LTA 3/10 • p. 265–292

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The Value Relevance of Environmental and Social Performance: Evidence from Swedish SIX 300 Companies

ABSTRACT

Environmental, social, and governance performance has attracted close attention around the world and is becoming a focus of many companies, investors, financial analysts, and accounting policy makers. This paper provides insight into how environmental and social performance is reflected in the market

Acknowledgments

We would like to thank Mistra, the Foundation for Strategic Environmental Research, Liikesivistysrahasto (the Foundation for Economic Education), Stiftelsen för Åbo Akademi (Åbo Akademi University Foundation), the Graduate School of Accounting at the Academy of Finland, and Öhrlings PricewaterhouseCoopers for the financial support. GES Investment Services made this study possible by providing the environmental and social ratings. We are grateful to Rickard Olsson for assistance with the financial data. Valuable comments have been received from participants at the Contemporary Accounting Research in Europe workshop in Jönköping, the Global Conference on Business and Finance in Costa Rica, and the 20th NFF Conference in Turku. The paper was awarded the Outstanding Research Award and the Best in Session Award at the Summer 2009 Global Conference on Business and Finance. We gratefully acknowledge insightful comments from the two anonymous reviewers at the FJBE.

Programs used in this paper are Stata 9.2. and PASW Statistics 17. The data was obtained from the GES Invetsment Services Risk Rating database (www.ges-invest.com) and from the Thomson Datastream (www.online.thomsonreuters.com/datastream).

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value of listed SIX 300 companies on OMX Stockholm. Applying the Ohlson valuation model, we express the market value of equity as a function of the book value of equity, accounting earnings, and environmental and social performance, where the last two variables are the proxies for other value-relevant information. We test this model with data from the GES Investment Services® risk ratings that enable us to create a holistic view on the long-term extra-financial performance and to disaggregate the effects of various dimensions of environmental and social performance on stock prices. The evidence presented in this study finds support for the value relevance of environmental performance at both aggregated and sub-aggregated levels. In the social dimension, support is found for community and supplier relations. We contribute empirical findings to the current debate on the relations between environmental and social performance and shareholder value, and demonstrate the extra-financial value of environmental and social performance.

Keywords: *Environmental Performance; Social Performance; Equity Valuation; Financial Accounting; Extra-Financial Information*

JEL classification: M41, Q56, M14

1. INTRODUCTION

This paper extends previous US- and UK-based research on the relation between environmental/social performance and the market value of companies based upon a conventional value relevance model into a Swedish context. Another extension is to follow the recommendations of Derwall (2007) and Scholtens and Zhou (2008) to go beyond aggregated effects of environmental and social performance and consider sub-dimensions of environmental and social performance as specific extra-financial drivers of value.[1] In Sweden, the environmental and social concerns of the government and labor unions impose powerful and unique regulatory and legal constraints on company activities. Institutional investors, such as the Swedish state pension funds, and the Swedish Society of Financial Analysts have provided guidelines for the integration of environmental and social performance into the investment process. Among Nordic countries being in the Top Six of the Responsible Competitiveness Index alongside the UK, Sweden is ranked first with high scores of policy drivers and business action (Accountability, 2007).

The understanding of whether environmental/social performance is related to the market value of companies in Europe, particularly in Sweden is still relatively unknown. Some previous European-based studies have looked at environmental and social information that has been disclosed in corporate annual financial reports and stand-alone sustainability reports (Cormier and Magnan, 2007; Schadewitz and Niskala, 2010). However, this approach does have its limitations. Voluntary social and environmental disclosures are diverse in their extent and content and have limited usefulness in measuring environmental/social performance (Barth and McNichols, 1994; Hedberg and Malmborg, 2003; Clarkson *et al*., 2008; Tagesson *et al*., 2009).

To overcome the limitations of previous research, this study focuses on environmental and social performance ratings produced externally by professional rating services that provide a multi-dimensional view on the performance of companies. The current research therefore facilitates a Swedish comparison with previous US and UK work (e.g. Guenster *et al.*, 2010; Scholtens and Zhou, 2008; Brammer *et al*., 2006), avoids difficulties associated with the internally-produced voluntary information on corporate environmental/social activities, and considers both aggregated and disaggregated environmental and social non-financial performance.

Starting with Amir and Lev (1996), a large body of accounting literature explores the value relevance of non-financial information. The general conclusion emerging from research in this area is that accounting (financial) information and related investment fundamentals, such as cash flows, book values, and earnings, do not alone explain the variation in stock prices/returns. Along this line, Barth and McNichols (1994) and Hughes (2000) argued that non-financial indicators of environmental performance have an unbooked-liability component that is assessed by the capital market. More recently, Daniel and Titman (2006) showed that future returns are unrelated to the traditional accounting measures of past performance (e.g. earnings and book values), which is defined as tangible information. Moreover, stock returns are explained by the intangible information about future performance, which is independent of past performance. A growing gap between the market value of companies' shares and their book value of equity continues to be an extremely important issue of academic debates.

Over the past decade, a rapid growth of socially responsible investments (SRI) has increased investors' awareness of extra-financial performance relating to environmental, social, and governance (ESG) issues (Brammer *et al*., 2006; Renneboog *et al*., 2008). An increasing number of academic studies have argued that ESG performance assists investors to value intangible assets that are not recognized in historical cost-based financial reports. The extra-financial factors disclosed, beyond regulatory requirements and legislation, include performance on value drivers that are the basis for future financial returns. Environmental/social performance affects stock prices either directly through an efficient utilization of human and material resources, or indirectly through a positive image with customers, suppliers, and community (Orlitzky *et al*., 2003; Brammer *et al*., 2006; Callan and Thomas, 2009). Although the literature on the relation between financial and environmental/social performance is growing, there is limited evidence of research focusing on the decoupling of corporate environmental/social responsibility constructs in order to deepen our understanding of the specific extra-financial drivers of market value of the company and what the value implications of the criteria are on a disaggregated level.

The purpose of this study is to investigate the value relevance of environmental and social performance ratings for the market values of companies listed on the OMX Stockholm (Stockholmsbörsen). We propose that the market value of companies will reflect both their financial

performance and non-financial environmental/social performance. According to our model, financial performance does not alone explain the market value of the companies, but the value relevance of financial statement information can be complimented if it is combined with environmental/social information that has been compiled into performance ratings. In terms of the research settings, our paper is closely related to research on the value relevance of non-financial environmental information in Hassel *et al*. (2005), which examined the value relevance of environmental performance in the late 1990s. Their results revealed that environmental performance is negatively related to the market value of equity in a time period with inflated market premiums in certain sectors. One of the key distinctions of this study is that it investigates both environmental and social performance also at disaggregated levels. In recent studies, multi-dimensional constructs that measure company performance across a wide range of ESG dimensions are used (Derwall, 2007; Scholtens and Zhou, 2008). They assess a company's general position with respect to a complex range of concerns relevant to investors. The effect of these mixed attributes is that ESG at the aggregate level does not relate to the market-value measures and, therefore, focusing attention on the wrong aspect yields inappropriate inferences. We provide empirical evidence from the SIX 300 Index of Swedish companies by using the GES Investment Services risk rating for the period 2005–2008 for both environmental and social indexes and their sub-dimensions. The SIX 300 Index represents the market performance of the 300 large, medium, and small stocks on OMX Stockholm.

Our results contribute to existing research in two ways. First, our findings contribute to research on the intangible determinants of stock prices. We show that environmental and social performance complements financial information to explain market value added during the period 2005–2008 at OMX Stockholm. Most of the previous research has been limited to US and UK companies in MSCI World. In Sweden, the integration of environmental and social information in the financial investment process is considered as an advanced concept that is firmly established in the recommendations of the Swedish Society of Financial Analysts (SFF) regarding sustainability reporting. Second, in order to understand the value relevance of especially social performance, the sub-dimensions of employee, community, and supplier relations have to be separated. Previous studies have been inconclusive on the social dimension.

The remainder of the paper is organized as follows: the next section presents the literature review. The following sections discuss institutional and regulatory background, data analysis, and results. The concluding discussion summarizes the findings, limitations, and implications of the study.

2. LITERATURE REVIEW

2.1 Environmental and social performance and extra-financial information

The concept of extra-financial information, i.e. information on issues about the future prospects of a company that are not directly quantifiable in financial terms per se, is embraced in this study. Extra-financial information is additional forward-looking information, which is linked in this study to the ESG performance of a company. From theoretical financial and economic perspectives, ESG performance is defined as an intangible asset, i.e. the goodwill of a company that is reflected in the stock market (Heal, 2005; Lundgren, 2007). Heal (2005) has argued that environmental/social programmes can increase profit in the long run through the reduced cost of conflicts with society, reduced waste, improved relations with regulators, brand creation, employee productivity, the lower cost of capital that, in sum, make companies more attractive to investors. Extra-financial information therefore is a component that can be attributed to intangible information.

Social and environmental accounting that aims to provide extra-financial information is at present predominantly a voluntary practice. There is still much debate on reporting practices, in particular, on the quantitative characteristics of performance information and independent verification of published sustainability data (Deegan, 2002). Prior research showed that quantity and quality of social and environmental disclosures are improving. In addition, it is strongly related to factors, such as company size, industry, profitability, culture, and nationality (Tagesson *et al*., 2009; Holland and Foo, 2003). Social and environmental disclosures, as a communication tool, enhance transparency by bringing a positive profile to companies and strengthening their relations with stakeholders (Azzone *et al*., 1996; Blacconiere and Northcut, 1997). However, the information reported by companies on their environmental and social activities is sparse, inconsistent, and typically omits large issues facing the reporting company (Cormier *et al*., 2009). A crucial component of these disclosures is that unverifiable practices of successful companies can be manipulated and misinterpreted or easily mimicked by other performers (Clarkson *et al*., 2008). Overall, the environmental and social reports vary widely across companies and do not provide a holistic view on corporate environmental and social performance.

The literature in social and environmental accounting research can be categorized into three broad groups based on the type of extra-financial information used. The first line of literature investigates the relations between corporate environmental/social disclosures provided via a set of communication channels (e.g., paper-based reports, web pages, press releases) and the stock market (Blacconiere and Northcut, 1997; Hasseldine *et al*., 2005; Murray and Gray, 2006; Cormier *et al*., 2009; Schadewitz and Niskala, 2010).

The second line of studies investigates the relation between environmental disclosures and environmental performance (Ingram and Frazier, 1980; Jaggi and Freedman, 1982; Wiseman,

1982; Freedman and Wasley, 1990; Fekrat *et al.*, 1996; Bewley and Li, 2000; Hughes *et al.*, 2001; Patten, 2002; Clarkson *et al.*, 2008; Cormier *et al.*, 2009). The results of these studies are mixed. One reason for inconclusive findings is due to different instruments that are used to measure environmental/social disclosures. Different types of disclosures (discretionary and non-discretionary) used in the content analysis can also lead to conflicting results. In addition, many studies do not differentiate between environmental and social disclosures that are related to inherently different aspects of environmental and social performance. Thus, the inferences drawing from these studies can be misleading.

This paper contributes to the third line of studies that examines the relation between corporate environmental/social performance and market value (see e.g., Orlitzky *et al*., 2003; Margolis *et al*., 2007; Callan and Thomas, 2009 for a review). These studies normally rely on environmental and social performance ratings supplied by professional investment services, such as ASSET4: Thomson Reuters, KLD Research and Analytics: RiskMetrics Group and GES-Investment Services.[2] The ratings have been found to provide consistent estimates across the MSCI U.S. company universe (Semenova, 2010). In particular, a group of studies that tests whether environmental/social performance contributes to the explanation of stock prices/returns in the long-run is most relevant for this study. The evidence provided by the event and portfolio studies is limited by the assumption that stock market misprices environmental and social performance in the short-run (McWilliams *et al*., 1999; Koedijk and Horst, 2008, Lundgren and Olsson, 2009).

2.2 Environmental performance and market value

The most consistent support in prior research has been found for the value relevance of environmental performance. Theoretical underpinnings relate to the academic debates on the Porter hypothesis that environmental policies can lead to an increased competitiveness of a company through product and process improvements (Porter and Van der Linde, 1995; Lundgren and Brännlund, 2009). Based on Porter's theory, an environmentally pro-active leading company can increase market value due to the reputational benefits of the anticipation of environmental regulations and future liabilities. Within the scope of the empirical literature, Barth and McNichols (1994) found that environmental liabilities are value relevant and provide explanatory power incremental to recognized assets and liabilities. Hughes (2000) extended the work of Barth and McNichols by using non-financial air-pollution measures and reported a negative relation between company value and SO_2 emissions. Johnston *et al*. (2008) revealed the value relevance of SO_2 emissions allowances held by electric utility companies. Konar and Cohen (2001) demonstrated that environmental performance correlates with intangible asset values (Tobin's *Q*) in high-risk industries. However, the environmental performance measures used in these studies are narrow indicators that collapse multi-dimensional environmental performance construct (Azzone

et al., 1996; Ilinitch *et al*., 1998) into a single dimension.

Multi-dimensional measures of environmental performance reflect, among their dimensions, pro-active environmental management that concentrates on improving the eco-efficiency of a company in the long-run through production and manufacturing process. Guenster *et al*. (2010) found a positive relation between best-in-class eco-efficiency score and Tobin's *Q*. The relation strengthened over time, indicating that the market-value effect of environmental performance was priced with a drift. The difference in market values of low and high eco-efficiency companies increased over time, indicating especially that the lagging companies were penalized. Their sample comprises US-listed companies. Hassel *et al*. (2005) used an abnormal earnings model with non-financial environmental performance as a driver of future earnings and found an incremental effect on the market value added based upon Swedish data in a period with inflated market premiums in certain sectors. Our study focuses on recent Swedish data using comprehensive environmental performance ratings at both aggregated and disaggregated levels.

Following Clarkson *et al*. (2008), this study isolates the items of environmental performance related to environmental policies, environmental reporting, environmental certification, etc. into the environmental preparedness dimension. Such items can be expected to be more widespread and easily duplicated by other environmental performers. Investors are more likely to interpret them as a positive sign that a company manages its environmental activities (Blacconiere and Northcut, 1997), but they may not contribute to the real protection of the environment. The paper goes beyond preparedness by introducing the core of environmental performance, i.e. how companies handle environmental impacts and risks in terms of product and process performance. We propose that environmental preparedness and environmental performance are value relevant since former brings a positive profile to companies and later indicates possible operational benefits from pro-active environmental management.

2.3 Social performance and market value

There is scarce evidence on the relation between corporate social performance and market value. According to stakeholder theory, the satisfaction of various stakeholder groups leads to positive relations between social and financial performance (Orlitzky *et al*., 2003; Waddock and Graves, 1997). Freeman *et al*. (2007) build a theoretical framework of stakeholder capitalism for social value creation that considers a company as a set of social transactions with a large number of stakeholders, such as customers, suppliers, communities, employees, and financiers. Principles of stakeholder capitalism focus on the voluntary cooperation of individuals in order to create sustainable relationships that provide the opportunity for leadership and competitiveness. Human-relations theories view employees as important organizational assets that can create value by improving motivation, inventing new products or building relations with clients (Edmans, 2008).

Allen *et al*. (2007) developed a model of stakeholder capitalism and showed that stakeholder-oriented firms which are concerned with employees and suppliers can benefit from a weakening of the competition through charging higher prices and reducing the probability of bankruptcy. Further, they argue that companies can improve a shareholder's welfare by voluntarily choosing to take into account other stakeholders.

In fact, it is important to look closely at the different components of stakeholder relations in connection with stock prices (Brammer *et al*., 2006; Scholtens and Zhou, 2008). Hillman and Keim (2001) indicated that good relations with primary stakeholders, such as employees, customers, suppliers, and communities, develop intangible value added, which increases market returns. Among stakeholder groups, community relations were found to be the main driver of the relations between market value added and stakeholder management.

Based on the social categories, such as community involvement, employee relations, diversity, and human rights, Derwall (2007) found an unexpected positive relation between social index and the cost of equity, but the author does not examine the sub-dimensions of social index separately. Scholtens and Zhou (2008) found that, in general, the association between the composite measures of stakeholder relations and stock returns does not provide consistent results.

Brammer *et al*. (2006) argued that various aspects of social performance have distinguishing impacts depending on the company's business. An awareness of employee relations allows the firm to enhance productivity and work satisfaction, while the consideration of community relations strengthens brand images and consumer loyalty. Using a set of disaggregated social performance indicators for environmental, employment, and community activities, Brammer *et al*. (2006) showed that improved community relations lead to poor investment returns, while low employment scores relate to low returns. Besides conflicts in sub-dimensions, they also found that corporate social performance explains a very small proportion of the variation in stock returns. Edmans (2008) found that employee satisfaction is positively correlated with long-run shareholder returns, but the stock market does not fully value intangibles. Mandl *et al*. (2008) concluded that the human-capital dimension contains value-relevant information beyond accounting figures and analysts' earnings forecasts.

Given the mixed US and UK-based evidence and inconclusive findings between financial and social performance, this paper wants to establish a link between employee, community, and supplier relations and market value. Overall, in this paper, environmental and social performance is determined as a long-term performance-related (i.e. success) factor that creates the extra-financial value of a company. We posit that environmental and social performance is likely to be positively valued by the capital market.

3. INSTITUTIONAL AND REGULATORY SETTING

A number of institutions and regulations in Sweden develop the engagement of companies, stakeholders, and investors in environmental/social responsibility. According to the Responsible Competitiveness Index (RCI), Sweden is a leader among 108 countries in social conditions and advanced public policies that promote responsible business practices (Accountability, 2007). The RCI indicates the degree of corporate responsibility in relation to climate, working environment, corruption and social issues by using a range of indicators classified into three sub-indexes, such as policy drivers, business action and social enablers. Countries with highest scores provide sustained innovation and implement environmental/social responsibility into both large domestic companies and SMEs. Nordic countries dominate in the top list of the RCI 2007.

Since 1996, the importance of extra-financial information to the investor has been highlighted by SFF.[3] SFF consists of professionals active in the sphere of qualified financial analysis within Sweden and represents the Stockholm Financial Centre. Being a member of the European Federation of Financial Analysts (EFFAS) and the Association of Certified International Investment Analysts (ACIIA), SFF promotes advanced standards for the collective competence of the financial sector in Sweden. Their recommendation, 'Environmental Information for Financial Analysts', states: 'environmental factors will increasingly influence the future cash flows of firms in both positive and negative ways' (SFF, 2000: 58; authors' translation). More recently, in revised SFF recommendations (2006), environmental information is complemented by social- and human-rights aspects, such as working conditions, employee relations, labour union rights, and child employment. The opinion of financial analysts is that environmental and social information is an important factor for future earnings forecasts. Such recommendations of financial analysts have a potential influence on the actions of the portfolio managers and, therefore, on the security prices of companies as well as on the advancement of environmental/social reporting (Nilsson, 2008).

Swedish state pension funds (AP funds) are required to consider environmental and social aspects in investment decisions by the Swedish government directive issued in 2001 (Hamilton and Eriksson, 2010). Similar practices are present in the UK, Germany, and Australia (Sparkes, 2002). The common strategy of AP funds is to maximize long-term return at a low risk level. AP funds represent the large group of institutional investors being on a leading SRI position after Dutch giant, ABP, French national pension reserve fund, Fonds de Reserve pour les Retraites (FRR), and the UK BT Pension Scheme (BTPS) managed by Hermes Found Management. Large institutional investors, such as AP funds, that use an external SRI analysis dominate on the Swedish stock market. They are more likely to apply a scope of environmental/social performance issues when valuing companies.

Stock exchanges have been identified as an important force contributing to transparency and disclosure on environmental/social performance among listed companies. OMX Stockholm, a division of NASDAQ OMX Exchange, has not mandated environmental and social disclosures for listed Swedish companies. However, it has a right to remove from listing those companies whose actions seriously violate human rights and other international ethical norms. OMX "Wholeheartedly Proud Policy" issued in 2007 considers corporate social responsibility in the following areas: securities transactions, the marketplace, employer/employee relations, company relations, environmental sustainability, and communication. NASDAQ OMX Exchange launched in 2008 OMX GES Nordic Sustainability Index that includes 50 companies listed on Nordic exchanges with strongest sustainability records.

Swedish companies are required by the accounting legislation, the Accountants Act, to disclose environmental information in the administration part of the annual report since 1999 (Nyquist, 2003; Hassel *et al.*, 2005). Denmark and the Netherlands were pioneers in mandating environmental reporting for certain industrial sectors in the late 1990s (Shadewitz and Niskala, 2010). Based upon the EU Accounts Modernization Directive (2003), the Swedish Annual Accounts Act requires disclosing non-financial information, including information on environmental and employee matters, in the audited director's report section of the annual report. Following national legislation, companies became to integrate environmental and social information into annual reports and provide more details on their official web pages. This approach is common in Australia, France, Denmark, Norway, Belgium and the Netherlands (ECCE, 2007).

European listed companies prepare their consolidated financial statements according to the International Accounting Standards (IAS) since 2005. To a certain degree, the IAS addresses the recognition and the measurement of environmental and social issues in annual reports (Shadewitz and Niskala, 2010). According to the report of the European Sustainability Reporting Association (ESRA, 2009), the number of Swedish listed and state-owned companies that provide information about environmental and social responsibilities in their annual or stand-alone sustainability reports has increased from 83% in 2007 to 90% in 2008. Tagesson et al. (2009) showed that Swedish companies provide extensive environmental/social information on their web pages besides annual financial statements.

Swedish state-owned companies (55) are required to issue GRI reports by the Sweden's Ministry of Enterprise, Energy and Communications since 2009. The initiative of the Ministry announced in 2007 led to a significant increase in GRI sustainability reporting from both state-owned and large listed Swedish companies from the 13% level in 2007 to 34% in 2008 (ESRA, 2009). GRI guidelines are used by all Swedish companies published stand-alone sustainability reports. The external independent assurance of sustainability reports was included in 69% of the separate sustainability reports published in 2008. The assurance statements in Sweden are based

upon the FAR SRS standard RevR 6 "Assurance of Sustainability Reports" and the FAR SRS RevU 5 "The Auditor's Consideration of Environmental Issues in the Audit of the Annual Report" (ESRA, 2009). In Finland, 72% of the companies reported in accordance with GRI and 30% of the sustainability reports were externally assured in 2008 (ESRA, 2008).

Environmental impacts of Swedish energy-intensive companies have been regulated with a CO2 and energy tax since 1991 (Brännlund and Lundgren, 2009). The strong price incentive provided through taxes indicates that the environmental policy of the government is a powerful determinant of corporate investments in environmental performance. As far as social context is concerned, Sweden has historically a high level of unionization. Trade unions among the Labor Organization affiliates have large delegations representing different occupational areas and parts of Sweden. The employment standards are established by law in Sweden. Collective agreements have high degree of legitimacy that facilitates stable and long-term relations on the labor market. Collective agreements are usually sectoral agreements and protect approximately 90% of the employees in different industries. Collective agreements provide more effective protection of employment condition than protection through minimum wage legislation used in other countries (e.g., Belgium, Spain, France, the Netherlands, Portugal, and Ireland). Similar collective agreements practice is present in Finland, Germany, and Italy. In addition, companies must have employee representation on their boards with the same rights and duties as all other board members (Allen *et al*., 2007). A survey of 100 large Swedish companies conducted by Swedish business magazine *Vekans Affärer* in 2007 found that companies focus on aspects such as climate and environment (81%) and employee relations (78%).

Overall, in 2008, the Swedish capital market was distinguished as one of the most developed in terms of integration of ESG information in the financial investment process with €191 billion invested based on sustainability criteria (Eurosif European SRI Study, 2008). However, a survey by Cerin and Swanström (2006) at the Swedish market suggested that there is a lack of empirical research on how environmental and social performance information used in valuation of companies in Sweden. This paper wants to fill the gap by exploring if and what kind of environmental and social performance is priced on OMX Stockholm. Given the fact that Sweden belongs to a group of code law countries with a planning-oriented system, this study, in this respect, is among the first to provide comprehensive empirical evidence by considering disaggregated extra-financial drivers of value.

4. METHODOLOGY

The foundation for our empirical tests is the regression of the market value of equity on the book value of equity, net income, and environmental/social performance. Assuming additive linear

relations, we propose to estimate the following regression model using panel data:

$$(1) \qquad \frac{MV_{i,t+1}}{TA_{i,t-1}} = \beta_0 + \beta_1 \frac{BV_{i,t-1}}{TA_{i,t-1}} + \beta_2 \frac{NI_{i,t}}{TA_{i,t-1}} + \beta_3 ESP_{i,t} + \beta_4 C_{i,t} + u_i + e_{i,t}$$

where $MV_{i,t+1}$ is the company's market value at time *t+1quarter*. The book value of its common equity at the end of the period *t-1quarter* is $BV_{i,t-1}$. The net income of the company for period *t* is $NI_{i,t}$. The vector of proxies for environmental and social measures of non-financial information for the company at time *t* is $ESP_{i,t}$, the vector of control variables at time *t* is C_{it} and the vectors of coefficients are β_3 and β_4, respectively. A company is denoted by *i*, i.e. a cross-section observation (*i* = 1,2,…224 firms), and *t* indicates time periods for each cross-section observation (for environmental/social variables *t* = November 2005, September 2006, September 2007, June 2008; for financial variables *t* = quarter4 2005; quarter3 2006; quarter3 2007; quarter2 2008). The term u_i captures random variables related to unobserved company-specific fixed effects. We deflate all accounting and market-based variables by the book value of assets $TA_{i,t-1}$ to control for size differences.

Equation (1) is based on the empirical analogue of the Ohlson model (1995) used by Hassel *et al*. (2005) in which the value relevance of environmental and social performance is investigated through other unobservable factors that affect market value. Note that the Ohlson residual income valuation and information dynamics model has become the conventional approach used to examine the value relevance of various non-financial variables in market-based accounting research (Amir and Lev, 1996; Ittner and Larcker, 1998; Trueman *et al*., 2000; Hirschey, 2001; Rajgopal *et al*., 2003; Kallapur and Kwan, 2004; Johnston *et al*., 2008). The model is based upon the hypothesis that the market expectations of future cash flows are reflected in current earnings, the book value of equity, and other non-accounting value-relevant information. By using the recognized Ohlson model (1995), we connect to a stream of value relevance literature that focuses on questions relating to non-financial intangible assets (Barth *et al*., 2001). According to Johnston *et al*. (2008) and Hassel *et al*. (2005), the coefficients of the deflated book value of equity β_1 and the deflated net income β_2 are expected to be positive.

In addition, in equation (1) we include control variables, such as sales growth and firm age, that are not reflected in the fundamental variables. Sales growth is used to control growth opportunities and firm age which is included as a proxy for unexpected sales growth, such as an investor's reaction which is higher for growth companies than for sluggish ones (Amir and Lev, 1996; Hughes, 2000; Johnston *et al*., 2008). Further, companies with high growth and capital expenditures in the early life-cycle stages, have been found to trade at a premium (Amir and Lev, 1996). Young companies are considered more environmentally/socially conscious and supposed to utilize cutting-edge technologies, processes, and strategies. We measure sales growth as the average in-

crease/decrease in sales over previous three quarters. A company's age is computed as the difference between the first registered trading day of shares and the respective date of analysis.

We also include industry dummies in the model to ensure that differences in the market value of equity are not merely an effect of industry differences. In the high-tech sector, traditional accounting indicators are complemented by the information on R&D expenditures, patent quality, population size, and penetration rate (Amir and Lev, 1996; Hirschey *et al*., 2001). It is expected that companies' environmental/social performance varies across industry sectors (Brammer *et al*., 2006; Semenova and Hassel, 2008; Beurden and Gössling, 2008). Environmental performance is more important in polluting industries with high inherent industry-risk[4] while in other sectors, such as information technology and retailing, the treatment of employees has higher importance. The impact on the community plays an important role for mining, steel, and metals companies. Previous empirical studies have incorporated industry groupings as a proxy that may mediate the influence of environmental/social performance on financial performance (Toms, 2002). Industries have been operationalized in this study by using the Global Industry Classification Standard (GICS) and combined into nine industry sectors. The term u_i contains the other important determinants of market value of equity, which are not explicitly included in equation (1).

While our fundamental argument is that environmental/social performance is multidimensional and that disaggregation is necessary to better understand the relations studied herein, we run a series of regressions of the market value of equity on the composite environmental and social measures (index) and their constituent sub-dimensions, such as environmental preparedness, environmental performance, employees, community, and supplier relations.[5] This enables us to disaggregate the effects of the various aspects of environmental and social performance on stock prices, and to determine their value-relevance to investors. Furthermore, because Semenova and Hassel (2008) and Hughes (2000) found that regulatory climate can influence the value relevance of environmental performance, we investigate equation (1) separately for each environmental/social performance dimension. We expect β_3 to be positive.

Equation (1) is estimated by using the pooled cross-section time-series data analysis. The first advantage of panel data approach is that the sample is much larger than when only cross-sectional methods are employed. Consequently, the precision in the estimation of the regression parameters will increase. We recognize that pooling several time periods of data for each company requires us to control for a correlation in the error term of the regression models over time for a given company (Cameron and Trivedi, 2005; Petersen, 2009). Ignoring this panel data problem would lead to underestimated standard errors and inflated *t*-statistics. In other words, the usual assumption that e_{it} is independently and identically distributed (iid) is clearly violated in panel data settings. In this study, we use clustering method that corrects serial correlation in the error term, e_{it} and produces consistent estimates in panel data models (Cameron and Trivedi, 2005; Petersen,

2009). Clustered standard errors allow residuals to be independent to within group correlation (Drukker, 2003).

The second advantage of the panel data approach is the possibility of a consistent estimation of the model, which controls bias from omitted variables. For the short panel used in this study, we estimate both fixed and random effects models. The fixed effects model allows the unobserved random factors, u_i, to be potentially correlated with observed regressors and permits the identification of the marginal effect for time-varying variables. The fixed effects model allows each cross-sectional unit to have different intercept. Accordingly, the unobserved heterogeneity is a parameter to be estimated in the fixed effects model. The random effects model treats any unobserved individual heterogeneity as being distributed independently of the observed regressors (Cameron and Trivedi, 2005). The random effects model, contrary to the fixed effect model, puts unobserved heterogeneity, u_i, into the error term, e_{it}, which are assumed to be iid. By including the industry dummies and control variables, we can capture unobserved fixed industry- and company-specific effects in the random model (Hirschey *et al*., 2001).

In this study, the parameters of the model are computed by using the fixed effects (within) OLS estimator and the random effects GLS estimator with clustered standard errors. We keep the assumption of zero correlation across groups as with fixed/random effects estimators and the assumption of zero correlation within groups as with clustered standard errors. Overall, the fixed and random effects estimates clustering at the panel level are robust to serial correlation and heteroskedasticity (Cameron and Trivedi, 2005; Petersen, 2009). The environmental/social measures, data sources, and the final sample of the study are introduced below.

5. DATA AND SAMPLE

5.1 Environmental and social performance data

Environmental and social performance data was obtained from the Global Ethical Standard (GES) Investment Services Risk Rating database. GES Investment Services provides the financial sector with analyses of ESG performance of the companies based on international standards on the environment, human rights and business ethics (Schäfer *et al*., 2006). The influence of GES ratings in a global stock market is estimated by more than €650 billion assets under management (gesinvest.com, 2010). Moreover, prior research found empirical support for the convergent validity of GES ratings (Semenova, 2010). The strength of the GES Investment Services Risk Rating database is that it provides evaluations of both the environmental and social performance of the SIX 300 companies at aggregated and sub-aggregated levels for all companies on the list.

The GES company-specific environmental index is based on two sub-dimensions, namely preparedness and performance. Preparedness represents reputational benefits from a company's

environmental policy, management systems, and regular reporting. Performance covers how a company handles environmental impacts and risks, in terms of product performance, energy use, GHG and VOC emissions, waste treatment, and other activities.

The GES company-specific social index evaluates the management of the relations with employees, communities, and suppliers in relation to the internationally agreed human-rights norms. The categories of social performance on which companies are evaluated are as follows: (I) employees, includes policies on health and safety, diversity, working hours and wages, child/forced labour; (II) community, covers community involvement policy and programmes; (III) suppliers, includes programmes on human rights and supply chain.

In contrast to the KLD social index, where social performance indicators are transferred among different dimensions, the GES social performance scores are estimated on the individual basis (Hillman and Keim, 2001; Brammer *et al.*, 2006; Derwall, 2007). The environmental/social dimensions of the GES rating are assessed on a seven-point, non-numerical scale from major strength (a) to major weakness (c). In the subsequent empirical analysis, the GES non-numerical ratings are converted into numerical scores, in which the highest performance-ranked (a) companies receive a rating equal to six and the lowest performance-ranked (c) companies receive a rating of zero. Altogether, the GES systematic screening evaluates companies' present environmental/social status and readiness for the future.

GES Investment Services has been evaluating the environmental/social performance of SIX 300 companies on an annual basis since November 2005. Ratings are based on information obtained from companies in their official documents, including annual and interim reports, and through a direct dialogue in the form of surveys or site visits. The evaluation also uses public information from non-governmental organizations (NGOs), the media, and the international network of analysts in the SiRi Company Ltd. The number of companies in each year was fairly stable, ranging from 268 to 275. However, in the first year of the sample period (2005), the population of companies was composed of 100 large- and medium-sized companies. Owing to the fact that the impact of environmental/social information on the market value of companies is increasing over time, we cover the time period of all available ratings. Our environmental/social data-set consists of 315 companies, which were rated from November 2005 to June 2008 at least once.

5.2 Other variables

Market value, common shareholders' equity, net income, the book value of assets, net sales, and birth date variables were retrieved from the Thomson Datastream tapes. The financial data-set consists of quarterly reports of 288 companies from the first quarter of 2005 to the last quarter of 2008, and covers all indicators essential for constructing accounting-based, market-based, and a set of control variables.

5.3 Sample

The sample for this study was drawn from the stock market index SIX 300 list of companies. This index is a market-capitalization weighted index of large, medium, and small companies trading on the OMX Stockholm and has been published since 1995. Our sample period was from 2005 to 2008. After the aggregation of the environmental/social data-set and the financial data-set by the company's ISIN code and the company name, we were left 276 companies listed on the OMX Stockholm from diverse industries over the period 2005–2008. As we aim to undertake panel data analysis, we include only those companies with at least three evaluations over the period. Missing data on some variables reduced the sample size to 224 companies. Table 1 shows an industry list of the companies in the sample according to the GICS used by GES Investment Services.

TABLE 1. Frequency distribution of companies across industries and market capitalizations.

Panel A. Companies classified by industry based on the Global Industry Classification Standard

Industry	Frequency (%)	Industry	Frequency (%)
Diversified Financials	11.5	Electronic Equipment & Instruments	2.2
IT Consulting & Services	11.0	Media	2.2
Commercial Services & Supplies	7.9	Software	2.2
Machinery	7.0	Construction & Engineering	1.8
Biotechnology	6.6	Household Durables	1.8
Real Estate	6.2	Trading Companies & Distributors	1.8
Communications Equipment	3.1	Industrial Conglomerates	1.3
Electrical Equipment	3.1	Marine	1.3
Health Care Equipment & Supplies	3.1	Metals & Mining	1.3
Paper & Forest Products	3.1	Pharmaceuticals	1.3
Specialty Retail	3.1	Textiles, Apparel & Luxury Goods	1.3
Building Products	2.6	Other (less than 1%)	11.0
Banks	2.2	Total	100

Panel B. Companies classified by market capitalization based on the SIX 300 Index

Capitalization	Frequency (%)
Large	22.5
Medium	32.2
Small	45.3
Total	100

6. RESULTS

6.1 Descriptive statistics

Table 2 provides the descriptive statistics for the regression variables. All accounting- and market-based variables are deflated by the opening book value of assets. Panel A in Table 2 shows the average values over the research period (before removing the outliers). For the sample companies, the distribution of environmental/social performance ratings is quite symmetric and consists of companies with both high and low environmental and social performance ratings, except suppliers that has virtually low scores or no valid values for companies in financials and information technology industry-sectors. As for the distribution of accounting- and market-based variables, we can see that there is non-normality in the data, which is caused by the accounting biases and noise. All variables have distributions that are leptokurtic and asymmetrical as indicated by high values of kurtosis and skewness. Due to extreme observations in the accounting- and market-based data, we adopt the approach that detects outliers from a univariate perspective and removes observations if they are more than 1.5 interquartile range away (Hair *et al*., 2005).

Panel B in Table 2 provides correlation coefficients between the explanatory variables using the pooled sample. The statistics show that environmental/social performance are significantly positively correlated with book value and net income. Note that the environmental/social variables are significantly correlated with each other and the unreported calculations of VIF statistics support this finding. For this reason, the research equation (1) is divided into the single regressions with each environmental/social variable in the statistical analysis. The deflated book value of equity, $BV_{i,t-1}/TA_{i,t-1}$, is significantly positively related (0.13) to deflated net income, $NI_{i,t}/TA_{i,t-1}$. The cross-sectional median and the mean of the regression variables are relatively stable over the research period.

6.2 Main results

Table 3 provides the results of fixed and random effects models based on equation (1) for environmental and social indexes. Columns of the panels report coefficients on dependent variable market value, $MV_{i,t+1}$, and their one-tailed tests of significance.[6]

We estimate equation (1) for each environmental/social proxy to assess whether the dimensions differ in their association with market value and to eliminate multicollinearity. For each of the environmental/social measures of company performance, we estimate the individual-specific effects panel data models (Cameron and Trivedi, 2005). Wooldridge test for first-order autocorrelation (2002, 282–283) indicates the presence of serial correlation in the panel data models. *F*-statistics are significant at $p < 0.001$. The results of the Lagrangian multiplier test identify the presence of individual-specific effects. The LM test statistics exceed the 95 percent critical value

TABLE 2. Descriptive statistics and correlation coefficients of key variables. Panel A reports the descriptive cross-sectional statistics of the sample. The sample consists of 224 companies included in the stock market index SIX 300 for OMX Stockholm. The research period of environmental/social observations is November 2005 to June 2008 and four annual environmental and social performance ratings are used. The research period of financial observations is the third quarter of 2005 to the third quarter of 2008. Market value, $MV_{i,t+1}$, is the market value of companies one quarter after the ratings are released. Book value, $BV_{i,t-1}$, is the companies' opening book value of equity and $NI_{i,t}$ is the net income. The deflator variable is the book value of assets, $TA_{i,t-1}$. The statistics present average values over the observation period. Panel B provides Pearson correlation coefficients among variables in the model using the pooled cross-section time-series sample (P values in parentheses)

Variables	Environmental Index	Preparedness	Performance	Social Index	Employees	Community	Suppliers	$MV_{i,t+1}/TA_{i,t-1}$	$BV_{i,t-1}/TA_{i,t-1}$	$NI_{i,t}/TA_{i,t-1}$
Panel A. All companies before removing outliers										
Mean	1.80	2.14	1.50	1.74	2.60	1.45	0.97	3.99	0.49	0.01
Median	2.00	2.00	1.00	2.00	3.00	2.00	0.00	0.99	0.46	0.01
Std. deviation	1.74	1.91	1.71	1.18	1.36	1.40	1.36	66.16	0.23	0.06
Skewness	0.60	0.34	0.81	0.44	–0.21	0.55	1.05	29.02	0.29	8.34
Kurtosis	–0.67	–1.11	–0.51	–0.41	–0.27	–0.40	–0.32	843.47	–0.59	168.35
Minimum	0	0	0	0	0	0	0	0.03	0.03	–0.36
Maximum	6	6	6	6	6	6	5	1924.73	1.11	1.30
Panel B. Pearson Correlation Coefficients (896 observations)										
Environmental Index	1.00									
Preparedness	0.94 (0.00)	1.00								
Performance	0.92 (0.00)	0.82 (0.00)	1.00							
Social Index	0.65 (0.00)	0.59 (0.00)	0.63 (0.00)	1.00						
Employees	0.63 (0.00)	0.57 (0.00)	0.61 (0.00)	0.84 (0.00)	1.00					
Community	0.64 (0.00)	0.61 (0.00)	0.62 (0.00)	0.81 (0.00)	0.64 (0.00)	1.00				
Suppliers	0.65 (0.00)	0.59 (0.00)	0.65 (0.00)	0.82 (0.00)	0.60 (0.00)	0.61 (0.00)	1.00			
$MV_{i,t+1}/TA_{i,t-1}$	–0.04 (0.28)	–0.05 (0.21)	–0.04 (0.32)	–0.07 (0.11)	–0.07 (0.07)	0.11 (0.01)	–0.04 (0.41)	1.00		
$BV_{i,t-1}/TA_{i,t-1}$	–0.31 (0.00)	–0.33 (0.00)	–0.27 (0.00)	–0.26 (0.00)	–0.19 (0.00)	–0.23 (0.00)	–0.24 (0.00)	0.32 (0.00)	1.00	
$NI_{i,t}/TA_{i,t-1}$	0.05 (0.24)	0.08 (0.05)	0.03 (0.00)	0.02 (0.63)	–0.01 (0.85)	0.11 (0.01)	0.13 (0.18)	0.46 (0.00)	0.13 (0.00)	1.00

for chi-squared with one degree of freedom. At this point, we conclude that the impact of the unobserved factors cannot be rejected in our regression models.

We make a distinction between fixed and random effects models. The Hausman test shows that the fixed effects model is the appropriate choice for our data, which implies that there is correlation between the included independent variables and the unknown individual-specific effect (Greene, 2003). The Hausman test statistics are significant at $p<0.001$ for chi-squared with three degrees of freedom. There is more justification for treating the unobserved effects to be related with the observed environmental/social and financial variables. However, the individual-specific effect is unknown and in short panels may not be consistently estimated (Cameron and Trivedi, 2005). The estimated cross-sectional variation (between-groups) is larger than variation over time (within groups) in the explanatory variables. Prior research also documented that ESG ratings do not change considerably over long-term interval (Guenster *et al.*, 2010; Semenova and Hassel, 2008). We show the results of both fixed and random effects models. The industry dummies are included but suppressed in the tables.

Consistent with the theory (Hassel *et al.*, 1995; Guenster *et al.*, 2010; Johnston *et al.*, 2008), the coefficients for the deflated net income and the deflated book value of equity are significantly positive and the coefficient for firm age as a control variable is significantly negative. It appears that accounting-based and control variables have the expected signs in our models.

As shown in Table 3, environmental index, preparedness, and performance are significantly positively related to the market value of equity ($\beta_3 = 0.06$, *t*-value = 2.38; $\beta_3 = 0.03$, *t*-value = 1.41; $\beta_3 = 0.06$, *t*-value = 2.30). This result differs from the study by Hassel *et al.* (2005) that found a significantly negative influence of environmental performance on stock returns in the same market, but with the limited data-set and inflated market premiums in certain sectors. The positive role for environmental performance is consistent with a formal model of goodwill capital developed by Lundgren (2007). Hence, the finding indicates that environmental performance is value relevant to investors at both aggregate and sub-aggregate levels.

Table 4 provides the results for the effects of social performance on market value. We observe that the relation between the social index and the market value is significantly negative ($\beta_3 = -0.06$, *t*-value = –2.20). The dimensions of disaggregated social performance display significant and different relations to the market value of equity.

Employees have a significantly negative relation to the market value of equity ($\beta_3 = -0.06$, *t*-value = –2.52). This finding is consistent with that of Scholtens and Zhou (2008). They found a negative association between employee relations and market return. Further, labour unions in Sweden are an important force in encouraging companies to adopt progressive human resources policies and practices. Companies with more than twenty-five employees have labour representatives among board members in order to guarantee that the interests of employees are taken

*TABLE 3. Association between market value and environmental performance. The table shows the outcome of estimating linear panel regressions of market value on financial variables and environmental performance. The unbalanced panel contains 224 companies constituting 896 company-year observations over the period 2005–2008. The table reports fixed effects (within) OLS and random effects GLS coefficients with t-statistic (in parentheses) based on clustered standard errors. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *, respectively (one-tailed tests). LM (BP) is the Breusch and Pagan Lagrangian multiplier test for random effects. Hausman is the Hausman test for fixed effects over random effects.*

Variable	Linear Panel Data Regressions					
	Fixed	Random	Fixed	Random	Fixed	Random
Intercept	0.53*** (4.49)	0.65*** (9.22)	0.58*** (4.70)	0.67*** (8.64)	0.55*** (4.59)	0.69*** (11.16)
$BV_{i,t-1}/TA_{i,t-1}$	0.62*** (2.65)	0.62*** (6.01)	0.62*** (2.60)	0.61*** (5.82)	0.64*** (2.72)	0.62*** (6.00)
$NI_{i,t}/TA_{i,t-1}$	4.19*** (2.83)	7.73*** (5.96)	4.12*** (2.75)	7.73*** (5.91)	4.23*** (2.84)	7.75*** (5.95)
Environmental Index	0.06*** (2.38)	0.03*** (2.20)				
Preparedness			0.03* (1.41)	0.02* (1.34)		
Performance					0.06*** (2.30)	0.03*** (2.20)
Control variables:						
Sales Growth	–	0.22 (0.80)	–	0.23 (0.84)	–	0.23 (0.84)
Firm Age	–	–0.02*** (–5.98)	–	–0.02*** (–5.77)	–	–0.02*** (–5.80)
Industry Dummies	–	72.49***	–	70.60***	–	64.70***
Adj. R^2	0.12	0.28	0.12	0.28	0.13	0.28
LM (BP)	124.20***	85.38***	123.42***	83.53***	124.07***	85.21***
Hausman	78.08***	256.90***	73.29***	274.97******	77.28***	255.44***
Num. obs.	896	896	896	896	896	896

*TABLE 4. Association between market value and social performance. The table shows the outcome of estimating linear panel regressions of market value on financial variables and social performance. The unbalanced panel contains 224 companies constituting 896 company-year observations over the period 2005–2008. The table reports fixed effects (within) OLS and random effects GLS coefficients with t-statistic (in parentheses) based on clustered standard errors. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *, respectively (one-tailed tests). LM (BP) is the Breusch and Pagan Lagrangian multiplier test for random effects. Hausman is the Hausman test for fixed effects over random effects.*

Variable	Linear Panel Data Regressions							
	Fixed	Random	Fixed	Random	Fixed	Random	Fixed	Random
Intercept	0.77*** (5.81)	0.74*** (9.06)	0.81*** (5.86)	0.80*** (9.14)	0.62*** (4.87)	0.64*** (6.83)	0.63*** (5.14)	0.72*** (9.79)
$BV_{i,t-1}/TA_{i,t-1}$	0.60*** (2.48)	0.58*** (5.61)	0.62*** (2.53)	0.57*** (5.49)	0.63*** (2.60)	0.61*** (5.84)	0.63*** (2.62)	0.60*** (5.89)
$NI_{i,t}/TA_{i,t-1}$	4.13*** (2.75)	7.89*** (5.98)	4.05*** (2.69)	7.88*** (5.98)	4.24*** (4.87)	7.66*** (5.78)	4.27*** (2.84)	7.79*** (5.94)
Social Index	–0.06*** (–2.20)	–0.01 (–0.37)						
Employees			–0.06*** (–2.52)	–0.02* (–1.37)				
Community					0.01 (0.28)	0.04** (2.04)		
Suppliers							0.00 (0.09)	0.04** (1.77)
Control variables:								
Sales Growth	–	0.26 (0.95)	–	0.23 (0.85)	–	0.27 (0.98)	–	0.27 (0.97)
Firm Age	–	–0.02*** (–5.26)	–	–0.02*** (–5.10)	–	–0.02*** (–5.75)	–	–0.02*** (–5.75)
Industry Dummies	—	69.68***	–	71.11***	–	72.26***	–	63.41***
Adj. R^2	0.13	0.28	0.13	0.28	0.16	0.29	0.15	0.29***
LM (BP)	123.92***	82.13***	124.79***	83.16***	116.77***	80.56***	123.10***	82.95***
Hausman	77.34***	264.69***	78.60***	255.98***	70.23	250.69***	645.32***	264.77***
Num. obs.	896	896	896	896	896	896	896	896

into account (Allen *et al*., 2007). It appears that companies incur additional costs to satisfy employee demands (McWilliams and Siegel, 2001; Scholtens and Zhou, 2008) and legal compliance issues (Brammer and Pavelin, 2006) that can negatively affect the market value of equity or neglect this relation. Hence, the result is consistent with the market view of these investments merely as costs not creating additional value.

When the random effects model is applied, community and suppliers are significantly positively related to a company's market value ($\beta_3 = 0.04$, t-value = 2.04; $\beta_3 = 0.04$, t-value = 1.77). Earlier work contains a general result that a good community performance is the main factor of the relations between social performance and market value that is expected by stakeholders in almost all industrial sectors (Hillman and Keim, 2001; Brammer and Pavelin, 2006; Scholtens and Zhou, 2008). We suggest that the discrepancy between random and fixed effects estimates for community and suppliers is explained by the narrow constructs of these measures since fixed effects model relies on the assumption that omitted factors are potentially related with observed extra-financial drivers of market value and isolate their impact. The findings indicate that social performance is value relevant to investors only at their sub-aggregate levels.

Model explanatory power for all specifications (e.g. adjusted R^2) ranges from 0.12 to 0.29 and all model F and χ^2 statistics are significant at $p < 0.001$. The adjusted R^2 increases from 0.28 with accounting-related variables on a stand-alone basis to 0.30 when the environmental and social sub-aggregated variables are included simultaneously in equation (1).

This result suggests that environmental and social performance explains a small portion of the variation in market values compared to, for example, the environmental liability measures used by Barth and McNichols (1994). Several factors may account for this result. Based on the analysts' research reports for North American and European companies, Nilsson (2008) found that financial analysts use environmental information in only 35% of the valuations. For most of the information, financial analysts focus on the negative side of the valuation, such as risk and expenditure assessment. Relatively low R^2 in the levels regression could also result from the scale effect as the fact of low variance to the mean of environmental and social performance as well as their lack of time-series invariability (Brown *et al*., 1999). Overall, the findings reveal that the environmental and social performance ratings contain information that is value relevant to investors. Positive relations between environmental index, preparedness, performance, and sub-dimensions of social index community, suppliers, and the market value of equity indicate that leading companies are trading at a premium.

6.3 Additional analysis

To check the sensitivity of our results, we performed several tests. First, we removed financial companies, where financial asset structure and level of regulation differ from other industries (not

reported). This yielded a sample of 716 company-year observations based upon 179 companies, most of which belong to industrial and information technology sectors. The results of this analysis are similar to those presented in Tables 3 and 4, with the exception of environmental preparedness, which is insignificant in this sample. In the second test, following Hirschey *et al*. (2001) and Hassel *et al*. (2005), we use the book value of shareholders' equity as an alternative deflator (not reported). Since the Hausman test favours the random effects model, we assumed that the company-specific effects are uncorrelated with regressors. As expected, environmental index, preparedness, and performance are significantly positive in all three models (e.g. *p*-values ranging from 0.015 to 0.036 based on one-tailed tests). In addition, suppliers are significantly positive (β_3 = 0.17, *t*-value = 3.00).

An additional concern is that large companies have lower relative costs to achieve high environmental and social performance than small companies do (McWilliams and Siegel, 2001). Lepoutre and Heene (2006) argued that it is difficult to integrate small companies into one corporate social responsibility framework due their distinguishing characteristics. Small companies tend to be more heterogeneous in terms of environmental and social activities compared to large- and mid-cap companies. We removed small-cap companies based upon the market capitalization of the SIX 300 Index. This yielded a sample of 488 company-year observation based upon 122 companies. The fixed effects estimates of environmental index, preparedness, and performance are significantly positive for companies with high market capitalization (e.g. *p*-values ranging from 0.012 to 0.041 based on one-tailed tests). Thus, the results of our robustness test are not materially different from those reported above.

7. CONCLUSIONS

With the publication of the recommendation by SFF (2006) regarding sustainability reporting and the growth of ethical funds, the importance of extra-financial information to investors in Sweden is increasing. In this paper, we posit that leading companies on environmental and social performance are rewarded by OMX Stockholm. Our hypotheses are tested by examining the valuation implications of GES environmental and social performance ratings and their sub-dimensions for SIX 300 companies listed on OMX Stockholm.

The evidence presented in this study indicates that environmental and social performance ratings are value relevant and complement financial information in explaining the variation in stock prices. Specifically, we find a significantly positive relation between the market value of equity and environmental performance. Given the fact that social indicators are not homogeneous, this study distinguishes the different impacts of the various dimensions of social performance

on stock prices. The results reveal that the community and supplier indicators are positively related to market value.

We conclude that leading companies with higher environmental and social performance ratings tend to achieve higher stock prices, while lagging companies with lower scores trade at lower market values. Regarding the relative explanatory power of the variables examined, non-financial environmental and social performance exhibits value relevance beyond that incorporated in earnings and the book value of equity. The results of this paper are in line with earlier studies, which show a positive relation between environmental/social information and market reactions. A relatively weak incremental effect of extra-financial performance supports the notion of Lorraine *et al*. (2004) and Edmans (2008) that the stock market had not yet fully valued environmental and social intangibles. With an increased environmental awareness and a more full-scale pricing of externalities, the value relevance of environmental and social information is likely in the future to increase in the financial markets. In addition, this paper suggests that the integration of extra-financial value approach into traditional financial investment analysis provides a richer picture of the long-term corporate performance. Environmental and social accounting has the potential to link financial performance of companies to environmental and social performance that is found to be relevant for investor decision-making.

Our study can be extended in several ways. Further research is needed on the value relevance of the interaction effect of environmental and social performance on the market value of equity and the investigation of the relations in large-, mid- and small-cap sub-samples of SIX 300 companies. Understanding how environmental and social norms may differ across industries and how they affect environmental/social performance relations and stock prices would be a valuable area for future research. The results of this study are limited to the data set that was provided by the GES Investment Services for SIX 300 companies (2005–2008). Therefore, the future work in this area would benefit from improved availability and quality of data, particularly regarding social performance, and from extended time period of empirical analysis. ■

Notes

1 The extra-financial drivers of company value are environmental, social and governance performance that creates potentially intangible value beyond tangible financial statements proxies' value.
2 www.asset4.com; www.kld.com; www.ges-invest.com
3 www.finansanalytiker.se
4 Polluting industries are the following: materials, energy, automobiles and components, food, beverage, and tobacco.
5 Environmental and social measures are described in the data and sample section.
6 Lawrence C. Hamilton iqr test supports the normality of the residuals of the empirical models.

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