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Article

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Revisiting the impact of ESG on financial performance of FTSE350 UK firms: Static and dynamic panel data analysis

Nisar Ahmad^{1*}, Asma Mobarek² and Naheed Nawazesh Roni³

Abstract: This study re-examines the impact of ESG (economic, environmental, social, and corporate governance performance) on the financial performance of UK firms. Most recent sample of 351 firms from FTSE350 for the time period 2002–2018 is used. The study estimates the impact of total ESG and individual dimensions of ESG on corporate financial performance using static and dynamic panel data techniques, and it also examines the impact of high and low ESG on firm financial performance. Further, the study investigates the role of firm size as a moderator in the relationship between ESG and firm financial performance. The results of total ESG performance indicate that ESG has a positive and significant impact on firm financial performance. However, in the case of the individual ESG performance, the results are mixed. Overall, the results confirm that high ESG firms show high financial performance as compared to low ESG firms. Results indicate that firm size moderates the relationship between ESG performance and firm financial performance.

Subjects: Economics; Environmental Economics; Business, Management and Accounting; Industry & Industrial Studies

Keywords: Financial performance; Corporate ESG performance; FTSE350 UK firms; Moderator; Static and dynamic panel data analysis
Subjects: K32; Q20

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PUBLIC INTEREST STATEMENT

ESG information is beneficial for investors and society due to its significant role in the financial markets. The social responsibility/ESG is not only the responsibility of public sector but also the responsibility of enterprises. ESG/CSR performance is acknowledged from investors, firm managers and other stakeholders as it is significant to increase the firm value. Firm value can be produced through incorporating ESG into the managerial strategies of the firm to reduce risk. Due to the importance of ESG, study investigates the impact of ESG on financial performance of the UK firms.

1. Introduction

ESG performance in recent years has received attention from investors, firm managers and other stakeholders as it is a well-known and increasingly important way to increase the value of a firm. Briefly, CSR/ESG enhances firm value (Malik, 2015). Firm value can be created when ESG performance is incorporated into the managerial strategies of the firm (Rezaee, 2016). ESG information is beneficial for investors and society (Shiller, 2013) due to the significant role of financial markets in sustaining several social activities. Van Duuren et al. (2016) explains that ESG investing resembles fundamental investing and that most investors buy additional shares due to ESG-related information. Slager et al. (2012) find that several companies initiate a valuation of their ESG ratings and communicate the results on ESG issues with interested parties. Eccles et al. (2014) explain that firms report their information not only to shareholders but also to stakeholders as high-sustainability firms are more long-term oriented and able to attract long-term investors.

ESG is the integration of firm performance regarding its economic, environmental, social and corporate governance performance. Individual and institutional investors pursue attractive financial returns that associate with a positive impact on communities and the environment. At present, firms pay more attention to share their ESG issues with the public (Hockerts & Moir, 2004 & Vandekerckhove et al., 2008). Nguyen and Trinh (2020) find that CSR activities are beneficial for firms at low level of CSR when non-linear relationship exists in case of energy firms in Vietnam and authors suggest that firms should balance the costs and benefits of CSR.

Revisiting the impact of ESG on the financial performance of firms is justified, particularly in the UK due to insufficient academic and empirical literature on the topic. Hence, in this study, the impact of ESG performance on firm financial performance in UK is estimated. Moreover, study explains the four subcategories of ESG, namely economic, environmental, social, and corporate governance performance, and estimates their separate impacts on the market value and earnings per share of the firm. Further, the impact of high and low ESG performance on financial performance of firm is estimated. The role of firm size as a moderator in the relationship between ESG and financial performance is also explained. To this end, panel data from 351 firms in 10 industries listed on the FTSE350 from 2002 to 2018 are collected from the ASSET4 databases using DataStream.

The prime motivation for our study is based on Elsayed and Paton (2005) work, which was a unique study due to its use of static and dynamic panel data analysis. However, our study improves on Elsayed and Paton (2005) by using recent and large sample data of UK firms as well as considering the four individual dimensions of ESG in the analysis and further revealing the moderating role of firm size in the relationship between ESG and corporate financial performance. In general, the contributions of our study to the ESG literature are summarized as: Firstly, while the past literature generally focused on environmental and firm performance relationship, our study finds that the social performance also matters to investors. Furthermore, four individual dimensions of ESG (economic, environmental, social, and corporate governance) performance are included in the analysis. When Adegbite et al. (2019) examined the relationship between the corporate social performance and corporate financial performance of 314 UK firms from 2002 to 2015; they concentrated on a single dimension (social performance) and neglected the other three dimensions of ESG, i.e. economic, environment and corporate governance. Collecting data from Thomson Reuters ASSET4, they measured the corporate social performance of the firm through employment quality, health and safety, training and development, diversity, human rights, community, and product responsibility. They used return on assets, return on equity and share price to measure the financial performance of a firm. They found a linear relationship between corporate financial performance and corporate social performance and concluded that current corporate social performance has a significant and positive impact on return on assets, although the lagged values of corporate social performance have an insignificant impact. However, the impact of current and lagged corporate social performance is positive and significant on return on equity and share price. Further, they

found that the impact of financial performance on corporate social performance is stronger during the post-crisis years in the case of financial and non-financial firms. They divided the CSR activities into high, medium and low perform CSR activities and showed that low and high CSR levels activities increase the financial performance of the firm while medium CSR level activities reduce the financial performance of the firm. Their study is recent, unique and comprehensive; however, it is limited to the single dimension of ESG. Our study represents an improvement over theirs by including four dimensions of ESG and using dynamic panel data techniques.

Secondly, our study estimates the impact of ESG on financial performance in a broader scope, including the market value and earnings per share of the firm. Many studies use return on assets, return on equity and Tobin Q as performance indicators while comparatively few studies use market value and earnings per share of the firm to reflect its market performance. Our study uses large and most recent sample data to find the impact of total and individual ESG performance on the market value and earnings per share of UK firms. Thirdly, the bulk of studies explore ESG practices and their impact on the financial performance of the corporate sector in the US; comparatively less literature is available in the UK. Hence, it is desirable to revisit this topic for UK firms to fill this gap.

2. Theoretical background

The relationship between ESG or its alternative of CSR (as ESG performance reflects the CSR of a firm) and firm performance is interesting as the arguments for the relationship between CSR activities and financial performance are mixed. Neo-classical economists have a pessimistic view of over-investing in CSR activities. They argue that CSR investment reduces the opportunities to exploit resources to maximize profit (Friedman, 1970) as engaging in CSR activities involves higher costs, thereby increasing the conflict of interest (Greening & Turban, 2000) among stakeholders (Barnett, 2007), which triggers competitive disadvantages and eventually diminishes firms' performance (Shen & Chang, 2009). In contrast, the stakeholder theory view (Bitektine & Haack, 2015; Tu & Huang, 2015; & Russo & Perrini, 2010) suggests that CSR activities can improve the relationship between firms and their stakeholders.

The resource-based view (Barney, 1991) assumes that a firm's resources are invaluable, unique, imitable, and non-substitutable. Such resources allow them to conduct CSR activities (Ruf et al., 2001) to develop their brand image and public reputation (Orlitzky et al., 2003), boost their appeal to employees, enhance customer trust (Greening & Turban, 2000) and consequently strengthen their competitive advantage and improve the firm's financial performance (Bird et al., 2007). The information effect on residual risk of the firm is a theoretical explanation for why ESG enhances firms' performance. Sharfman and Fernando (2008) argue that high ESG ratings lower the residual risk of companies compared to the market. Godfrey et al. (2009) conclude that investment in ESG is insurance for reputational risks. Therefore, an ESG rating reduces the residual risk of the firm through its non-accounting parameters.

Theoretically exploring the role of firm size in the relationship between ESG and corporate financial performance; it is a positive relationship between firm size and corporate social performance as larger firms have a greater familiarity and ability to participate in more and better social performance than smaller firms with lower familiarity (Chen & Metcalf, 1980). For these reasons, firm size is a positive predictor of corporate financial performance (Gooding & Wagner III, 1985). In general, the resource-based theory assumes that large firms have higher corporate social performance and financial performance. Meanwhile, institutional and legitimacy theory suggests that regardless of size, investment in corporate social performance enhances financial performance.

3. Review of the literature and the study hypotheses

Overall, the empirical studies explaining the relationship between ESG and corporate financial performance in the existing literature are mixed. Many studies explore the relationship between ESG and corporate financial performance focusing on the social and environmental aspects of firms and neglecting the corporate governance factor. Sassen et al. (2016) show that ESG has a negative and significant impact on all types of risk related to the firm. Barnett (2007) argues that financial gain is achieved through an improvement in the trustworthiness of the relationship with stakeholders, which

reduces transaction costs. King and Lenox (2000) explain that low environmental performance leads to operational inefficiency due to a competitive disadvantage. Hence, the ESG performance of the firm is related to its operating performance through a reduction in cost and risk.

An adequate review of existing literature explains the relationship between corporate social responsibility and corporate financial performance. Firms adopt corporate social responsibility as a tool of value creation. Corporate sector in this perception can achieve social responsibility through profitability as the firms with profitability can deliver the returns to investors; fulfill employee need and commitment, and supply quality goods and services to consumers. Yuanyuan et al. (2018) find a positive relationship between corporate social responsibility and firm value. Their findings are based on manufacturing listed firms at Shanghai and Shenzhen Stock Exchange, China during time period from 2010 to 2015. However, selected studies explain that relation between corporate social responsibility and firm value is negative. Davis and Blomstrom (1975) and Vance (1975) explain that negative relation may be due to direct expenditures of the responsible firms for social and environmental matters. Galbreath (2013) finds inadequate studies to include all dimensions of ESG while estimating its relationship with the corporate performance of a firm. These estimations are not enough to explain the overall impact of the ESG performance of firms on financial performance and stock value.

Studies employing samples from UK firms, however, differ from our study. Moore (2001) finds a correlation between corporate social performance and corporate financial performance in UK firms using a sample of eight firms from UK supermarket industry for the period from 1994 to 1997. The data sources of the study are the annual reports of the firms and ethical investment research services. The financial performance scores of firms are based on growth in terms of turnover, profitability, return on capital employed and earnings per share. The results of the study indicate a negative correlation between the social and financial performance of the firm, and a positive correlation between the social and lagged financial performance of the firm. Our study revisits the relationship between ESG and firm performance using recent data. Their study uses correlation and the rank correlation technique for estimation, while our study uses static and dynamic panel data analysis models.

Orlitzky et al. (2003) conclude that empirical studies investigating the link between corporate social and financial performance indicate diverse and contradictory results. However, these studies are based on meta-analysis demonstrates that several models and techniques used in these empirical studies for different countries may lead to different results. For example, sampling frequency is the main cause of the variance in the results between studies in corporate social responsibility. Qiu et al. (2016) estimated the impact of environmental and social disclosure score on market prices, long-term growth and the capital cost of a firm. They employed data from FTSE350 UK firms from 2005 to 2009 using the environmental and social scores developed by Bloomberg. They certified a positive and significant impact of the individual as well as overall environmental and social scores on price and growth, but not in case of equity cost. They included two dimensions, whereas our study includes four dimensions of ESG scores. Elsayed and Paton (2005) found a positive relationship between corporate social performance and financial performance. Their study includes environmental performance while estimating the relationship between ESG and the financial performance of 227 UK firms for the period 1994–2000. The environmental scores of these firms were derived from Management Today and their environmental performance was based on community evaluation criteria. Our study revisits the relationship between ESG and UK firms' financial with a broader data sample including four dimensions of ESG.

Hypothesis 1:

Total/individual/higher ESG performance has a positive impact on the financial performance of the firms.

As noted, firm size is a significant factor in the corporate social and financial performance. Moreover, it plays a moderating role in the linkage of corporate social and financial performance.

A moderator variable changes the strength or direction of an effect in the relationship between independent and dependent variables. In our case, firm size plays the role of moderator in the relationship between ESG and firm financial performance. The relationship between ESG and financial performance might be due to a size effect. Firm size is related to corporate financial performance as firm size leads to net economies of scale in manufacturing operations (Thompson, 1967), greater control over external stakeholders and resources (Aldrich & Pfeffer, 1976 & Pfeffer & Salancik, 1978), and increases promotional opportunities resulting in the attraction and retention of employees (Williamson, 1975).

Many studies explore the role of size as a moderator while estimating the relationship between ESG and firm financial performance. Chen and Metcalf (1980) found no relationship between the environmental performance and financial performance of the firm. They used stock market returns for the market performance of firms. However, environmental performance and firm size are positively linked since bigger firms invest more in CSR. Moreover, bigger firms are under extra pressure from stakeholders to invest in CSR, and these firms obtain benefit from economies of scale, better management and access regarding external stakeholders and resources as well as better promotional opportunities. Our study finds a positive relationship between ESG and the financial performance of firms and establishes the role of firm size as a moderator in this relationship. Moreover, our study includes all dimensions of ESG in estimating the role of firm size as a moderator, while Chen and Metcalf (1980) included only environmental performance.

Orlitzky (2001) explored the question of whether firm size confounds the relationship between corporate social performance and firm financial performance. His analysis was based on a meta-analysis of 41 empirical studies. He concluded that firm size is not the third factor in the relationship between firm social performance and its financial performance. Firm size has a direct impact on corporate social performance and financial performance. Again, Orlitzky et al. (2003) sustained the role of the moderating variables (for example, firm size) in the relationship between corporate social and financial performance with a meta-analysis of 52 studies, 18 of which published in 1990 or later. They documented a positive relationship between the corporate social and financial performances of firms in most cases and found that the average correlation coefficient of these studies was 0.15. They put together the moderating variables and attached significant importance to the indirect role of these variables in explaining this relationship. The specification of this relationship is based on moderating variables.

Many studies used firm size simply as a control variable (Waddock & Graves, 1997; McWilliams & Siegel, 2000 & Hillman & Keim, 2001). However, the effect of firm size is more than as a control variable in the relationship between corporate social performance and financial performance. Furthermore, the effect of firm size is also very complex. There are few studies which show the separate effect of size on financial performance as well as social performance (Ullmann, 1985 & Graves & Waddock, 1994). Ullmann (1985) explained how firm size has a positive impact on social performance. Large US firms attract public attention and face more pressure from stakeholders to discharge their social responsibilities. Ullmann (1985) further explained that large firms have more financial resources to spend on the demands of stakeholders. Overall, our study is unique in its investigation of the relationship of ESG and market performance as it includes firm size as a control variable as well as a moderating variable.

Hypothesis 2:

Firm size moderates the relationship between the ESG performance and financial performance of firms.

4. Sample and methodology

The impact of ESG on the corporate financial performance of UK firms is revisited in this study using a recent and large sample data. The panel data comprising 351 firms of 10 industries from

the FTSE350 from 2002 to 2018 is collected from the ASSET4 databases using DataStream. The market value (MV) and earnings per share (EPS) of the firm are the dependent variables. The ESG scores, ECO scores, ENV scores, SOC scores, CG scores, ESGH scores, ESGL scores and firm size are the independent variables, whereas financial leverage, total revenues, capital expenditure as a percentage of sales and effective tax rate are used as the control variables in this study. The description and definition of these variables is given in [Table 1](#).

Studies are subjective in terms of the performance measure because each type of performance measure focuses on different aspects with limitations and biases. Orlitzky et al. (2003) explained that accounting-based measures are better indicators of organizational capabilities, however, stock market investors decide on a stock price and the subsequent market value and their decisions are based on their perception of past, current, and future stock returns. Moreover, Ullmann (1985) explained that accounting-based performance measures are required to be adjusted for risk and industry characteristics. He further explained that market-based performance measures are better when investors analyze the ability of firms to generate future profits rather than looking at the past performance of a firm. Further, market-based performance measures are less likely to be affected by differences in accounting procedures and managerial manipulation. Market value and earnings per share are more important factors in purchasing a security. Value investors select securities or assets based on disconnects between market value and what they perceive the security is worth in future image for a discounted price. Growth in earnings per share of the firm is a significant measure of firm performance regarding its management. It shows how much money a firm is earning for shareholders as it reflects the changes in profit as well as the new shares of the firm. The market value of a firm is determined by the share price and total shares. The earnings per share of a firm are derived from its profitability and shares. Therefore, the earnings per share of a firm are important in determining the market value and market price of a firm. Qiu et al. (2016) found a positive impact of earnings per share on the stock price. Therefore, our study uses market-based performance measures; namely market value and earnings per share of the firm.

Our study considers economic, environmental, social, and corporate governance performance scores as equally weighted. The ESG scores are used to measure the ESG performance of the firm. The ESG scores are taken from the Thomson Reuters ASSET4 database, which uses publicly available information and is available on DataStream. The Thomson Reuters ASSET4 database provides the economic, environmental, social, and corporate governance (ESG) information of a firm systematically and transparently. Thomson Reuters ASSET4 also contains over 250 key performance indicators organized into 18 categories within four dimensions: (1) economic performance score; (2) social performance score; (3) environment performance score; and (4) corporate governance performance score. ESG performance is measured on a scale from 0 to 100 using the data from the Thomson Reuters ASSET4 ESG database. DataStream provides information about a company's economic, social, environmental, and corporate governance-related performances, and the ASSET4 ESG database provides separate scores for each of these four dimensions. The Thomson Reuters ASSET4 database is frequently used by researchers to investigate the relationship between ESG and firm performance (e.g., Cheng et al., 2014; Ioannou & Serafeim, 2010).

Our estimations are based on static and dynamic panel data techniques. It is the advantage of panel data that it considers variations in both cross-section and time in a time-series dimension. It reduces the chances of temporal errors in the data in generalizing the results (Bell et al., 2018). The fixed effects model estimates the parameter for each cross-sectional unit (firms), and the random effects model considers that firm-specific terms are randomly distributed. Therefore, this model gains efficiency and does not need to estimate each parameter for each firm. In the case of a correlation between fixed effect and independent variables, the random effects estimator will be inconsistent (Baltagi, 1995). The Hausman test statistic is a useful tool in deciding to use a fixed effects model or a random effects model. Based on the value of the Hausman test statistic, the random effects model is used to estimate the impact of ESG on firm financial performance.

Table 1. Description/Definition of Variables

Variable	Description/Definition
LMV	LMV is the log of market value of the firm. Market value on data stream is the share price multiplied by the number of ordinary shares in issue. The amount in issue is updated whenever new tranches of stock are issued or after a capital change. For companies with more than one class of equity capital, the market value is expressed according to the individual issue. Market value is displayed in millions of units of local currency.
LMV (L1)	It is one lag of LMV.
LEPS	LEPS is the log of earnings per share of the firm (EPS). EPS is the latest annualized rate that may reflect the last financial year or be derived from an aggregation of interim period earnings.
LEPS (L1)	It is one lag of LEPS.
LESG	LESG is the log of ESG scores of firms based upon Equal-Weighted Rating showing how a company's financial and extra-financial health can be equally weighted based on the information in ASSET4's economic, environmental, social and corporate governance pillars. It reflects a balanced view of a company's performance in these four areas.
LECO	LECO is the log of economic (ECO) scores showing economic performance of the firm. The economic pillar measures a company's capacity to generate sustainable growth and a high return on investment through the efficient use of all its resources. It is reflection of a company's overall financial health and its ability to generate long term shareholder value through its use of best management practices.
LENV	LENV is the log of environmental (ENV) scores showing environmental performance of firm. The environmental pillar measures a company's impact on living and non-living natural systems, including the air, land and water, as well as completes ecosystems. It reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities in order to generate long term shareholder value.
LSOC	LSOC is the log of social (SOC) scores showing social performance of firm. The social pillar measures a company's capacity to generate trust and loyalty with its workforce, customers and society, through its use of best management practices. It reflects the company's reputation and the health of its license to operate, which are key factors in determining its ability to generate long term shareholder value.
LCG	LCG is the log of corporate governance (CG) scores showing corporate governance performance of firm. The corporate governance pillar measures a company's systems and processes, which ensure that its board members and executives act in the best interests of its long-term shareholders. It reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances in order to generate long term shareholder value.

(Continued)

Table 1. (Continued)

Variable	Description/Definition
LTA	LTA is log of total assets (TA) of firm used as a proxy for firm size. Total assets represent the sum of total current assets, long term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment and other assets.
LDA	LDA is the log of debt to assets ratio used as a proxy for financial leverage.
LREV	LREV is the log of revenues (REV). Net sales or revenues represent gross sales and other operating revenue less discounts, returns and allowances.
CAPS	CAPS is the capital expenditures as percentage of sales. It is calculated as: $CAPS = \text{Capital Expenditure} / (\text{Net Sales or Revenues}) * 100$
ETR	ETR is the effective tax rate. It is defined as income taxes (Credit) divided by income before taxes and expressed as a percentage.
ESGH	ESGH is the dummy variable for high ESG performing firms and calculated from 20% of high ESG scores of firms based upon quintal value.
ESGL	ESGL is the dummy variable for low ESG performing firms and calculated from 20% of low ESG scores of firms based upon quintal value.

A dynamic panel data approach is also used to estimate the relationship between ESG and firm financial performance. Including a lagged dependent variable as an explanatory variable in the model represents the dynamic effects in the panel data analysis. This approach was used in the studies (e.g., Elsayed & Paton, 2005) when estimating the relationship between the social and financial performance of firms. Dynamic variant of the static model is initiated to solve the issues of serial correlation and endogeneity of the explanatory variables. However, standard estimators may be inconsistent due to the inclusion of a lagged dependent variable. The GMM approach can be used to obtain the consistent estimators, as described by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell & Bond, 1998, Blundell & Bond, 2000), who developed the first-differenced GMM and the GMM system estimators. The GMM approach transforms the equation into first differences and uses the lagged values of the endogenous variables as instruments. The results of dynamic panel data analysis in our case are based on the Arellano-Bover/Blundell-Bond system estimator.

5. Results and discussion

Name of industries, industry code and number of firms in each industry are provided in Table 2. This table shows the name of industries according to industry classification benchmark (ICB) in UK. ICB uses a system of 10 industries. The financials, materials and consumer services are top ranked industries based on the highest frequencies of firms. The numbers of firms in these industries, respectively, are 132, 62 and 61.

The summary statistics of the variables is presented in Table 3. It consists of number of observations, mean value, standard deviation, minimum value and maximum value. These variables are the log of market value of the firm, log of earnings per share of firm, log of ESG scores, log of economic scores, log of environmental scores, log of social scores, log of corporate governance scores, log of total assets as proxy for firm size, log of debt to assets ratio as a proxy for leverage, log of revenues, capital expenditures as percentage of sales and the effective tax rate. ESGH and ESGL are the dummy variables, showing, respectively, 20% of high ESG scores and 20%

Table 2. Name of industry and number of firms

Sr. No.	Industry Code	Industries	No. of Firms
1	0001	Oil & Gas	10
2	1000	Basic Materials	20
3	2000	Industrials	62
4	3000	Consumer Goods	31
5	4000	Health Care	11
6	5000	Consumer Services	61
7	6000	Telecommunications	5
8	7000	Utilities	8
9	8000	Financials	132
10	9000	Technology	11
		Total	351

Source: FTSE 350

of low ESG scores of the firms based on their quintal value. Dependence among the independent variables is concluded with correlation and variance inflation factor.

The correlation among explanatory variables is explained in Table 4. The results are based on the Pearson correlation coefficient.

The values of variance inflation factor are given in Table 5. The variance inflation factor (VIF) indicated how much the independent variables are correlated with each other. The variance inflation factor is estimated to double check the correlation among the independent variables. Multicollinearity does not occur among the explanatory variables as the values of VIF are less than 10.

5.1. Results of static analysis

The results of static analysis are given in Tables 6 and Table 7. Random effects GLS regression is used to estimate the impact of ESG on firm financial performance. Z values of the parameters are

Table 3. Summary statistics of variables

Variables	Observations	Mean	Std. Dev.	Min	Max
LMV	4689	7.268	1.544	1.327	11.940
LEPS	4576	3.018	1.190	1.098	7.045
LESG	3458	4.009	0.736	1.112	4.587
LECO	3458	3.812	0.816	0.086	4.595
LSOC	3458	3.990	0.691	1.411	4.595
LENV	3458	3.958	0.628	2.195	4.578
LCG	3455	4.127	0.583	0.457	4.584
LTA	5092	14.436	1.928	5.308	21.596
LDA	5065	2.821	0.976	1.098	5.608
LREV	5050	13.430	2.248	5.215	19.707
CAPS	4477	16.713	97.943	0.000	3663.83
ESGH	3458	0.199	0.399	0.000	1.000
ESGL	3458	0.200	0.400	0.000	1.000

Source: Author's calculation

Table 4. Correlation matrix of independent variables

	LESG	LECO	LENV	LSOC	LCG	ESGH	ESGL	LTA	LDA	LREV	CAPS
LESG	1.00										
LECO	0.78	1.00									
LENV	0.83	0.56	1.00								
LSOC	0.89	0.60	0.74	1.00							
LCG	0.79	0.51	0.55	0.66	1.00						
ESGH	0.36	0.41	0.43	0.37	0.29	1.00					
ESGL	-0.87	-0.67	-0.70	-0.76	-0.64	-0.23	1.00				
LTA	0.41	0.35	0.48	0.40	0.28	0.47	-0.30	1.00			
LDA	0.15	0.05	0.21	0.18	0.08	0.12	-0.10	0.31	1.00		
LREV	0.51	0.43	0.51	0.52	0.36	0.46	-0.39	0.77	0.24	1.00	
CAPS	-0.06	-0.08	0.01	-0.11	-0.03	-0.03	0.04	0.01	0.13	-0.26	1.00
ETR	0.05	0.02	0.03	0.08	0.04	0.03	-0.04	0.01	-0.01	0.11	-0.09

Source: Author's calculation

Table 5. Values of Variance Inflation Factor (VIF)

	Model 1		Model 2		Model 3	
	LMV	LEPS	LMV	LEPS	LMV	LEPS
LESG	1.37	1.38				
LECO			1.72	1.71		
LENV			2.57	2.57		
LSOC			3.24	3.23		
LCG			1.94	1.94		
ESGH					1.34	1.35
ESGL					1.19	1.19
LTA	2.90	2.93	2.97	2.99	3.03	3.06
LDA	1.14	1.15	1.16	1.17	1.14	1.15
LREV	3.46	3.55	3.53	3.61	3.36	3.43
CAPS	1.26	1.30	1.28	1.32	1.26	1.29
ETR	1.03	1.03	1.04	1.04	1.03	1.03
Mean VIF	1.86	1.89	2.16	2.18	1.77	1.79

reported in brackets with each parameters and *** (**,*) indicates significance at the 1 (5, 10) percent level. Table 6 explains the impact of total ESG, individual ESG, high and low performing ESG firms on their financial performance, respectively, shown in model 1, model 2 and model 3. In Table 6, model 1 shows the positive and significant impact of total ESG on market value and earnings per share of the firm. Model 2 shows a positive impact of individual ESG (economic, environmental, social and corporate governance performance) on market value and the earnings per share of the firm. However, the impact of environmental and corporate governance performance on market value is not significant. Further, three dimensions, including environmental, social and corporate governance performance, have a significant impact on the earnings per share of the firm. In case of economic performance, this impact is not significant. Model 3 concerns high and low performing ESG firms. The results show that high ESG firms have a positive and significant impact on their market value and earnings per share, whereas low ESG firms have a significantly negative impact on their market value and earnings per share.

Table 6. Impact of ESG on firm financial performance: A static analysis

	Model 1		Model 2		Model 3	
	LMV	LEPS	LMV	LEPS	LMV	LEPS
LESG	0.167*** (7.04)	0.150*** (5.03)				
LECO			0.052*** (2.84)	0.013 (0.61)		
LENV			0.027 (0.89)	0.091*** (2.56)		
LSOC			0.121*** (4.00)	0.065** (1.78)		
LCCG			0.049 (1.52)	0.098*** (2.49)		
ESGH					0.118*** (4.02)	0.076** (2.19)
ESGL					-0.166*** (-5.21)	-0.149*** (-3.85)
LTA	0.489*** (23.93)	0.250*** (9.22)	0.487*** (23.67)	0.233*** (8.67)	0.494*** (24.47)	0.255*** (9.64)
LDA	-0.144*** (-7.97)	-0.115*** (-5.14)	-0.143*** (-7.90)	-0.115*** (-5.13)	-0.147*** (-8.18)	-0.120*** (-5.36)
LREV	0.240*** (11.60)	0.232*** (8.33)	0.229*** (10.99)	0.224*** (8.00)	0.251*** (12.53)	0.243*** (8.83)
CAPS	0.001** (2.24)	0.001** (2.14)	0.001** (2.18)	0.001** (2.11)	0.001** (2.31)	0.001** (2.22)
ETR	-0.045** (-1.99)	-0.060** (-2.23)	-0.047** (-2.09)	-0.061** (-2.25)	-0.046** (-2.03)	-0.061** (-2.27)
Intercept	-3.13*** (-14.60)	-3.94*** (-13.41)	-3.25*** (-15.07)	-4.11*** (-13.96)	-2.67*** (-11.72)	-3.61*** (-11.56)
Observations	2741	2711	2741	2711	2741	2711
R-Square	0.726	0.047	0.728	0.049	0.730	0.045

Source: Author's calculation

Our results are comparable with those of other studies. Qiu et al. (2016) estimated the positive relationship between the social and financial performance of UK firms. However, they included two dimensions in the social performance of a firm (environmental and social performance) for FTSE350 UK firms and their data ranges from 2005 to 2009. Moore (2001) found a positive correlation between the social and lagged financial performance of eight firms from the UK supermarket industry for the period 1994–1997. Elsayed and Paton (2005) found a positive but insignificant relationship between the environmental performance and financial performance of 227 UK firms for the period 1994–2000.

Table 7 explains the role of firm size as a moderator in the relationship between ESG and corporate financial performance.

In Table 7, model 1 explains that firm size moderates the relationship between ESG and earnings per share of the firm. However, the coefficient of the interaction term is not significant. Model 2 shows that firm size significantly moderates the relationship between corporate governance with market value and earnings per share of the firm. Model 3 explains that firm size moderates the relationship of high ESG firms and earnings per share of firms and results are significant.

The results of our study are different from those of Orlitzky (2001) as firm size was a confounder in their study and the relationship between social and financial performance

Table 7. Firm size as a moderator in the relationship of ESG and corporate financial performance: A static analysis

	Model 1		Model 2		Model 3	
	LMV	LEPS	LMV	LEPS	LMV	LEPS
LESG	−0.100 (−0.44)	0.577** (2.03)				
ESGH					0.097 (0.31)	0.891*** (2.41)
ESGL					−0.158 (−0.45)	−0.564 (−1.32)
LECO			−0.334** (−1.72)	−0.319 (−1.37)		
LENV			−0.249 (−0.68)	0.180 (0.41)		
LSOC			−0.098 (−0.27)	0.521 (1.17)		
LCG			0.872*** (2.48)	0.801** (1.90)		
LTA	0.409*** (5.81)	0.375*** (4.18)	0.488*** (5.13)	0.514*** (4.32)	0.493*** (23.93)	0.256*** (9.50)
ESGH*LTA					0.002 (0.08)	−0.052** (−2.21)
ESGL*LTA					−0.001 (−0.02)	0.030 (0.98)
LESG*LTA	0.019 (1.18)	−0.031 (−1.51)				
LECO*LTA			0.027** (2.00)	0.023 (1.43)		
LENV*LTA			0.019 (0.76)	−0.006 (−0.21)		
LSOC*LTA			0.016 (0.60)	−0.033 (−1.04)		
LCG*LTA			−0.058*** (−2.36)	−0.049* (−1.68)		
LDA	−0.144*** (−7.98)	−0.115*** (−5.12)	−0.141*** (−7.84)	−0.113*** (−5.04)	−0.146*** (−8.18)	−0.119*** (−5.32)
LREV	0.235*** (11.40)	0.235*** (8.41)	0.210 (10.62)	0.221*** (7.87)	0.248*** (12.53)	0.245*** (8.89)
CAPS	0.001** (2.21)	0.001** (2.16)	0.001** (2.10)	0.001** (2.03)	0.001** (2.30)	0.001** (2.22)
ETR	−0.046** (−2.01)	−0.059** (−2.23)	−0.049** (−2.17)	−0.061** (−2.29)	−0.047** (−2.04)	−0.061** (−2.28)
Intercept	−1.99** (−2.04)	−5.74*** (−4.68)	−3.16*** (−2.39)	−8.00*** (−4.85)	−2.63*** (−11.29)	−3.66*** (−11.48)
Observations	2741	2711	2741	2711	2741	2711
R-Square	0.729	0.047	0.734	0.049	0.729	0.046

was spurious whereas firm size is a moderator in our case. The results of our study are consistent with those of Orlitsky et al. (2003) as both studies find firm size is a moderator in the relationship between corporate social and financial performance. The results of both studies Orlitsky (2001) and Orlitsky et al. (2003) were derived from meta-analysis, whereas the results of our study are empirical.

5.2. Results of dynamic analysis

The results of the dynamic analysis are given in [Tables 8](#) and [Table 9](#). The Z values of the parameters are reported in brackets with each parameters and *** (**,*) indicates significance at the 1 (5, 10) percent level. [Table 8](#) explains the impact of total ESG, individual ESG; and high and low ESG firms on their financial performance, respectively, shown in model 1, model 2 and model 3.

The dynamic results in [Table 8](#) explain that total ESG performance has a positive and significant impact on the market value and earnings per share of a firm, as reported in model 1. Model 2 shows a positive impact of the three individual dimensions of ESG (including economic, social, and corporate governance performance) on the market value and earnings per share of the firm. Meanwhile, environmental performance has a negative impact on financial performance that is not significant and statistical; this type of impact is no more than zero. Regarding the positive significant impact of the separate dimensions, it is explained that economic performance has a positive and significant impact on market

Table 8. Impact of ESG on firm financial performance: A dynamic analysis

	Model 1		Model 2		Model 3	
	LMV	LEPS	LMV	LEPS	LMV	LEPS
LMV (L1)	0.485*** (25.87)		0.481*** (25.50)		0.487*** (25.86)	
LEPS (L1)		0.699*** (32.11)		0.695*** (31.86)		0.702*** (32.17)
LESG	0.067*** (2.46)	0.124*** (2.93)				
LECO			0.032* (1.84)	0.010 (0.39)		
LENV			-0.027 (-0.83)	-0.043 (-0.89)		
LSOC			0.001 (0.02)	0.106** (2.14)		
LCG			0.087 (2.51)	0.144*** (2.76)		
ESGH					0.012 (0.44)	-0.014 (-0.35)
ESGL					-0.133*** (-4.01)	-0.149** (-2.93)
LTA	0.304*** (10.61)	0.299*** (7.37)	0.308*** (10.63)	0.294*** (7.13)	0.303*** (10.61)	0.313*** (7.87)
LDA	-0.164*** (-7.32)	-0.102*** (-3.04)	-0.159*** (-7.11)	-0.098*** (-2.92)	-0.162*** (-7.25)	-0.107*** (-3.21)
LREV	0.113*** (4.03)	-0.104*** (-3.18)	0.115*** (4.12)	-0.111*** (-3.37)	0.110*** (3.98)	-0.100*** (-3.05)
CAPS	0.001*** (3.59)	0.001 (1.27)	0.001*** (3.59)	0.001 (1.39)	0.001*** (3.60)	0.001 (1.33)
ETR	-0.047** (-2.05)	0.013 (0.38)	-0.045** (-1.95)	0.009 (0.27)	-0.047** (-2.07)	0.013 (0.39)
Intercept	-1.857*** (-6.92)	-2.10*** (-5.03)	-2.038*** (-7.35)	-2.33*** (-5.54)	-1.53*** (-5.38)	-1.83*** (-4.12)
Observations	2636	2596	2636	2595	2636	2595
Instruments	142	142	145	145	143	143

Source: Author's calculation

Table 9. Firm size as a moderator in the relationship of ESG and corporate financial performance: A dynamic analysis

	Model 1		Model 2		Model 3	
	LMV	LEPS	LMV	LEPS	LMV	LEPS
LMV (L1)	0.481*** (25.55)		0.473*** (24.95)		0.485*** (25.72)	
LEPS (L1)		0.699*** (32.11)		0.698*** (31.81)		0.699*** (31.84)
LESG	-0.821*** (-2.83)	-0.224 (-0.49)				
ESGH					-0.093 (-0.31)	0.331 (0.77)
ESGL					0.993** (2.61)	0.170 (0.28)
LECO			-0.275 (-1.47)	-0.309 (-1.10)		
LENV			-0.583 (-1.48)	0.830 (1.41)		
LSOC			-0.218 (-0.54)	0.066 (0.11)		
LCG			0.221 (0.58)	-0.022 (-0.04)		
LTA	0.041 (0.46)	0.198 (1.41)	0.042 (0.34)	0.393** (2.06)	0.321*** (10.92)	0.322*** (7.89)
ESGH*LTA					0.006 (0.35)	-0.022 (-0.81)
ESGL*LTA					-0.083** (-2.97)	-0.023 (-0.53)
LESG*LTA	0.064*** (3.08)	0.025 (0.76)				
LECO*LTA			0.022* (0.099)	0.022 (1.13)		
LENV*LTA			0.039 (1.43)	-0.062 (-1.49)		
LSOC*LTA			0.016 (0.55)	0.002 (0.06)		
LCG*LTA			-0.009 (-0.34)	0.012 (0.29)		
LDA	-0.166*** (-7.44)	-0.103*** (-3.07)	-0.161*** (-7.15)	-0.098*** (-2.92)	-0.162*** (-7.22)	-0.107*** (-3.19)
LREV	0.099*** (3.50)	-0.108*** (-3.25)	0.104*** (3.69)	-0.105*** (-3.16)	0.098*** (3.50)	-0.099*** (-3.03)
CAPS	0.001*** (3.59)	0.001 (1.27)	0.001*** (3.57)	0.001 (1.38)	0.001*** (3.57)	0.001 (1.31)
ETR	-0.048** (-2.10)	0.013 (0.39)	-0.046** (-2.00)	0.009 (0.27)	-0.048** (-2.09)	0.014 (0.43)
Intercept	1.96 (1.54)	-0.660 (-0.34)	1.84 (1.05)	-3.75 (-1.40)	-1.62*** (-5.48)	-1.94*** (-4.24)
Observations	2636	2596	2636	2596	2636	2596
Instruments	143	143	149	149	145	145

Source: Author's calculation

value. Social and governance performance have a positive and significant impact on the earnings per share of a firm. Model 3 explains that low ESG firms have a negative impact on the market value and earnings per share of firms and this negative impact is significant.

The results are not significant in case of high ESG firms. Elsayed and Paton (2005) found the impact of environmental performance on firm performance using dynamic panel data analysis. This impact is positive and insignificant on Tobin's Q. However, the environmental impact is negative and insignificant on return on assets and return on sales. He concludes that the impact of environmental performance on firm financial performance is limited. In addition to firm-specific factors, one needs to understand the market trend. Good ESG performance can reduce information asymmetry between firms and investors and firms can well predict the intrinsic value of a stock. However, if the market trend cannot be forecasted, the accuracy of the earnings per share can be poor.

Table 9 explains the role of firm size as a moderator in case of dynamic panel data analysis.

In Table 9, model 1 explains that firm size moderates the relationship between ESG and the market value of the firm. We do not find significant results in Model 2 when firm size moderates the relationship between individual ESG and corporate financial performance. Firm size moderates the relationship between low ESG firms and their market value, as shown in model 3, and these results are significant. No study explains the role of firm size as a moderator in the relationship between ESG and financial performance using dynamic analysis. This is the unique contribution of our study.

6. Conclusions and implications

The economic, environmental, social, and corporate governance (ESG) performance of firms is important for investors, firm managers and other stakeholders. It is the integration of firm performance regarding its economic, environmental, social, and corporate governance performance. Individual and institutional investors across the world seek attractive financial returns along with a positive impact on communities and the environment. Keeping in view the importance of ESG, the impact of total and individual ESG on the market value and earnings per share of firms in the UK is estimated. The study analyzes the impact of the high and low ESG performance of firms on their financial performances. The study also investigates the role of firm size as a moderator in the relationship between ESG performance and firm performance.

The static and dynamic results of the study indicate an overall positive and significant impact of total ESG on the market value and earnings per share of firms. Individual dimensions of ESG also have a positive impact on the financial performance of firm. However, the results are mixed when considering the individual dimensions of ESG and their impact on financial performance of firm. High and low ESG firms are found to have different impacts on financial performance. High ESG firms perform better as compared to low ESG firms. Firm size also moderates the relationship between ESG and firm financial performance.

The findings of the study have important implications for ESG stakeholders, climate change, geopolitical instability, and uncertainty in financial markets. As ESG is important and beneficial for stakeholders including firm financial performance, customers, employees, environment, and planet, its implications for social benefits and welfare is desired for policy makers to implement the financial procedures and incentives to increase the scale and reputation of ESG activities.

This study focuses on the performance of FTSE350 UK firms and limited with UK firms. The results of study are not applicable to the other countries. The analysis can be extended to include All Share UK firms in future. Future research can find out the impact of individual features of ESG on firm financial performance, for example, the corporate governance features such as board characteristics and gender composition; the social features as charity and employees' welfare; and environmental structures on CO2 emissions. Future studies can include the firm sample from developed and developing countries.

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