SOC	ENV	CG	SEH	COR	EMP	GOV	INV	PEN	OTH
SOC	1.000									
ENV	0.749	1.000								
CG	0.302	0.141	1.000							
SEH	-0.050	-0.112	-0.120	1.000						
COR	0.003	0.008	-0.292	0.525	1.000					
EMP	-0.052	-0.068	-0.145	0.301	-0.077	1.000				
GOV	0.101	0.083	-0.046	0.196	-0.035	-0.041	1.000			
INV	-0.100	-0.164	0.298	0.421	-0.241	-0.121	-0.095	1.000		
PEN	-0.038	-0.059	0.064	0.245	-0.082	-0.055	-0.020	0.313	1.000	
OTH	0.027	0.004	-0.078	0.174	-0.022	-0.031	-0.005	-0.078	-0.027	1.000
LEV	0.129	0.114	0.039	-0.018	-0.021	-0.031	0.026	-0.001	0.010	0.011
ROE	0.117	0.022	0.116	0.066	0.032	0.049	0.026	-0.002	0.024	0.021
FMB	0.086	-0.012	0.226	0.074	-0.067	0.062	-0.049	0.151	0.017	-0.015
SOC,I	0.164	0.272	-0.003	-0.016	0.005	-0.014	0.054	-0.035	-0.024	-0.010
SOC,C	0.379	0.307	-0.009	0.105	0.082	0.130	0.049	-0.097	-0.016	0.087
ENV,I	0.151	0.291	-0.018	-0.038	0.000	-0.024	0.040	-0.044	-0.024	-0.025
ENV,C	0.299	0.386	-0.341	-0.035	0.093	0.093	0.019	-0.251	-0.082	0.062
GOV,I	0.000	-0.031	0.137	0.008	-0.034	-0.042	0.014	0.068	0.032	0.013
GOV,C	-0.009	-0.173	0.769	-0.014	-0.310	-0.072	-0.097	0.421	0.134	-0.070

Table 2. Correlation Matrix For All Variables Used In The Regression Models.

Panel 2.

	LEV	ROE	FMB	SOC,I	SOC,C	ENV,I	ENV,C	GOV,I	GOV,C
LEV	1.000								
ROE	-0.040	1.000							
FMb	-0.211	0.428	1.000						
SOC,I	-0.042	0.043	0.057	1.000					
SOC,C	0.123	0.092	0.203	0.071	1.000				
ENV,I	-0.051	0.009	0.021	0.932	0.064	1.000			
ENV,C	0.073	-0.048	0.039	0.112	0.792	0.124	1.000		
GOV,I	-0.174	0.017	0.098	0.001	-0.076	-0.099	-0.138	1.000	
GOV,C	0.003	0.108	0.290	-0.073	-0.016	-0.094	-0.446	0.142	1.000

This table contains the spearman correlation for all variables for the full sample. Variable definitions are as given in table 1.

Table 3. Results for Strategic Holdings and Leverage

	ALL			LME			CME		
	SOC	ENV	CG	SOC	ENV	CG	SOC	ENV	CG
INT	**-47.68**	**-42.48**	**-14.33**	**-41.12**	**-40.44**	**-9.600**	**-54.71**	**-46.60**	**-20.16**
	(8.18)	**(14.02)**	**(3.15)**	**(5.39)**	**(9.60)**	**(1.45)**	**(7.48)**	**(7.23)**	**(4.08)**
SEH	**-0.118**	**-0.124**	**-0.144**	**-0.159**	**-0.158**	**-0.151**	**-0.0494**	**-0.0644**	**-0.148**
	(6.44)	**(8.07)**	**(8.13)**	**(5.15)**	**(6.93)**	**(3.79)**	**(1.97)**	**(2.47)**	**(6.86)**
LEV	**0.999**	**1.091**	**0.471**	**0.987**	**1.104**	**0.430**	**0.969**	**0.879**	**0.471**
	(6.34)	**(5.94)**	**(4.03)**	**(5.99)**	**(5.42)**	**(3.47)**	**(3.21)**	**(3.01)**	**(2.88)**
ROE	**0.996**	**0.662**	**0.434**	**1.230**	**0.798**	**0.483**	0.595	0.665	0.298
	(6.55)	**(3.23)**	**(4.30)**	**(7.63)**	**(3.65)**	**(4.81)**	(1.70)	(1.86)	(0.99)
FMB	-0.0881	-0.315	0.0379	0.255	-0.166	0.225	**-0.765**	**-1.268**	-0.367
	(0.50)	(1.73)	(0.27)	(1.04)	(0.67)	(1.60)	**(2.37)**	**(3.24)**	(1.80)
I	**0.842**	**0.859**	**0.268**	**0.702**	**0.741**	**0.238**	**1.050**	**1.026**	**0.402**
	(8.00)	**(18.14)**	**(3.92)**	**(5.24)**	**(11.81)**	**(2.69)**	**(8.23)**	**(13.96)**	**(4.24)**
C	**0.974**	**0.915**	**0.985**	**0.933**	**0.989**	**0.922**	**0.970**	**0.899**	**1.037**
	(19.46)	**(17.78)**	**(42.86)**	**(9.84)**	**(11.52)**	**(18.38)**	**(15.62)**	**(9.74)**	**(15.70)**
N	19360	19360	19360	11670	11670	11670	7690	7690	7690
adj. R-sq	0.185	0.229	0.607	0.162	0.161	0.325	0.181	0.193	0.440

Equation 1a: $Score_{it} = a_0 + a_1SEH_{it} + a_2LEV_{it} + a_3ROE_{it} + a_4FMB_{it} + a_5C_{it} + a_6I_{it} + e_{it}$

The equation is estimated using OLS on a pooled cross-section and time-series with standard errors adjusted for clustering by firm and by year (Petersen, 2009). The absolute value of t-statistics are in brackets and coefficients and t-statistics representing significance at 0.05 or less are in bold. The variables are as defined in table 1 where $Score_{it}$ represents the different measures of social (SOC), environmental (ENV) and governance (CG), INT is the intercept, SEH strategic equity holding, LEV deciles of total debt over total debt plus equity, ROE deciles of net income over equity, FMB market value of equity plus total debt over book value of equity plus total debt and I and C the industry and country averages for the score in question. ALL is the full sample and LME and CME the samples for liberal market economies and coordinated market economies respectively.

Table 4. Results for Critical Values of Strategic and Debt Holdings

	ALL			LME			CME		
	SOC	ENV	CG	SOC	ENV	CG	SOC	ENV	CG
INT	**-43.71**	**-37.93**	**-10.59**	**-39.40**	**-38.08**	-7.806	**-50.35**	**-42.63**	**-15.41**
	(7.90)	**(13.70)**	**(2.26)**	**(5.47)**	**(9.54)**	(1.46)	**(7.06)**	**(7.06)**	**(3.04)**
D_SEH	**-5.196**	**-5.282**	**-5.534**	**-5.935**	**-5.507**	**-5.654**	**-3.385**	**-4.339**	**-5.726**
	(7.08)	**(7.62)**	**(9.23)**	**(7.49)**	**(7.25)**	**(8.08)**	**(2.79)**	**(3.50)**	**(5.74)**
D_LEV	**2.713**	**3.017**	**1.300**	**2.509**	**2.471**	1.180	2.713	**2.971**	1.252
	(2.87)	**(3.07)**	**(2.18)**	**(2.46)**	**(2.16)**	(1.81)	(1.71)	**(1.98)**	(1.35)
ROE	**1.014**	**0.689**	**0.424**	**1.251**	**0.837**	**0.480**	**0.697**	**0.793**	0.307
	(6.38)	**(3.21)**	**(4.16)**	**(7.98)**	**(3.81)**	**(5.02)**	**(1.99)**	**(2.19)**	(1.00)
FMB	-0.269	**-0.494**	-0.0553	0.0267	-0.448	0.160	**-1.025**	**-1.482**	**-0.519**
	(1.60)	**(2.80)**	(0.43)	(0.12)	(1.95)	(1.23)	**(3.29)**	**(3.93)**	**(2.64)**
I	**0.836**	**0.855**	**0.222**	**0.714**	**0.738**	**0.199**	**1.036**	**1.026**	**0.343**
	(8.03)	**(17.80)**	**(3.11)**	**(5.47)**	**(11.88)**	**(2.26)**	**(8.05)**	**(13.98)**	**(3.51)**
C	**1.002**	**0.936**	**0.992**	**0.986**	**1.065**	**0.945**	**1.009**	**0.914**	**1.041**
	(20.27)	**(17.95)**	**(50.16)**	**(10.69)**	**(12.47)**	**(23.80)**	**(16.05)**	**(9.92)**	**(15.43)**
N	19360	19360	19360	11670	11670	11670	7690	7690	7690
adj. R-sq	0.178	0.221	0.602	0.150	0.147	0.316	0.178	0.191	0.432

Equation 1a: $Score_{it} = a_0 + a_1 D_SEH_{it} + a_2 D_LEV_{it} + a\ ROE_{it} + a_4 FMB_{it} + a_5 C_{it} + a_6 I_{it} + e_{it}$

The equation is estimated using OLS on a pooled cross-section and time-series with standard errors adjusted for clustering by firm and by year (Petersen, 2009). The absolute value of t-statistics are in brackets and coefficients and t-statistics representing significance at 0.05 or less are in bold. The variables are as defined in table 1 where $Score_{it}$ represents the different measures of social (SOC), environmental (ENV) and governance (CG), INT is the intercept, D_SEH is a zero-one dummy where one represents strategic equity holdings greater than 20%, D_LEV is a zero-one dummy where one representes values of LEV falling in the top 20% of the sample, ROE deciles of net income over equity, FMB market value of equity plus total debt over book value of equity plus total debt and I and C the industry and country averages for the score in question. ALL is the full sample and LME and CME the samples for liberal market economies and coordinated market economies.

Table 5. Results for Categories of Strategic Holdings and Leverage

	ALL			LME			CME		
	SOC	ENV	CG	SOC	ENV	CG	SOC	ENV	CG
INT	**-45.44**	**-41.09**	**-13.01**	**-40.74**	**-40.38**	-7.364	**-51.96**	**-46.44**	**-17.77**
	(8.05)	**(13.54)**	**(3.08)**	**(5.52)**	**(9.74)**	(1.24)	**(7.19)**	**(6.87)**	**(3.67)**
COR	**-0.0961**	**-0.0953**	**-0.138**	**-0.124**	**-0.107**	**-0.205**	-0.0468	-0.0494	**-0.115**
	(4.43)	**(4.63)**	**(8.40)**	**(3.38)**	**(3.01)**	**(6.53)**	(1.65)	(1.71)	**(5.13)**
EMP	**-0.313**	**-0.313**	**-0.288**	**-0.428**	**-0.386**	**-0.338**	**-0.207**	**-0.232**	**-0.264**
	(9.94)	**(8.99)**	**(10.76)**	**(10.85)**	**(10.31)**	**(9.23)**	**(4.73)**	**(4.53)**	**(7.06)**
GOV	**0.244**	**0.209**	0.0523	**0.255**	**0.241**	**0.126**	**0.267**	**0.229**	-0.00155
	(6.15)	**(5.97)**	(1.38)	**(2.66)**	**(3.65)**	**(2.42)**	**(5.64)**	**(5.11)**	(0.04)
INV	**-0.156**	**-0.174**	**-0.0781**	**-0.214**	**-0.234**	-0.0870	-0.0218	-0.0248	-0.00999
	(3.45)	**(5.09)**	**(2.01)**	**(3.92)**	**(5.12)**	(1.76)	(0.31)	(0.36)	(0.17)
PEN	-0.194	-0.125	**-0.432**	0.125	0.174	**-0.393**	**-0.644**	**-0.540**	**-0.477**
	(1.56)	(1.13)	**(3.86)**	(0.84)	(0.82)	**(3.36)**	**(3.24)**	**(2.94)**	**(3.01)**
OTH	-0.0795	**-0.127**	**-0.179**	**-0.184**	**-0.207**	**-0.294**	0.00433	-0.0504	**-0.138**
	(1.64)	**(2.33)**	**(4.99)**	**(2.47)**	**(3.13)**	**(3.47)**	(0.07)	(0.71)	**(2.64)**
LEV	**0.982**	**1.079**	**0.443**	**0.956**	**1.090**	**0.384**	**0.915**	**0.837**	**0.433**
	(6.26)	**(5.96)**	**(3.82)**	**(5.84)**	**(5.34)**	**(3.25)**	**(3.01)**	**(2.84)**	**(2.49)**
ROE	**0.941**	**0.598**	**0.458**	**1.203**	**0.756**	**0.496**	0.554	0.632	0.287
	(6.19)	**(3.00)**	**(4.55)**	**(7.51)**	**(3.47)**	**(5.10)**	(1.60)	(1.78)	(0.96)
FMB	0.0583	-0.165	0.0528	0.283	-0.119	0.229	-0.622	**-1.131**	-0.287
	(0.34)	(0.94)	(0.41)	(1.14)	(0.46)	(1.67)	(1.89)	**(2.83)**	(1.39)
I	**0.800**	**0.840**	**0.247**	**0.674**	**0.726**	**0.238**	**0.991**	**1.007**	**0.344**
	(7.83)	**(17.81)**	**(3.74)**	**(5.16)**	**(11.68)**	**(2.73)**	**(7.75)**	**(13.94)**	**(3.76)**
C	**0.970**	**0.907**	**0.972**	**0.974**	**1.026**	**0.886**	**0.975**	**0.910**	**1.032**
	(19.92)	**(16.98)**	**(55.87)**	**(10.73)**	**(12.25)**	**(19.44)**	**(15.99)**	**(9.18)**	**(15.95)**

N	19360	19360	19360	11670	11670	11670	7690	7690	7690
adj. R-sq	0.198	0.241	0.612	0.177	0.175	0.338	0.196	0.207	0.445

Equation 1b. $Score_{it} = a_0 + a_{11}COR_{it} + a_{12}EMP_{it} + a_{13}GOV_{it} + a_{14}INV_{it} + a_{15}PEN_{it} + a_{16}OTH_{it} + \ldots$

$$a_2LEV_{it} + a_3ROE_{it} + a_4TQ_{it} + a_5CM_{it} + a_6IM_{it} + e_{it}$$

The equation is estimated using OLS on a pooled cross-section and time-series with standard errors adjusted for clustering by firm and by year (Petersen, 2009). The absolute value of t-statistics are in brackets and coefficients and t-statistics representing significance at 0.05 or less are in bold. The variables are as defined in table 3 except that the strategic equity holding (SEH) variable is replaced with its six components, corporate holdings (COR), employee/family holdings (EMP), government holdings (GOV), investment institutions' holdings (INV), pension fund holdings (PEN) and other strategic equity holdings (OTH). ALL is the full sample and LME and CME the samples for liberal market economies and coordinated market economies.

Table 6. Results for Critical Values of Holding by Category plus Leverage

	ALL			LME			CME		
	SOC	ENV	CG	SOC	ENV	CG	SOC	ENV	CG
INT	**-41.65**	**-37.54**	-8.449	**-38.70**	**-38.10**	-5.661	**-47.16**	**-42.31**	**-11.40**
	(7.80)	**(13.59)**	(1.89)	**(5.59)**	**(9.69)**	(1.04)	**(6.74)**	**(6.90)**	**(2.31)**
D_COR	**-4.696**	**-4.856**	**-4.395**	**-5.274**	**-4.577**	**-6.741**	**-3.373**	**-3.985**	**-3.246**
	(4.45)	**(4.69)**	**(6.18)**	**(3.47)**	**(2.93)**	**(5.15)**	**(2.52)**	**(3.02)**	**(3.45)**
D_EMP	**-11.55**	**-11.92**	**-8.710**	**-12.70**	**-11.91**	**-8.936**	**-9.623**	**-11.27**	**-8.513**
	(10.31)	**(8.71)**	**(9.60)**	**(8.43)**	**(7.38)**	**(7.45)**	**(5.48)**	**(5.72)**	**(5.49)**
D_GOV	**11.91**	**11.13**	**4.875**	**12.60**	**12.45**	**6.015**	**12.26**	**11.11**	3.680
	(6.93)	**(7.46)**	**(3.17)**	**(3.46)**	**(4.11)**	**(2.17)**	**(5.49)**	**(5.47)**	(1.94)
D_INV	**-3.372**	**-3.321**	**-1.661**	**-5.003**	**-5.186**	**-2.442**	0.693	0.549	1.160
	(4.11)	**(4.52)**	**(3.08)**	**(5.92)**	**(6.95)**	**(3.36)**	(0.51)	(0.38)	(0.92)
D_PEN	**-10.56**	**-7.475**	**-8.385**	-5.798	-3.913	-9.074	**-14.79**	**-11.22**	**-8.353**
	(2.87)	**(2.24)**	**(2.44)**	(1.04)	(0.83)	(1.69)	**(3.63)**	**(2.99)**	**(2.50)**
D_OTH	-1.926	**-4.994**	**-3.681**	-5.243	**-6.257**	**-7.387**	0.743	-3.535	-1.851
	(0.93)	**(2.32)**	**(2.52)**	(1.56)	**(2.40)**	**(2.43)**	(0.29)	(1.19)	(0.80)
D_LEV	**2.558**	**2.860**	**1.193**	**2.276**	**2.290**	0.930	2.671	**2.989**	1.218
	(2.82)	**(3.08)**	**(2.06)**	**(2.32)**	**(2.13)**	(1.44)	(1.71)	**(2.06)**	(1.31)
ROE	**0.964**	**0.651**	**0.411**	**1.241**	**0.821**	**0.479**	0.591	0.684	0.230
	(5.84)	**(3.03)**	**(3.73)**	**(8.03)**	**(3.74)**	**(4.86)**	(1.71)	(1.92)	(0.76)
FMB	-0.169	**-0.405**	-0.0194	0.0153	**-0.455**	0.176	**-0.824**	**-1.276**	**-0.418**
	(1.07)	**(2.51)**	(0.15)	(0.07)	**(2.02)**	(1.35)	**(2.58)**	**(3.29)**	**(2.04)**
I	**0.793**	**0.834**	**0.186**	**0.682**	**0.725**	**0.180**	**0.978**	**1.002**	**0.260**
	(7.63)	**(17.62)**	**(2.69)**	**(5.28)**	**(11.73)**	**(2.05)**	**(7.64)**	**(14.00)**	**(2.71)**
C	**1.010**	**0.957**	**0.979**	**1.036**	**1.119**	**0.928**	**0.999**	**0.928**	**1.020**
	(21.03)	**(17.92)**	**(60.05)**	**(11.38)**	**(12.92)**	**(22.35)**	**(16.98)**	**(9.75)**	**(15.10)**

N	19360	19360	19360	11670	11670	11670	7690	7690	7690
adj. R-sq	0.192	0.234	0.605	0.162	0.158	0.322	0.196	0.211	0.437

Equation 1b: $Score_{it} = a_0 + a_{11}D_COR_{it} + a_{12}D_EMP_{it} + a_{13}D_GOV_{it} + a_{14}D_INV_{it} + a_{15}D_PEN_{it} + a_{16}D_OTH_{it} + \ldots$

$$a_2D_LEV_{it} + a_3ROE_{it} + a_4TQ_{it} + a_5CM_{it} + a_6IM_{it} + e_{it}$$

The equation is estimated using OLS on a pooled cross-section and time-series with standard errors adjusted for clustering by firm and by year (Petersen, 2009). The absolute value of t-statistics are in brackets and coefficients and t-statistics representing significance at 0.05 or less are in bold. The variables are as defined in table 4 except that the variables identifying the six components of strategic equity holdings are zero-one dummies where one represents an strategic equity holding greater than 10% for corporate holdings (D_COR), employee/family holdings (D_EMP), government holdings (D_GOV), investment institutions' holdings (D_INV), pension fund holdings (D_PEN) and other strategic equity holdings (D_OTH). ALL is the full sample and LME and CME the samples for liberal market economies and coordinated market economies.

Table 7. Propensity Score Matching Results For Critical Values

		All			LME			CME		
		SOC	ENV	CG	SOC	ENV	CG	SOC	ENV	CG
D_SEH	ATT	**-5.502**	**-5.968**	-1.461	-2.182	-1.055	**3.603**	-1.711	**-5.034**	**-5.136**
	T	**(6.65)**	**(6.96)**	(1.85)	(1.69)	(0.79)	**(3.87)**[1]	(1.40)[2]	**(4.20)**	**(4.90)**
D_COR	ATT	**-2.710**	**-3.695**	**-3.618**	-2.103	-0.401	**-5.284**	**-2.805**	**-4.437**	**-2.638**
	T	**(2.89)**	**(3.90)**	**(4.23)**	(1.48)	(0.29)	**(4.04)**	**(2.38)**	**(3.83)**	**(2.81)**
D_EMP	ATT	**-10.284**	**-10.432**	**-9.351**	**-11.399**	**-9.914**	**-8.058**	**-10.122**	**-11.144**	**-9.452**
	T	**(9.54)**	**(9.47)**	**(9.12)**	**(8.26)**	**(7.02)**	**(6.72)**	**(6.38)**	**(7.00)**	**(7.05)**
D_GOV	ATT	**16.294**	**16.847**	**4.887**	**20.092**	**18.411**	**11.881**	**13.625**	**14.388**	3.146
	T	**(7.75)**	**(7.75)**	**(2.54)**	**(4.69)**	**(4.56)**	**(3.13)**	**(6.04)**	**(6.07)**	(1.40)
D_INV	ATT	-2.390	-1.944	1.064	-2.562	-1.814	-0.445	2.163	1.298	**6.844**
	T	(1.49)	(1.15)	(0.72)[2]	(1.44)	(0.97)	(0.35)	(1.37)	(0.83)	**(5.09)**
D_PEN	ATT	**-7.192**	**-7.289**	**-8.087**	6.480	0.679	-3.208	**-20.844**	**-17.107**	**-11.452**
	T	**(2.06)**	**(2.11)**	**(2.50)**	(1.37)	(0.14)	(0.78)	**(4.35)**	**(3.60)**	**(2.70)**
D_OTH	ATT	-2.488	**-5.132**	**-6.649**	-4.129	-6.070	**-6.596**	2.030	-2.687	-2.890
	T	(1.22)	**(2.46)**	**(3.65)**	(1.27)	(1.86)[2]	**(2.28)**	(0.80)	(1.03)[2]	(1.42)[2]
D_LEV	ATT	**5.140**	**6.155**	**1.711**	**4.931**	**5.787**	**2.146**	**4.398**	**6.351**	**2.178**
	T	**(6.08)**	**(7.04)**	**(2.09)**	**(4.85)**	**(5.55)**	**(2.74)**	**(3.13)**	**(4.56)**	**(1.96)**

Equation 2: $TRT_{it} = b_0 + b_2 LEV_{it} + b_3 ROE_{it} + b_4 FMB_{it} + \Sigma y.YR_{it} + \Sigma c.CO_{it} + \Sigma i.IND_{it} + e_{it}$

The table reports the average treatment effect on the treated (ATT) where treatment is defined as strategic equity holdings greater than 20% (D_SEH), and strategic equity holdings of greater than 10% for each of the components of SEH: (D_COR), employee/family holdings (D_EMP), government holdings (D_GOV), investment institutions' holdings (D_INV), pension fund holdings (D_PEN) and other strategic equity holdings (D_OTH). The treated firms are matched with their closest untreated neighbour on the basis of the probability of treated estimated from the probit model specified in equation 2. Absolute values of the t-statistics are give in brackets and ATT estimates and t-statistics signifying statistical significance less than 0.05 are shown in bold. The treatment is assessed agains the three ESG scores, social (SOC), environmental (ENV) and governance (CG) for the full sample and sub-samples restricted to liberal market economies (LME) and coordinated market economies (CME). [1] signifies that the significant result is not confirmed when using bootstrapping techniques. [2] signifies that bootstrapping returns a statistically significant result where as the standard technique does not.

Appendix 1. ESG Scores, Strategic Equity Holdings and Leverage by Industry.

	N	SOC	ENV	CG	SEH	LEV
UNCLASS	12	25.00	21.33	25.63	40.33	5.83
BASIC IND.	2179	51.77	57.22	50.46	23.96	5.51
CAPITAL GOODS	2446	56.08	63.75	48.97	24.27	5.80
CONSUMER DUR.	613	57.59	66.42	47.70	26.38	4.75
CON. NON-DUR	1350	54.27	51.31	51.75	27.81	6.43
CONSUMER SER.	2798	46.14	40.27	50.48	29.91	6.31
ENERGY	1364	48.24	46.20	60.94	28.02	5.55
FINANCE	4124	43.27	38.88	50.48	25.71	4.47
HEALTH CARE	1098	51.14	45.60	56.09	28.01	6.99
PUBLIC UTILITIES	1231	58.36	59.26	55.01	28.86	4.80
TECHNOLOGY	1518	47.47	48.09	58.92	25.52	6.53
TRANSPORT	627	48.54	50.17	42.69	29.11	4.82
Total	19360	49.72	49.30	52.03	26.70	5.58

This table shows the distribution of observations and mean social (SOC), environmental (ENV) and governance (CG) scores, strategic equity holdings (SEH) and leverage deciles (LEV) across basic industry groups.

Appendix 2. ESG Scores, Strategic Equity Holdings and Leverage by Country.

COUNTRY	N	SOC	ENV	CG	SEH	LEV
AUSTRALIA	902	40.74	41.71	58.66	22.44	5.01
AUSTRIA	141	48.72	49.29	27.73	38.61	4.16
BELGIUM	193	48.13	52.99	44.66	39.54	4.18
BRAZIL	115	69.53	56.06	25.94	38.20	5.27
CANADA	1041	34.64	34.85	69.64	19.04	4.90
CHILE	33	48.03	43.87	10.92	57.33	5.42
CHINA	126	35.69	32.10	22.01	49.21	4.76
COLOMBIA	8	43.27	36.62	28.90	48.38	5.38
CYPRUS	3	43.79	24.65	53.06	0.00	2.00
CZECH REP.	12	64.23	53.51	29.98	57.17	5.33
DENMARK	173	46.18	51.23	26.81	30.27	5.23
DUBAI	4	25.81	36.49	20.35	50.00	4.00
EGYPT	6	25.28	12.42	10.66	26.33	5.67
FINLAND	193	64.76	70.68	51.53	21.28	5.11
FRANCE	673	75.18	74.33	50.37	34.27	4.60
GERMANY	553	66.20	66.01	30.49	29.62	4.51
GREECE	174	51.05	48.54	19.20	30.29	4.47
HONG KONG	482	36.30	33.30	25.32	47.71	5.08
HUNGARY	9	85.68	76.33	45.30	42.56	3.00
ICELAND	3	55.58	27.59	26.68	51.33	3.00
INDIA	103	62.47	53.23	26.87	48.15	5.94
INDONESIA	31	60.95	39.17	22.46	35.00	7.71
IRELAND	116	41.20	41.93	60.11	24.87	4.72
ISRAEL	31	30.49	31.06	27.04	29.68	5.55
ITALY	360	60.81	49.41	34.23	41.74	3.96
JAPAN	2631	43.95	60.89	11.50	14.95	4.03
JORDAN	2	63.84	57.73	20.55	34.00	2.50
KAZAKHSTAN	2	34.63	18.55	55.66	0.00	4.00
KUWAIT	8	29.72	14.68	3.37	26.25	5.13
LUXEMBOURG	9	53.16	44.27	38.56	23.56	7.00
MALAYSIA	63	44.41	37.54	37.99	41.46	4.97
MEXICO	54	54.65	48.90	19.40	24.61	4.56
MOROCCO	5	63.68	20.43	3.43	45.40	7.00
NETHERLANDS	248	75.31	66.77	62.65	17.81	4.77
NEW ZEALAND	64	42.56	47.08	51.13	21.16	4.56
NORWAY	173	59.59	55.96	50.90	33.50	5.49
OMAN	2	12.10	15.99	5.33	0.00	3.50
PERU	4	64.28	35.72	46.98	60.00	8.50
PHILIPPINES	14	39.75	35.73	24.16	42.86	5.64
POLAND	34	33.34	27.93	14.71	57.24	4.15
PORTUGAL	85	75.21	64.48	43.35	54.39	4.29
QATAR	4	25.85	19.82	4.35	60.00	7.00
RUSSIA	77	48.76	38.65	21.18	51.05	4.35
SAUDI ARABIA	11	23.65	28.44	5.41	64.82	5.91
SINGAPORE	265	34.24	32.55	35.65	38.37	4.56
SOUTH AFRICA	76	75.21	63.56	60.46	35.76	5.43
SOUTH KOREA	130	54.23	61.81	16.27	35.41	4.38
SPAIN	344	73.38	67.60	44.21	43.62	4.94
SRI LANKA	1	50.79	47.34	23.26	0.00	5.00
SWEDEN	400	61.42	62.92	49.19	26.61	4.71

SWITZERLAND	420	57.10	58.80	49.46	25.81	5.60
TAIWAN	103	38.68	47.61	12.06	13.08	5.26
THAILAND	32	52.39	42.99	45.44	27.72	5.78
TURKEY	41	47.51	38.17	12.39	53.44	4.46
UK	2314	63.27	58.73	68.10	26.75	9.92
USA	6259	43.24	38.57	72.91	25.45	5.58
Total	19360	49.72	49.30	52.03	26.70	5.58

This table shows the distribution of observations and mean social (SOC), environmental (ENV) and governance (CG) scores, strategic equity holdings (SEH) and leverage deciles (LEV) across countries. Those countries classified as liberal market economies are in italics. The allocation to LME or CME is initially based on equity market capitalisation to GDP and origin of the legal system. Common law countries with higher than median MC/GDP are designated LME. For all large economies, and hence substantial samples, this corresponds to the Hall and Soskice (2001) classification. It is assumed to hold for smaller economies. In a few instances the decision rules did not correspond and a judgement allocation was made. For example the Indian legal system is common law but it has a relatively small equity market. These decisions only affect a few small samples and the results are not noticeably changed if countries with small samples (less than 100 firm/years) are excluded.

Appendix 3. Distribution of Leverage, Return on Equity and Firm Market to Book across Deciles.

	LEV		ROE		FMB	
	mean	median	mean	Median	mean	median
Decile						
1.000	-0.054	0.000	-0.667	-0.224	-7.824	0.803
2.000	0.067	0.067	0.001	0.007	1.003	1.006
3.000	0.182	0.185	0.051	0.052	1.147	1.146
4.000	0.268	0.269	0.082	0.082	1.310	1.310
5.000	0.342	0.343	0.109	0.109	1.518	1.514
6.000	0.411	0.411	0.136	0.136	1.809	1.802
7.000	0.485	0.484	0.166	0.166	2.249	2.239
8.000	0.575	0.574	0.206	0.205	3.090	3.052
9.000	0.691	0.689	0.271	0.267	6.644	5.484
10.000	0.990	0.875	1.086	0.451	283.218	134.193
Average	0.408	0.384	0.143	0.124	34.647	1.668

LEV, ROE and FMB are used in the regression models as deciles estimated from the full sample for leverage, measured as total debt/(equity + total debt), return on equity, measured as net income over equity, and firm market to book, measured as market value of equity plus total debt over book value of equity plus total debt. The table shows the distribution of the underlying values.