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The Effect of Firm-level ESG Practices on Macroeconomic Performance

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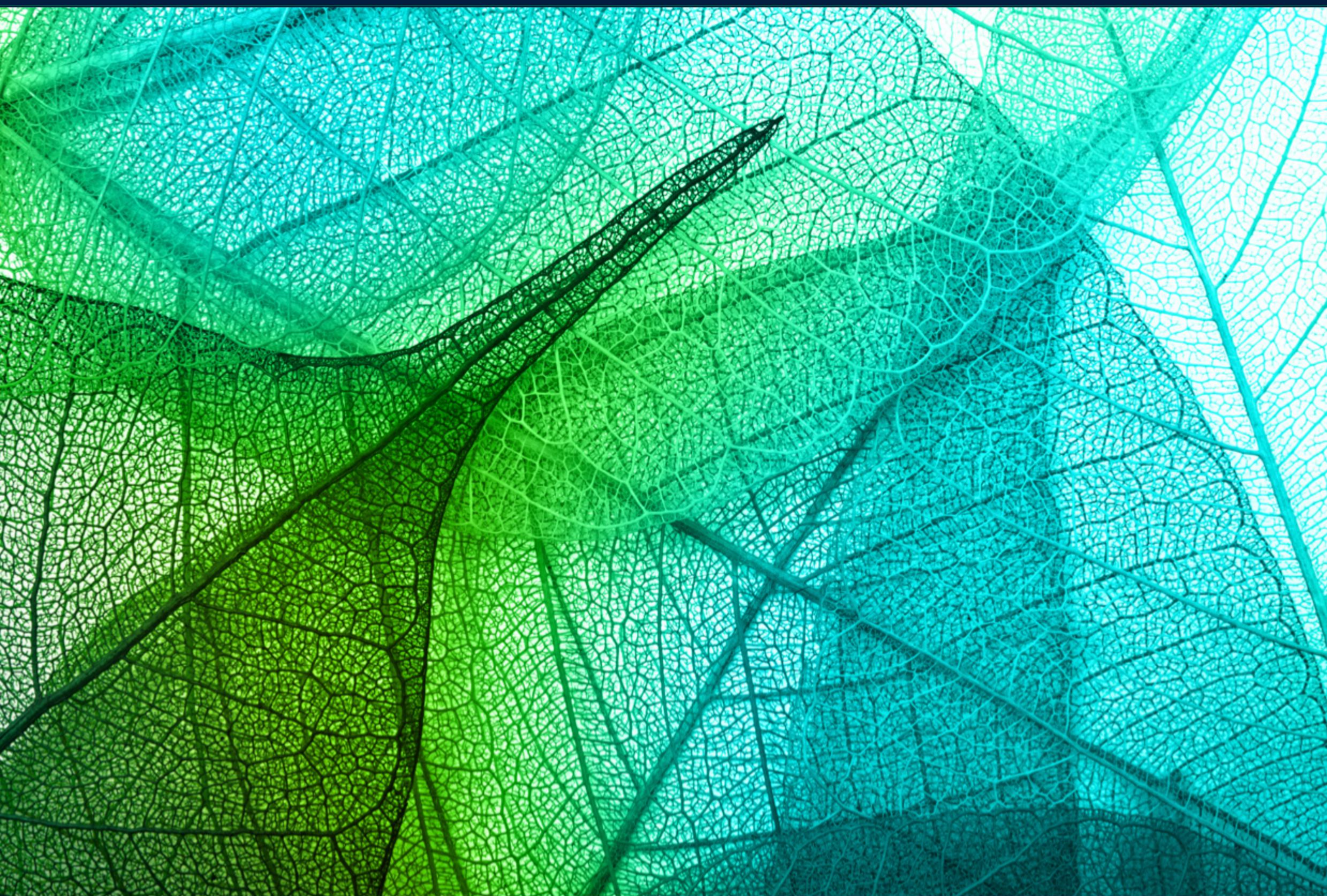
3rd June 2020

Oxford Sustainable Finance Programme, Smith School of Enterprise and the Environment, University of Oxford | Working Paper No. 20-03

ISSN 2732-4214 (Online)



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Acknowledgements

We would like to thank the UK Partnering for Accelerated Climate Transitions (UK PACT) - China Green Finance Programme for funding this work. Thanks for the support in translation and stakeholder engagement to Yao Wang, Yali Wang and other colleagues from the International Institute of Green Finance of Central University of Finance and Economics(IIGF,CUFE). We would also like to thank Krister Koskelo, a D.Phil. candidate at the University of Oxford, for his research assistance, as well as the internal and external reviewers who provided many insightful comments.

Supported by

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Suggested citation

Zhou, X., Caldecott, B.L., Harnett, E., & Schumacher, K. (2020), 'The Effect of Firm-level ESG Practices on Macroeconomic Performance', University of Oxford Smith School of Enterprise and the Environment Working Paper 20-03.

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The Effect of Firm-level ESG Practices on Macroeconomic Performance

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Abstract

This paper investigates whether the development and adoption of firm-level environmental, social and governance (ESG) practices affects national macroeconomic performance, and whether this differs between developed countries and emerging economies. Using dynamic panel techniques – generalised method-of-moments (GMM) estimators – we find that an increase of micro-ESG performance can result in the improvement of living standards as measured by GDP per capita. When we test this link by country type, we find that firm-level social performance in a country is positively associated with GDP per capita in both developed countries and emerging economies. As for the other two components of firm-level ESG measures, namely environmental and governance performance, we find that these affect macroeconomic performance in emerging economies, but that the effects remain insignificant in developed countries. While further research is needed, these results may be of particular interest to policymakers and central banks, as they suggest that encouraging the adoption of ESG practices at the firm-level could support macroeconomic performance.

Executive Summary

This paper investigates the linkages between the adoption of environmental, social and governance (ESG) practices in companies and the macroeconomic performance of those firms' home countries, over the period 2002-2017. This first empirical study to examine the effect of firm-level ESG implementation on macroeconomic performance across both developed and emerging economies finds that the two are indeed positively correlated (Table A). Broadly, this finding holds across all categories, but there are some differences in the strengths of the effect when looking separately at the three constituents of ESG, or when looking separately at developed and emerging economies.

Key findings:

- Across the sample group, an increase of firms' ESG performance in a country is associated with a positive, statistically significant effect on living standards in that country, as measured by GDP per capita.

- Firms' average social performance has a statistically significant positive effect on growth in GDP per capita in both developed and emerging economies. Environmental and governance performance has a statistically significant positive effect for growth in GDP per capita in emerging but not developed economies.

Results: Our results across the whole sample group show that a one-unit increase in firms' average E, S, and G scores at the country-level is associated with 0.06%, 0.10%, and 0.19% increases in the log of GDP per capita[1], respectively. To put this in terms of a concrete example, if Indonesian firms (with a mean firm environment score of 43.5) were to raise their environmental performance to the level of the highest performers in the dataset, those of France (71.8), other things being equal, this would be associated with a 15% increase in GDP per capita, from just under US$4,300 to just over US$4,900.

[1] Following previous economic growth literature, we make use of the logarithmic transformation of GDP per capita, because GDP growth is approximately proportional, and log (GDP) grows linearly which fits into the linear regression model (Toya and Skidmore 2007).

For the 11 emerging economies in the sample, we document a statistically significant association between all three kinds of corporate ESG performance—that is, environmental, social and governance performance—and national economic growth per capita. For developed countries, firms' average environmental and governance performance has no statistically significant effect on national economic growth per capita, but firm-level social performance does have a significant, positive effect. A one-unit increase in mean firm social performance is associated with a 0.07% increase in the log of GDP per capita, suggesting that a rise in Japanese firms' mean social performance (44.56) to the level of Spain (67.38) would be associated with a 18.48% increase in Japan's GDP per capita, other things being equal.

Table A The results of the micro-ESG performance effect on macroeconomic growth

	Percentage change in the log of GDP per capita for every one-point (out of 100) increase in average E, S, and G performance		
	All countries	Developed countries	Emerging economies
Environment performance	0.06% increase. *Statistically significant.*	-0.01% increase. *Not statistically significant.*	0.12% increase. *Statistically significant.*
Social performance	0.10% increase. *Statistically significant.*	0.07% increase. *Statistically significant.*	0.11% increase. *Statistically significant.*
Governance performance	0.19% increase. *Statistically significant.*	0.03% increase. *Not statistically significant.*	0.26% increase. *Statistically significant.*

Policy Implications: Overall, our results suggest that the higher level of corporate ESG practice is across the entire national economy, the more pronounced the positive macroeconomic effect. Our results thus refute the notion that active integration of environmental, social, or governance policies into corporate decision-making will lower GDP growth, and make a compelling case to industry stakeholders, investors, and policymakers that ESG policy implementation across the corporate sector will generate macroeconomic benefits.

This research will be of particular interest to economic policymakers as well as central banks. Policymakers have a variety of tools at their disposal to encourage the adoption of ESG practices at the firm-level and our conclusions support the view that such efforts should be accelerated to enhance long-run macroeconomic performance. The findings also have implications for institutions in international development, such as multilateral development banks, as our results imply that the adoption of firm-level ESG practices is not in tension with economic growth and development, but rather a way to accelerate it.

Our finding that firm-level social performance is positively associated with GDP per capita is notable in light of the ongoing Covid-19 pandemic, during which the employment practices of companies are under particular scrutiny. Our research suggests that, if some of the pandemic recovery efforts were directed at enhancing companies' ESG and especially social performance, all things being equal, this could stimulate economic growth.

1. Introduction

In recent years, measuring and evaluating companies based on environmental, social, and governance (ESG) factors has become increasingly commonplace across the entire financial sector, and beyond. The Paris Climate Agreement and the United Nations Sustainable Development Goals (SDGs), both adopted in 2015, have acted as catalysts for increased adoption and monitoring of sustainable corporate practices. Initiatives such as the United Nations Principles for Responsible Investment (UN PRI), launched in 2007, have raised awareness among companies to consider ESG policies and issues as an aspect of business or risk management distinct from their general corporate social responsibility (CSR) efforts (UN PRI, 2018). A large number of companies have started to implement internal policies on key ESG themes such as transparent disclosure of impacts and risks, ESG impact measurement, data collection, and adequate reporting, for example via integrated annual reports or separate sustainability reports (Skouloudis et al., 2016; IIRC, 2015; GRI, 2019). Outside efforts to measure and monitor companies' ESG performance have proliferated, whether through the work of credit rating agencies branching out into ESG scores, or initiatives such as the Carbon Disclosure Project (CDP), which uses annual surveys to track the efforts of more than 7,000 companies in areas such as climate change and water management (CDP, 2019).

The impacts of these kinds of efforts on firm-level performance have been well documented. Several studies have found that firms that have improved their ESG outcomes, for example by reducing their carbon emissions, promoting gender and racial diversity or actively engaging with communities in which they operate, have in most cases experienced higher firm value (Yu et al., 2018), better credit ratings (Devalle et al. 2017), higher productivity (Koźluk and Zipperer, 2014; Abrizio et al., 2017), greater competitiveness (Dechezleprêtre and Sato, 2017; Madsen and Ulhoi, 2017), and stronger financial performance overall (Friede et al., 2015; Lee et al., 2018). Moreover, numerous studies, reports and essays have attempted to examine the linkages between environmental or social legislation and firm-level performance (Ambec et al., 2010; Everett et al., 2010; Clark et al., 2014; Friede et al., 2015; Rubashkina et al., 2015; Cohen and Tubb, 2018; Lopez-Arceiz et al., 2017) and how macroeconomic factors affect individual firms' willingness and capacity to adopt ESG-aligned internal policies (Annicchiarico and Di Dio; 2015; Baldini et al., 2016; Mavragani et al., 2016; Lins et al., 2017; Banerjee et al, 2019).

An area that has seen much less research is the potential influence that adoption of ESG practices at the firm-level could have on country-level, i.e. macroeconomic, performance. Several theoretical studies have made the case conceptually that ESG adoption could affect the macro-economy based on the Porter Hypothesis (Porter and Van der Linde, 1995) that firm-level ESG implementation enhances economic competitiveness and/or productivity (Everett et al., 2010; Abrizio et al., 2017; Dechezleprêtre and Sato, 2017; Cohen and Tubb, 2018). Expanding on this notion, gains in productivity (Abrizio et al., 2017) and competitiveness (Dechezleprêtre and Sato, 2017; Cohen and Tubb, 2018) are based on established economic theory, ultimately translating into stronger net economic growth (Kordalska and Olczyk, 2016). However, empirical studies on this topic remain remarkably scarce. To our knowledge, only one other study by Skouloudis et al. (2016) has looked at the potential links between CSR practices and national competitiveness, but it only focused on European countries.

This paper is therefore the first empirical study to examine the effect of firm-level ESG implementation on macroeconomic performance across both developed and emerging economies. We examine the period 2002-2017. We apply dynamic panel generalised method-of-moments (GMM) techniques to correct any potential bias resulting from omitted variables, simultaneity, or unobserved country-specific effects. This paper employs two available dynamic panel GMM estimators: 1) the 'difference GMM' estimator developed by Arellano and Bond (1991), and 2) the 'system GMM' estimator developed by Blundell and Bond (1998) and Arellano and Bover (1995). Both reference methods produced consistent results.

We find that an increase in micro-ESG performance can, generally speaking, result in the improvement of living standards, as measured by GDP per capita. We then investigate whether the micro-ESG performance effect varies across markets. We show that for the 19 developed countries in our sample, firm-level environmental and governance performance has no statistically significant effect on national economic growth, whereas firm-level social performance does have a significant, positive impact on GDP per capita. Among emerging economies, we document a strong and significant association between all three kinds of ESG performance—that is, environmental, social and governance performance—and national economic growth. These results imply that firms' ESG policies do not only matter in developed countries (which generally have integrated ESG policies more broadly), but could improve macroeconomic performance in emerging economies as well. This study increases the scope of prior studies by providing the first evaluation of the effects of firm-level ESG performance on macroeconomic performance across the most significant global economies. It also extends the coverage period and overall data granularity, hence providing the most up-to-date and detailed empirical evidence on this topic.

This paper starts by providing a literature review of previous studies and results regarding the effects of firm-level ESG implementation on economic parameters. It then sets out our core hypothesis: that countries with higher levels of firm-level ESG practice adoption have experienced stronger macroeconomic performance. Afterwards, we present our data, which was sourced primarily from the Thomson Reuters Asset4 ESG scores, and our methodology, centred around dynamic panel GMM techniques to correct potential bias introduced by unobserved country-specific effects or the endogeneity of explanatory variables. The subsequent results section, which includes a robustness test section, proves our initial theory insofar as we find strong evidence that, in general, firm-level social performance in a country is positively associated with GDP per capita for all sample countries. The final section addresses some of the methodological shortcomings and questions that fell out of the scope of our current study, and which could be addressed in future research. Finally, the analysis concludes by discussing the broader policy implications of our findings.

2. Literature review and hypothesis development

2.1. *Why Do Firm-Level ESG Practices Matter?*

In the context of globalisation, economic liberalisation and privatisation, there has been a shift in the burden of responsibility away from government institutions towards the corporate realm (Hughes, Buttle, and Wrigley 2007). The overall concept of ESG, and the notion that firms should adopt better ESG practices, have gained more traction as environmental and corporate governance issues alike have frequently led to massive losses, or even insolvency, for several large firms (Ribando and Bonne, 2010). ESG is shorthand for environment, society (or social) and governance; measuring a company on its ESG performance encompasses considering the impact of business and investment activities on the environment and society (for the "E" and "S"), and looking at that company's internal governance structures (for "G"). These are increasingly seen as the key ways to measure the non-financial performance of the company (Atan et al. 2018). Corporate action on ESG issues has increased dramatically over the past two decades (PWC 2010; Murray, 2012). Under the UN Global Compact, launched in 2000, 14,429 companies in more than 160 countries[2] have pledged to align their operations with ten principles covering human rights, labour conditions, environmental protection and anti-corruption measures. Firms have a significant impact on the environment and society through the production of vital goods and services, but also have the power to influence consumer behaviour, invest in innovation, and lobby governments for greater action on important issues. Corporate supply chains make up the distribution channels of products, from the site(s) of their source material to the delivery to the end consumer. Firm-wide ESG strategies at multinational firms can raise international levels of sustainability by implementing higher corporate standards, above and beyond local standards (Angel and Rock, 2005). Corporations are thus key to initiating change on a global scale (Clark and Hebb, 2005; Porter and Kramer, 2006; Becker-Olsen, Cudmore, and Hill, 2006), but could they also have the potential to impact national levels of productivity and competitiveness? The investment community in particular sees ESG issues as important, and, increasingly, as financially "material" to an investment portfolio (Richardson 2009; Clark, Feiner, and Viehs, 2014). If these factors are material to investment returns, then they are perhaps likely to be relevant to national-scale economic risk and returns as well.

While the literature tends to group environmental, social, and governance issues together, there remains some debate around the validity of this grouping. While the geographic literature tends to focus more on environmental and social issues, the European Center for Corporate Engagement (ECCE) found that investors use corporate governance factors most often in their decision-making processes (Jaworski, 2007). It could therefore be argued that governance should, perhaps, be detached from E and S. However, this study will use the term ESG, in accordance with the majority of literature, but recognises that they are separate entities, and that while they should not entirely be separated, a deeper understanding of sustainability requires individual examination of the components, an approach that is incorporated into this study. Indeed, this study seeks to pre-empt some common criticisms of

[2] https://www.unglobalcompact.org/what-is-gc/participants. Accurate as of 27.05.2020.

ESG research: many studies pick and choose among the various ESG dimensions (Uecker-Mercado and Walker, 2012) whereas we have sought to provide insight into each constituent part separately and collectively. Furthermore, the majority of ESG research uses data from only, or mainly, the US, sometimes with the addition of UK data (Renneboog, Horst, and Zhang, 2008). Whereas that approach limits the understanding of ESG behaviour to very few specific countries, this research extends to 38 countries globally.

2.2. *Link between ESG performance and financial outperformance*

A large and growing academic literature has explored the numerous ways in which ESG issues can affect firm-level financial performance. Porter and van der Linde (1995) explore the competitive advantages available through environmental innovation, Clark and Hebb (2005) point to the lower reputational and environmental risk factors involved in more responsible companies, while Nahal and Lucas-Leclin (2013) highlight the negative impact on supply chains from rising climate anomalies. Lee, Cin, and Lee (2016) find that there is a significant positive correlation among corporate environmental responsibility performance, returns on equity, and returns on assets. In terms of social performance, Barnett and Salomon (2012) also find that companies that perform well on measures of corporate social responsibility also attain higher financial performance. Nollet, Filis, and Mitrokostas (2016) believe that an enterprise that incorporates the fulfilment of social responsibility as a part of its strategic planning can thereby make itself more enticing to consumers and investors, thus creating extra value for its products. Regarding the corporate governance effect on financial performance, Masulis, Wang, and Xie (2007) find that poor governance in companies usually correlates with poor acquisition decisions, thus reducing such firms' market value.

In contrast to the evidence in favour of the positive impacts of ESG practices, some researchers document that ESG adoption can reduce firm value, as adhering to a higher level of ESG standards entails extra costs. Brammer, Brooks, and Pavelin (2006) find that there is a negative correlation between corporate social performance indicators and share returns. Duque-Grisales and Aguilera-Caracuel (2019) also document a significant negative relation between ESG performance and financial performance, both individually and in combination.

Although the findings of existing literature are not unanimous, there is growing evidence for ESG having a positive or non-negative financial impact. For useful meta-analysis and summary of previous research, see Friede et al. (2015) and Clark et al. (2014). Despite growing evidence, some scholars still question this link, mostly on the basis of arguments concerning methodological and data quality issues (Margolis and Walsh 2003; Garcia-Castro, Ariño, and Canela 2010).

The reasons why companies decide to adopt ESG have also been discussed (Bansal and Roth, 2000; Hedberg and Von Malmborg, 2003; Kim and Statman, 2012), with Porter and Kramer (2006) arguing that there are moral, financial, brand reputation, and legal reasons. Milton Friedman (1970) suggested that corporations were primarily responsible for providing shareholders with maximum profit; but in recent times, strong ESG alignment is increasingly seen as making good business sense (Wilmshurst and Frost, 2000; Clark and Hebb, 2005; Willard, 2012). Sustainable companies appear to have a lower risk factor, and offer potentially better long-term investing strategies (MSCI, 2017a; Della Croce, Stewart, and Yermo, 2011; Clark and Hebb, 2004). ESG can also act as a proxy for assessing the quality of management within a company (Greenwald, 2009).

2.3. Hypothesis Development

To date, few academic studies have sought to scale-up firm-level ESG performance to the national-level, or relate it to macroeconomic performance. Important exceptions to the lack of research include work on the link between CSR and national competitiveness, including Boulouta and Pitelis (2014), European Commission (2008a; 2008b), and Zadek (2006) who all find positive correlations, through both empirical and theoretical discussions. No research has sought to directly establish a relationship between firm-level corporate ESG performance, individually, and GDP, as we do in this research, though Boulouta and Pitelis (2014) did include GDP (perhaps erroneously) in their calculations for competitiveness. Interestingly, in a sample of Asian countries, Chapple and Moon (2005) found that there was no statistically significant correlation between Gross National Product (GNP) and CSR activity, with economic development not a driver of ESG, a claim which was also discussed in Ringov and Zollo (2007). Boulouta and Pitelis (2011) document a positive relationship between firm-level CSR practices and national competitiveness. However, that result is drawn on questionnaire survey data, which served as a proxy for CSR performance; moreover, the study only focused on developed countries for a six-year period at the earlier stage of CSR development.

National GDP is a measure of the market value of all goods and services produced in a country, and it can therefore be hypothesised that ESG incorporation by companies in a given country, leading to better performance, could thereby also boost GDP. This is linked to the concept of 'responsible competitiveness', defined as 'an economy's productivity being enhanced by businesses taking explicit account of their social, economic, and environmental performance' (MacGillivray, Sabapathy, and Zadek, 2003). These arguments have led us to propose the following hypotheses:

H1: Firm-level environmental performance positively affects a country's GDP per capita

H2: Firm-level social performance positively affects a country's GDP per capita

H3: Firm-level governance performance positively affects a country's GDP per capita

There are several difficulties in attempting such a study, highlighted in previous academic literature. These include the challenges inherent in scaling microeconomic, firm-level factors to the national level (Swift and Zadek, 2002; Frynas, 2008; European Commission, 2008b; Kwarteng, Dadzie, and Famiyeh, 2016), particularly as productivity is often driven by the action of complex, multinational firms. Research has illustrated a range of factors that prevent micro-level CSR scaling up to the national economy, including: the possibility of CSR benefits harming national economies even as they benefit individual companies, and potential distortions to trade flows caused by CSR practices that lead to new standards and changes in consumer or corporate expectations (Swift and Zadek, 2002; Boulouta and Pitelis, 2014). Hence, much of the literature tends to emphasize the importance of macro-level, rather than firm-level, factors to explain national productivity and competitiveness, as there are inherent problems with aggregating corporate performance (e.g. size, scope and performance differentials) (Schwab, 2018; Aiginger, 2006). Further, the definitional and data measurement problems of ESG performance at the national-level have led some researchers to focus only on specific areas, such as environmental performance (Porter and van der Linde, 1995; Etsy et al. 2005; Skouloudis, Isaac, and Evaggelinos, 2016). It is notable that several ESG data providers have also started to offer country-level macroeconomic growth scores based on aggregated ESG performance indicators. For example, Beyond Ratings states that their country growth potential scores are based on an "econometric model, using PCA and PLS regressions to determine the materiality of 229 E, S and G factors." (Beyond Ratings, 2019). Our study instead aims to test the link between firm-level ESG integration and macroeconomic growth.

3. Data and Methodology

This section documents our variables, data sources, and methods of analysis. While the majority of our data sources are publicly available, we are, to the best of our knowledge, the first to investigate specifically how firm-level ESG performance influences national-level economic growth across a range of economies.

3.1. *Data*

3.1.1. Firm-level ESG Performance

In conducting this research, we employ average firm-level ESG scores in a country as an indicator of microeconomic ESG performance. The scores were sourced from the Thomson Reuters Asset4 database, which has been widely used throughout previous studies (Eccles et al., 2014; Ioannou and Serafeim, 2012; Ioannou et al., 2014). This database incorporates more than 400 ESG metrics across 10 different ESG topics (see Appendix 1), derived from sources including firms' annual reports, company CSR websites, and newspaper articles. The Thomson Reuters ESG scores cover over 6,500 companies globally for a period ranging from 2002 to 2017, which allows us to perform a statistical analysis in a global context for the last 15 years. Firm-level E, S, G performance values range from 0 to 100, with 100 as the highest score. We use the Asset4 company ESG scores to construct an equally weighted mean of E, S, and G scores separately by country at year t that measures the average microeconomic E, S, and G performance of firms based in a given country, for all observed countries and times.

Using the mean of publicly listed firm ESG scores in a country as an indicator of national micro-ESG performance is not ideal, but given data limitations on ESG performance for non-listed companies we argue that it is an important way of beginning to test our hypotheses. We acknowledge that the use of large listed firms in scaling microeconomic factors to the country-level may create measurement biases, as multinational firms often set up part of business activities in other markets. However, institutional theory argues that organisations that operate beyond their home region need to gain the organisation's legitimacy in the foreign markets where they operate (Kostova and Zaheer 1999). These organizations must adapt to the expectations of their host regions, which make companies adopt local ESG practices and requirement (Berrone and Gomez-Mejia 2009; Deephouse and Suchman 2008). Asset4 firm level ESG scores in a country are, therefore, likely to largely represent the level of firm-level ESG performance in that country.

In total, excluding Hungary and Czech Republic, each of which contain fewer than ten firms, we obtained the average of E, S, and G corporate scores over the 2002-2017 period for 30 countries, grouped into 19 developed countries and 11 emerging countries, applying the MSCI Country Classification Standard (MSCI, 2017b). The list of countries and the number of firms included per country are shown in Table 1. Column (1) and (2) report the mean and standard deviations of the environmental scores by country for the sample period of 2002-2017. Column (3) to Column (6) present the mean and standard deviations of the social and governance scores, respectively. Column (7) shows the number of listed firms included in the Asset4 database. It is worth noting that in general, developed countries have much higher environmental and social scores than emerging economies and the latter are much more volatile than the former during our sample period, suggesting that firms from developed markets perform much better than those from emerging economies. The governance performance follows a similar pattern; however, it exhibits relatively low variations between the two economic groups.

3.1.2. Macroeconomic Performance

This paper employs a widely-used measure of macroeconomic performance: Gross Domestic Product (GDP) per capita (Barro, 2006; Grossman and Krueger, 2006; Jones, 2016; Wong et al., 2005). GDP per capita is downloaded from the World Bank database[3]. It is the rate of GDP to midyear population and measures the change or trend in a nation's

[3] The World Bank measures GDP at purchasing price parity (PPP). Further, the calculation includes gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. See: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD

living standards over time. Despite arguments that GDP-based measures are potentially not always the most relevant indicators of economic performance for all economies, GDP data are nonetheless arguably more reliable than national accounts data due to variations in definitions, method, and reporting standards.

3.1.3. Control Variables

To improve the robustness of our analysis, we control for a selection of macro-factors that have been associated with national economic growth. As both prior theoretical and empirical studies have pointed to a positive relationship between financial development and economic growth (Arestis et al., 2006; Durusu-Ciftci et al., 2017; Arellano and Bover, 1995), we control for total market value, which is the total market capitalisation of listed domestic companies in a country. Following existing studies linking foreign direct investment (FDI) and economic growth (Alfaro et al. 2004; E. Borensztein and De Gregorio, 2013; De Mello, 2002), we control for net FDI in our sample. We also include a measure of the consumer price index (CPI) to control for inflation. Table 2 presents a summary of the variables used in this study. Column (1) to (4) show each variable's name, definition, measurement, and data source, respectively.

3.1. ***Methodology***

For our analysis, we need to address the potential impact of unobserved heterogeneity in the panel data. The application of within transformation in regression models, such as fixed effect and first difference, can take account of these data-specific aspects, but the demeaning process introduces a correlation between the lagged dependent variable and the error, and yields a biased coefficient (Nickell, 1981). We instead use dynamic panel generalised method-of-moments (GMM) techniques to correct potential bias induced by unobserved country-specific effects and endogeneity of explanatory variables.

There are two types of dynamic panel GMM methods, the 'difference GMM' estimator developed by Arellano and Bond (1991,) as well as the 'system GMM estimator' developed by Blundell and Bond (1998), and Arellano and Bover (1995). In the 'difference GMM' framework, Arellano and Bond (1991) partially dismantle the regression equation to remove time invariate fixed effects and then instrument the first-differenced variables using lagged values of the original regressors to eliminate potential parameter inconsistency arising from simultaneity bias. This approach has increasingly been used in macroeconomic growth studies (Benhabib and Spiegel 2000; Banerjee and Duflo 2003; Easterly and Levine 1997) since its first application by Caselli, Esquivel, and Lefort (1996). Building on the work of Arellano and Bover (1995), Blundell and Bond (1998) proposed a 'system GMM' estimator, which was designed to address weak instrument concern when the dependent variable is close to a random walk and the lagged values of financial development capture little information of future changes.

Based on Arellano and Bond's (1991) work, we estimate the dynamic panel data model that is specified as follows:

$$MacroPerform_{i,t} = \beta_1 MacroPerform_{i,t-1} + \beta_2 ESG\_Score_{i,t} + \beta_3 Controls_{i,t} + \beta_4 Yr2008_i + \beta_5 Yr2009_i + \beta_6 Year_{i,t} + \sigma_i + \varepsilon_{i,t}$$

Whereas $MacroPerform_{i,t}$ is the outcome variable – the natural logarithm of GDP per capita for country *i* at year *t*. $MacroPerform_{i,t-1}$ is the value of the natural logarithm of GDP per capita in the previous year *t*-1. We use GDP per capita as a proxy of macroeconomic performance. $Controls_{i,t}$ include a set of factors that could influence national economic performance. They are the logarithm of total market value, net foreign direct investment (FDI), and CPI. $Yr2008$ and $Yr2009$ dummies are added to reflect the unique macroeconomic conditions during the 2008 financial crisis and the subsequent economic downturn. The time trend variable $Year$ is also included to capture macroeconomic cycle effects. σ_i is a time-invariant unobservable and $\varepsilon_{i,t}$ is a time-varying unobservable. We take the first difference to remove the country-specific fixed effect and then use one lag of the exogenous variable as the instrument set.

4. Results

We first report the basic summary statistics of the aforementioned variables (Table 3). Our panel data covers 30 countries over the 2002-2017 period, with a total number of 450 country-year observations. We decompose the standard deviation, minimum values and maximum values into 'between' and 'within' components for all variables. The mean of the environmental score is 55.556, with a minimum value of 31.697 and a maximum value of

81.940. The standard deviations between and within countries are 7.534 and 7.796 respectively, indicating that the environmental score is quite dispersed between countries as well as over the 2002 to 2017 sample period. The distribution of the social score exhibits similar features. Differing from both the environmental and social performance scores, the governance score is much less volatile both across and within countries. Looking at GDP per capita, the between and within standard deviations are 2.045 and 0.123 respectively, which suggests that there is a greater variation between than within countries. The correlation matrices for all variables are presented in Table 4.

Table 5 presents the result of the overall performance of the ESG score effect on macroeconomic performance on a global scale. The estimates of the 'difference GMM' estimator show that a one point (out of 100) increase of the average E, S, and G performance leads to 0.06%, 0.09% and 0.16% increases in the log of GDP per capita, respectively. The 'system GMM' estimator produces consistent results, whereby a one point (out of 100) increase of the average E, S, and G performance leads to 0.06%, 0.10% and 0.19% increases in the log of GDP per capita, respectively. Our results indicate that an increase in firm-level environmental, social, or governance performance can result in improvement in living standards respectively, as measured by GDP per capita. The size of the resulting growth is both statistically and economically significant. After controlling for country-specific effects, endogeneity, and macroeconomic cycle effects, the panel analysis suggests that microeconomic, firm-level ESG practices exert a positive influence on macroeconomic development.

In Table 6 we examine more closely the question of whether increases in firm-level ESG performance are related to an improvement of macroeconomic growth in developed countries. The results in columns (1) to (3) show that for the observed 19 developed countries, firm-level environmental and governance performance have no statistically significant effect on national economic growth, whereas firm-level social performance does have a significant impact on GDP per capita. For every one point (out of 100) increase in the average social performance during the sample period, we observed a 0.07% increase in GDP per capita. These results confirm our original hypothesis and strengthen the notion that firm-level ESG measures can factor into macroeconomic performance. This finding is consistent with Skouloudis et al. (2016), who found that there was a positive, albeit weak, correlation between firm-level CSR policies and GDP growth. The limited geographic scope and time period covered in that study resulted in a low number of observations, which reduces the explanatory value of its findings considerably. Our results further confirm previously documented evidence that firms' environmental and social performance do influence macroeconomic performance indicators. Abrizio et al. (2017) and Dechezleprêtre and Sato (2017) hinted at the notion that their findings could also bear relevance in the context of overall GDP growth; however, their studies were limited to competitiveness or productivity as dependent variables.

Following the developed country analysis, we then investigate the research question in the context of emerging economies, significantly expanding the scope of previous findings that either focused solely on developed economies (Rubashkina et al., 2015; Ahn and Kim, 2015; Skouloudis at al., 2016; Korez-Vide and Tominc, 2016; Abrizio et al., 2017) or on emerging ones (Ngobo and Fouda, 2012; Fayissa and Nsiah, 2013); some previous analyses further limited themselves to just country- or region-specific case study analyses (Zárate-Marco and Vallés-Giménez, 2015; Lee et al., 2016; Devalle et al., 2017). Columns (4) to (6) in Table 6 present our results, showing a strong and significant association between micro-level environmental, social and governance development and national economic benefits as measured by GDP per capita. These results strengthen the notion that ESG policies do not only impact developed countries, which generally have integrated ESG policies more broadly, but improve macroeconomic performance in emerging economies as well. Ngobo and Fouda (2012) and Fayissa and Nsiah (2013) observed similar macroeconomic trends for African countries with governance as the primary determining factor. Moreover, Kordalska and Olczyk (2016) found that elevated competitiveness scores are successful predictors of economic growth for the majority of low-income countries, as well as for several large middle-income countries such as China and India.

5. Robustness Tests

We performed a series of robustness tests. Table 7 reports the results of the firm-level ESG performance effect on macroeconomic development for the whole sample using two-year lagged dynamic GMM estimators. The results are consistent with the one-year lagged GMM estimator tests. We also examine the firm ESG performance effect on the unemployment rate using both the 'difference GMM' estimator and the 'system GMM' estimator, with results reported in Table 8. The finding suggests that a higher level of environmental and social performance significantly reduces unemployment rates. The correlation between environmental and social scores and the unemployment rate may help to explain our main finding that firm-level adoption of ESG practices contributes to improvement in GDP per capita.

Furthermore, we included several more controls such as government expenditure, R&D expenditure, and financial structure in the GMM estimators. With these additional controls, we obtained identical, statistically significant estimates to those reported in Table 5 and 6. We also conducted a serial correlation test. The output suggested no evidence of second-order serial correlation, thus satisfying the Arellano–Bond model assumptions.

6. Discussion and Policy Implications

The results presented in this paper deliver the most comprehensive link to date between firm-level ESG efforts and macroeconomic growth. Given the robustness of our data observations in terms of time period and breadth of geographic coverage, our findings add to the existing literature by not only looking at how firm-level performance affects macroeconomic performance factors such as competitiveness or productivity, but how it actually impacts overall national growth figures. This paper acts as an aggregate study by taking account of factors and variables presented in prior literature (Eccles et al., 2014; Friede et al., 2015; Skouloudis et al., 2016; Kordalska and Olczyk, 2016; Cohen and Tubb, 2018), which as outlined in the literature review, remained incomplete in terms of drawing a link between ESG implementation at the firm-level and macroeconomic performance. Our results further substantiate the overall theories explored in previous studies. Echoing some of the underlying characteristics outlined by Arellano and Bover (1995), Eccles et al. (2014), Friede et al. (2015), Skouloudis et al. (2016), and Cohen and Tubb (2018), our findings refute the notion that active integration of environmental or social policies into corporate decision-making will lower GDP growth. Although this paper has applied a more granular approach than Skouloudis et al. (2016), by incorporating data from additional sources besides composite indices, this paper has not created individual country growth profiles. It has instead chosen to divide them into three groups, the first being developed countries (Table 6), the second emerging economies (Table 7), and the last a composite group of all countries (Table 5).

Our results make a compelling case to industry stakeholders, investors, and policymakers that ESG policy implementation across the corporate sector will generate macroeconomic benefits. Fostering business and regulatory environments that facilitate the implementation of ESG policies could lead to higher growth as compared to business-as-usual scenarios. Theoretical innovators in this space, including Porter and Van der Linden (1995), Wilmshurst and Frost (2000), and Clark and Hebb (2005), have shown that stringent economic policies do not necessarily stifle economic growth, either at the micro- or macro-levels. Companies that pro-actively adopt more progressive internal ESG policies will over the medium- to long-term experience less violent fluctuations during economic downturns, and more solid growth during periods of increased economic expansion (Harrison and Berman, 2015; Annicchiarico and Di Dio, 2015; Lins et al., 2017). Furthermore, our results suggest that the higher the level of corporate ESG practice is across the entire national economy, the more pronounced the positive macroeconomic lever effect.

Our conclusions will be of particular interest to policymakers in developed or developing countries, who are responsible for long-run economic performance, as well as central banks interested in how the macro-economy will perform and its implications for monetary policy.

Policymakers have a variety of tools at their disposal to encourage the adoption of ESG practices at the firm-level and our conclusions support the view that such efforts should be accelerated to enhance long-run macroeconomic performance. Our finding that firm-level social performance is positively associated with GDP per capita in both developed countries and emerging economies is particularly interesting in light of Covid-19, where the employment and community practices of companies are under particular scrutiny. Our research suggests that policymakers might want to use post-Covid recovery bailouts and stimulus to enhance company ESG performance, particularly social performance in developed economies, through conditionality associated with any concessional financing provided.

The findings also have potential implications for the practices of actors who are in part responsible for supporting international development, such as multilateral development banks (e.g. World Bank, Asian Development Bank, Inter-American Development Bank) and international financial institutions (e.g. IMF), as well as multilateral development agencies (e.g. UNDP) and policy fora (e.g. OECD). Promoting the adoption of firm-level ESG practices is not in tension with economic growth and development, but rather is a way to accelerate it.

There are many important further questions that policymakers and researchers should explore: How do firm-level ESG practices affect other aspects of macroeconomic performance, including unemployment? Which ESG practices in particular are the most effective at generating changes that result in improvements in macroeconomic performance and how does this differ by country context? Are the outcomes of better ESG practices, including lower pollution, the drivers of better macroeconomic performance, or is it the improved performance of the firm, or a combination of both?

There are many others, but this is certainly an area that has direct implications for policy and one that is particularly relevant today as governments around the world seek to recover from an unprecedented demand and supply shock created by a global pandemic.

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Table 1 Summary of micro-economic E, S, and G score by country

Country	Environmental score		Social score		Governance score		No. firms
	Mean	St. d	Mean	St. d	Mean	St. d	
UNITED STATES	46.09	2.37	50.33	2.91	49.98	0.32	2520
JAPAN	56.89	3.71	44.56	2.70	50.09	0.25	430
UNITED KINGDOM	59.02	2.75	56.87	1.60	50.44	1.00	402
AUSTRALIA	49.27	9.38	51.22	4.90	51.87	2.30	383
CANADA	46.87	6.64	49.64	4.92	48.66	1.55	311
CHINA	40.05	5.99	37.27	7.99	49.91	0.80	241
SOUTH AFRICA	61.36	11.96	67.29	10.17	50.53	0.85	127
SOUTH KOREA	58.05	5.99	55.05	5.89	49.95	2.20	120
INDIA	51.83	5.27	58.23	6.44	49.55	0.40	103
FRANCE	71.78	6.40	65.85	4.40	49.70	0.58	102
GERMANY	61.90	3.93	62.45	5.39	50.00	1.23	102
BRAZIL	60.50	8.00	63.58	11.45	49.22	1.97	92
SWEDEN	62.81	7.16	59.53	3.22	50.53	0.76	72
SWITZERLAND	56.18	4.09	53.33	3.41	47.83	1.49	69
ITALY	54.97	6.84	57.73	4.89	48.35	1.37	51
SPAIN	66.80	6.88	67.38	6.40	49.95	1.39	47
MEXICO	51.76	14.62	50.12	14.50	50.11	1.83	43
INDONESIA	43.46	4.31	55.73	4.19	50.24	1.01	40
NETHERLANDS	63.75	4.06	65.66	2.88	52.36	2.03	40
POLAND	44.28	10.75	39.66	4.68	49.88	0.69	34
RUSSIAN	51.25	10.63	45.57	8.98	49.19	2.25	33
BELGIUM	55.97	3.62	49.98	2.62	48.57	1.12	29
DENMARK	53.56	8.58	49.25	8.67	49.46	0.78	28
TURKEY	53.55	9.82	54.66	7.01	50.46	0.50	28
NORWAY	56.56	5.64	59.18	3.95	49.51	1.58	27
FINLAND	63.51	9.01	57.67	4.74	51.58	0.93	26
GREECE	53.71	5.97	48.28	3.50	49.21	1.78	18
AUSTRIA	52.79	7.36	53.84	4.95	50.14	2.89	16
IRELAND	50.75	5.23	49.77	5.19	41.06	2.75	14
PORTUGAL	58.62	10.89	59.51	11.23	48.62	6.14	10

Table 2 Variable description

Variable (1)		Definition (2)	Measurement (3)	Data source (4)
Asset4 ESG Score	Environmental Score	We use Thomson Reuters Asset4 Environmental scores as indicators of microeconomic environmental performance. The environmental score covers 3 categories: resource use, emissions, and innovation, which largely come from corporate, public reporting (annual reports, corporate social responsibility (CSR) reports, company websites, and global media sources).	Thomson Reuters ESG scores cover over 6,500 companies globally for the period of 2002-2017, which allows us to conduct micro-economic ESG performance analysis in a global context in the last 15 years. We construct an equal weighted mean of E scores separately by country at year t that measures the average micro-economic environmental performance of firms based in a given country, for all observed countries and times.	Thomson Reuters
	Social Score	We use Thomson Reuters Asset4 Social scores as indicators of micro-economic social performance. The social score covers 4 categories: work force, human rights, community and product responsibility. Data largely derives from corporate, public reporting (annual reports, corporate social responsibility (CSR) reports, company websites, and global media sources).	Thomson Reuters ESG score covers over 6,500 companies globally for the period of 2002-2017, which allows us to conduct micro-economic ESG performance analysis in a global context in the last 15 years. We construct an equal weighted mean of S scores separately by country at year t that measures the average micro-economic social performance of firms based in a given country, for all observed countries and times.	Thomson Reuters
	Governance score	We use Thomson Reuters Asset4 Governance scores as indicator of microeconomic governance performance. The governance score covers 3 categories: management, shareholders, and CSR strategy. Data largely derives from corporate, public reporting (annual reports, corporate social responsibility (CSR) reports, company websites, and global media sources).	Thomson Reuters ESG score covers over 6,500 companies globally for the period of 2002-2017, which allows us to conduct micro-economic ESG performance analysis in a global context in the last 15 years. We construct an equal weighted mean of G scores separately by country at year t that measures the average micro-economic governance performance of firms based in a given country, for all observed countries and times.	Thomson Reuters
Dependent variable	Gross Domestic Product per Capita	Gross domestic product per Capita is the change or trend in a nation’s living standards over time. It is often used as an informal measure of a nation’s prosperity.	GDP per capita is gross domestic product (GDP) divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Data are in constant local currency.	World Bank
Controls	Total MV (logged)	Total market value (MV) refers to the total market capitalization of listed domestic companies (US$) in a country.	Market capitalization (also known as market value) is the share price times the number of shares outstanding (including their several classes) for listed domestic companies. Investment funds, unit trusts, and companies whose only business goal is to hold shares of other listed companies are excluded. Data are end of year values converted to U.S. dollars using corresponding year-end foreign exchange rates.	World Bank
	FDI (logged net inflows)	Foreign direct investment refers to direct investment equity flows in an economy. In this study (US$), we use net inflows (inward investment less outward investment) as an indicator of investment.	FDI is calculated as the aggregate equity capital, reinvestment of earnings, and other capital. Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy. Ownership equal to or above 10% of the ordinary shares of voting stock is included.	World Bank
	Inflation	Inflation is measured by consumer price index (CPI). It is defined as the change in the prices of a basket of goods and services that are typically purchased by specific groups of households	Inflation is measured in terms of the annual growth rate and in index, 2015 base year. Inflation measures the erosion of living standards.	OECD

Table 3 Summary statistics

This table presents the basic summary statistics of all variables used for the period from 2002 to 2017. Our variables of interest are the mean of firm-level ESG scores by country: that is, environment scores, social scores and governance scores. The outcome variable is GDP per capita. Controls include total market value, net foreign direct investment, and CPI. Column 1 to Column 5 report the total observation, mean, standard deviation, minimum and maximum values, respectively.

Variables	Obs (1)		Mean (2)	Std. Dev. (3)	Min (4)	Max (5)
Micro-ESG scores						
	overall	N = 450	55.556	10.764	31.697	81.940
Environment score	between	30 countries		7.534	40.015	71.783
	within	2002-2017		7.796	28.636	84.096
	overall	N = 450	55.014	10.087	26.882	84.593
Social score	between	30 countries		7.840	37.270	69.740
	within	2002-2017		6.488	31.208	84.957
	overall	N = 450	49.633	2.607	34.199	57.079
Governance score	between	30 countries		1.869	41.064	52.364
	within	2002-2017		1.846	35.215	58.095
Outcome Variables						
	overall	N = 450	11.530	2.019	8.846	17.441
GDP per capita (logged)	between	30 countries		2.045	9.012	17.139
	within	2002-2017		0.123	10.835	12.102
Control Variables						
	overall	N = 450	26.805	1.499	23.051	30.940
Total MV (logged)	between	30 countries		1.452	23.858	30.546
	within	2002-2017		0.446	24.950	28.057
	overall	N = 450	24.741	0.734	20.538	27.362
FDI (logged)	between	30 countries		0.555	24.155	26.370
	within	2002-2017		0.490	20.791	26.372
	overall	N = 450	3.016	3.492	-4.478	44.964
CPI	between	30 countries		2.654	0.130	11.579
	within	2002-2017		2.314	-3.217	36.402

Table 4 Correlation matrix

	GDP per Capita	Environment score	Social score	Governance score	Total MV (logged)	Net FDI	CPI
GDP per Capita	1						
Environment score	-0.082	1					
Social score	-0.048	0.741	1				
Governance score	0.081	0.118	0.136	1			
Total MV (logged)	-0.097	-0.068	-0.092	0.072	1		
Net FDI	-0.220	-0.129	-0.058	-0.004	0.502	1	
CPI	0.030	-0.221	-0.072	0.015	-0.112	-0.037	1

Table 5 The main results of the firm-level ESG performance effect on macroeconomic growth

This table show estimates of the firm ESG performance effect on national economic growth across the whole sample. Columns (1) to (3) report the estimated coefficients and t statistics from the one-year lagged difference GMM estimator and column (4) to (6) report the estimated coefficients and t statistics from the one-year lagged system GMM estimator. Our variables of interest are firm-level ESG performance indicators, averaged by country, which are derived from Asset4 environmental, social, and governance scores respectively. The outcome variable is the natural logarithm of GDP per capita. Controls include total market value, net foreign direct investment, and CPI. All variables are defined in Table 2. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent variable	GDP per Capita (log)					
	Difference GMM Estimator			System GMM Estimator		
	(1)	(2)	(3)	(4)	(5)	(6)
Environment score	0.0006***			0.0006***		
	(3.02)			(3.09)		
Social score		0.0009***			0.0010***	
		(3.94)			(3.89)	
Governance score			0.0016**			0.0019***
			(2.03)			(1.89)
Lagged one-year GDP	0.906***	0.913***	0.899***	1.032***	1.033***	1.029***
	(61.63)	(60.52)	(62.82)	(221.38)	(220.24)	(229.40)
Total MV (logged)	0.026***	0.027***	0.026***	0.013***	0.014***	0.011***
	(6.37)	(6.55)	(6.36)	(3.83)	(3.91)	(3.28)
FDI (logged)	0.006**	0.006**	0.006**	0.011***	0.011***	0.011***
	(2.55)	(2.41)	(2.40)	(4.42)	(4.32)	(4.36)
CPI	-0.004***	-0.004***	-0.004***	-0.001*	-0.001*	-0.002**
	(-5.37)	(-5.22)	(-5.80)	(-1.68)	(-1.70)	(-2.40)
Year08	0.001	0.002	0.001	-0.010***	-0.009**	-0.011***
	(0.29)	(0.38)	(0.17)	(-2.70)	(-2.55)	(-3.13)
Year09	-0.056***	-0.056***	-0.056***	-0.060***	-0.060***	-0.061***
	(-14.83)	(-14.56)	(-15.07)	(-15.88)	(-15.73)	(-16.53)
Year	-0.001**	-0.001**	-0.000	-0.003***	-0.003***	-0.002***
	(-2.18)	(-2.39)	(-1.52)	(-9.84)	(-9.98)	(-9.58)
Observations	450	450	450	450	450	450
No. of Country	30	30	30	30	30	30

Table 6 The results of the firm ESG performance effect on macroeconomic growth by market

This table show estimates of the firm ESG performance effect on national economic growth by country type using the system GMM estimator. Columns (1) to (3) report the estimated coefficients and *t*-statistics for developed markets and columns (4) to (6) report the estimated coefficients and *t*-statistics for emerging economies. Our variables of interest are firm ESG performance indicators, averaged by country, which are derived from Asset4 environmental, social, and governance scores respectively. The outcome variable is the natural logarithm of GDP per capita. Controls include total market value, net foreign direct investment, and CPI. All variables are defined in Table 2. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent variable	GDP per Capita (log)					
	Developed markets			Emerging market		
	(1)	(2)	(3)	(4)	(5)	(6)
Environment score	-0.0001			0.0012***		
	(-0.22)			(3.80)		
Social score		0.0007**			0.0011***	
		(2.21)			(3.14)	
Governance score			0.0003			0.0026**
			(0.48)			(2.20)
Lagged one-year GDP	0.987***	0.991***	0.991***	0.863***	0.876***	0.886***
	(26.27)	(26.51)	(26.43)	(35.46)	(36.22)	(37.08)
Total MV (logged)	0.019***	0.021***	0.019***	0.024***	0.025***	0.022***
	(3.51)	(3.90)	(3.53)	(4.17)	(4.20)	(3.84)
FDI (logged)	0.006***	0.006***	0.006***	0.012	0.008	0.011
	(2.91)	(3.01)	(2.93)	(1.45)	(1.01)	(1.34)
CPI	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	-0.005***
	(-3.58)	(-3.49)	(-3.59)	(-4.35)	(-4.51)	(-5.10)
Year08	-0.008*	-0.008*	-0.009*	0.012	0.010	0.007
	(-1.75)	(-1.73)	(-1.83)	(1.48)	(1.30)	(0.94)
Year09	-0.065***	-0.065***	-0.065***	-0.046***	-0.050***	-0.052***
	(-14.34)	(-14.54)	(-14.52)	(-6.30)	(-6.89)	(-7.43)
Year	-0.001*	-0.001***	-0.001**	0.001	0.001	-0.000
	(-1.77)	(-3.18)	(-2.44)	(1.13)	(0.70)	(-0.55)
Observations	285	285	285	165	165	165
No. of Country	19	19	19	11	11	11

Table 7 The results of the firm ESG performance effect on macroeconomic growth: Robustness check

This table reports results of the firm ESG performance effect on macroeconomic growth across the whole sample using two-year lagged dynamic GMM estimators. Columns (1) to (3) report the estimated coefficients and *t*-statistics from the difference GMM estimator and columns (4) to (6) report the estimated coefficients and *t*-statistics from the system GMM estimator. Our variables of interest are firm ESG performance indicators, averaged by country, which are derived from Asset4 environmental, social, and governance scores respectively. The outcome variable is the natural logarithm of GDP per capita. Controls include total market value, net foreign direct investment, and CPI. All variables are defined in Table 2. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent variable	GDP per Capita (log)					
	Difference GMM Estimator			System GMM Estimator		
	(1)	(2)	(3)	(4)	(5)	(6)
Environment score	0.001**			0.001**		
	(2.26)			(2.20)		
Social score		0.001***			0.001***	
		(3.39)			(2.92)	
Governance score			0.002**			0.002**
			(2.07)			(2.03)
Lagged one-year GDP	1.110***	1.108***	1.110***	1.338***	1.331***	1.339***
	(23.69)	(23.55)	(23.82)	(42.19)	(41.90)	(42.20)
Lagged two-year GDP	-0.195***	-0.186***	-0.204***	-0.304***	-0.295***	-0.308***
	(-4.63)	(-4.39)	(-4.89)	(-9.16)	(-8.84)	(-9.25)
Total MV (logged)	0.022***	0.022***	0.022***	0.002	0.002	-0.001
	(4.55)	(4.66)	(4.62)	(0.43)	(0.56)	(-0.28)
FDI (logged)	0.005**	0.005*	0.005**	0.004	0.004	0.004
	(2.09)	(1.93)	(2.01)	(1.46)	(1.34)	(1.46)
CPI	-0.005***	-0.005***	-0.006***	-0.003***	-0.003***	-0.004***
	(-6.49)	(-6.42)	(-6.73)	(-3.98)	(-3.97)	(-4.54)
Year08	-0.001	-0.001	-0.001	-0.014***	-0.013***	-0.015***
	(-0.17)	(-0.13)	(-0.18)	(-3.56)	(-3.38)	(-3.91)
Year09	-0.058***	-0.058***	-0.057***	-0.060***	-0.060***	-0.061***
	(-14.73)	(-14.72)	(-14.68)	(-14.87)	(-14.93)	(-15.27)
Year	-0.001**	-0.001**	-0.001	-0.003***	-0.003***	-0.002***
	(-2.04)	(-2.38)	(-1.49)	(-8.23)	(-8.60)	(-8.15)
Observations	420	420	420	420	420	420
No. of Country	30	30	30	30	30	30

Table 8 The results of the firm ESG performance effect on the unemployment rate

This table reports results of the firm ESG performance effect on the national unemployment rate across the whole sample using one-year lagged dynamic GMM estimators. Columns (1) to (3) report the estimated coefficients and *t*-statistics from the difference GMM estimator and columns (4) to (6) report the estimated coefficients and *t*-statistics from the system GMM estimator. Our variables of interest are firm-level ESG performance indicators, averaged by country, which are derived from Asset4 environmental, social, and governance scores respectively. The outcome variable is the unemployment rate. Controls include total market value, net foreign direct investment, and CPI. All variables are defined in Table 2. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent variable	Unemployment Rate					
	Difference GMM Estimator			System GMM Estimator		
	(1)	(2)	(3)	(4)	(5)	(6)
Environment score	-1.751**			-2.058**		
	(-2.08)			(-2.46)		
Social score		-2.062**			-3.517***	
		(-2.25)			(-3.80)	
Governance score			1.340			-2.864
			(0.50)			(-1.09)
Lagged one year unemployment rate	0.730***	0.730***	0.722***	0.957***	0.962***	0.947***
	(25.04)	(24.92)	(24.80)	(61.89)	(61.94)	(64.80)
Total MV (logged)	-0.065	-0.076	-0.015	-0.633***	-0.615***	-0.613***
	(-0.40)	(-0.46)	(-0.09)	(-7.47)	(-7.09)	(-7.20)
FDI (logged)	-0.368***	-0.369***	-0.365***	-0.449***	-0.452***	-0.462***
	(-4.73)	(-4.73)	(-4.73)	(-5.71)	(-5.63)	(-5.90)
CPI	0.034	0.034	0.039	0.033	0.034	0.041
	(1.12)	(1.12)	(1.30)	(1.19)	(1.20)	(1.52)
Year08	-0.569***	-0.586***	-0.556***	-0.612***	-0.658***	-0.621***
	(-2.97)	(-3.05)	(-2.92)	(-3.43)	(-3.62)	(-3.52)
Year09	1.310***	1.293***	1.312***	1.626***	1.604***	1.611***
	(7.18)	(7.05)	(7.25)	(8.89)	(8.60)	(8.96)
Year	0.002	0.000	-0.005	-0.024**	-0.026**	-0.027**
	(0.18)	(0.03)	(-0.36)	(-1.98)	(-2.15)	(-2.27)
Observations	313	313	313	313	313	313
No. of Country	29	29	29	29	29	29

Appendix 1: The composition of the Thomson Reuters Asset4 ESG scores

Pillar	Categories	Theme	Indicator Description
Corporate Governance	Management	Board Functions	Does the company have a policy for maintaining effective board functions?
Corporate Governance	Management	Board Functions	Does the company have a corporate governance committee?
Corporate Governance	Management	Board Functions	Percentage of independent board members on the audit committee as stipulated by the company.
Corporate Governance	Management	Board Functions	Percentage of non-executive board members on the audit committee as stipulated by the company.
Corporate Governance	Management	Board Functions	Percentage of independent board members on the compensation committee as stipulated by the company.
Corporate Governance	Management	Board Functions	Percentage of non-executive board members on the compensation committee as stipulated by the company.
Corporate Governance	Management	Board Functions	Percentage of independent board members on the nomination committee as stipulated by the company.
Corporate Governance	Management	Board Functions	Percentage of non-executive board members on the nomination committee as stipulated by the company.
Corporate Governance	Management	Board Functions	The number of board meetings during the year.
Corporate Governance	Management	Board Functions	The average overall attendance percentage of board meetings as reported by the company.
Corporate Governance	Management	Board Functions	The average overall attendance percentage of board committee meetings as reported by the company.
Corporate Governance	Management	Board Functions	Does the company have a succession plan for executive management in the event of unforeseen circumstances?
Corporate Governance	Management	Board Functions	Does the board or board committees have the authority to hire external advisers or consultants without management's approval?
Corporate Governance	Management	Board Functions	Percentage of independent board members on the audit committee as stipulated by the company.
Corporate Governance	Management	Board Functions	Does the company report that all audit committee members are non-executives?
Corporate Governance	Management	Board Functions	Does the company have an audit committee with at least three members and at least one "financial expert" within the meaning of Sarbanes-Oxley?
Corporate Governance	Management	Board Functions	Percentage of independent board members on the compensation committee as stipulated by the company.
Corporate Governance	Management	Board Functions	Does the company report that all compensation committee members are non-executives?
Corporate Governance	Management	Board Functions	Percentage of non-executive board members on the nomination committee.
Corporate Governance	Management	Board Functions	Are the majority of the nomination committee members non-executives?
Corporate Governance	Management	Board Functions	Percentage of nomination committee members who are significant shareholders (more than 5%).
Corporate Governance	Management	Board Functions	Does the company publish information about the attendance of the individual board members at board meetings?
Corporate Governance	Management	Board Structure	Does the company have a policy for maintaining a well-balanced membership of the board?
Corporate Governance	Management	Board Structure	Does the company have a policy regarding the size of its board?
Corporate Governance	Management	Board Structure	Does the company have a policy regarding the independence of its board?
Corporate Governance	Management	Board Structure	Does the company have a policy regarding the diversity of its board?
Corporate Governance	Management	Board Structure	Does the company have a policy regarding the adequate experience on its board?
Corporate Governance	Management	Board Structure	Does the company have a nomination committee?
Corporate Governance	Management	Board Structure	Does the company have a unitary board structure, a two-tier board structure with a supervisory board or a mixed board structure with a board of directors and a supervisory board?
Corporate Governance	Management	Board Structure	Has the chairman previously held the CEO position in the company?
Corporate Governance	Management	Board Structure	The total number of board members at the end of the fiscal year.
Corporate Governance	Management	Board Structure	Is the board member the CEO?
Corporate Governance	Management	Board Structure	The maximum number of years a board member can be on the board as stipulated by the company.
Corporate Governance	Management	Board Structure	The smallest interval of years in which the board members are subject to re-election.
Corporate Governance	Management	Board Structure	Total number of board members which are in excess of ten or below eight.
Corporate Governance	Management	Board Structure	Does the company describe the professional experience or skills of every board member? OR Does the company provide information about the age of individual board members?
Corporate Governance	Management	Board Structure	Percentage of female on the board.
Corporate Governance	Management	Board Structure	Percentage of board members who have either an industry specific background or a strong financial background.
Corporate Governance	Management	Board Structure	Average number of years each board member has been on the board.
Corporate Governance	Management	Board Structure	Percentage of non-executive board members.
Corporate Governance	Management	Board Structure	Percentage of independent board members as reported by the company.
Corporate Governance	Management	Board Structure	Percentage of strictly independent board members (not employed by the company; not representing or employed by a majority shareholder; not served on the board for more than ten years; not a reference shareholder with more than 5% of holdings; no cross-board membership; no recent, immediate family ties to the corporation; not accepting any compensation other than compensation for board service).
Corporate Governance	Management	Board Structure	Does the CEO simultaneously chair the board or has the chairman of the board been the CEO of the company?
Corporate Governance	Management	Board Structure	Average number of other corporate affiliations for the board member.
Corporate Governance	Management	Board Structure	Are all board member individually subject to re-election (no classified or staggered board structure)?
Corporate Governance	Management	Compensation Policy	Does the company have a policy for performance-oriented compensation that attracts and retain the senior executives and board members?

Corporate Governance	Management	Compensation Policy	Does the company have a performance oriented compensation policy?
Corporate Governance	Management	Compensation Policy	Does the company have an ESG related compensation policy?
Corporate Governance	Management	Compensation Policy	Does the company have a compensation policy to attract and retain executives?
Corporate Governance	Management	Compensation Policy	Does the company have a compensation committee?
Corporate Governance	Management	Compensation Policy	Does the company have the necessary internal improvement and information tools for the board members to develop appropriate compensation/remuneration to attract and retain key executives?
Corporate Governance	Management	Compensation Policy	The maximum time horizon of targets to reach full senior executives' compensation.
Corporate Governance	Management	Compensation Policy	Is the CEO's compensation linked to total shareholder return (TSR)?
Corporate Governance	Management	Compensation Policy	The maximum time horizon of the board member's targets to reach full compensation.
Corporate Governance	Management	Compensation Policy	The total compensation of non-executive board members (if total aggregate is reported by the company).
Corporate Governance	Management	Compensation Policy	The total compensation paid to all senior executives (if total aggregate is reported by the company).
Corporate Governance	Management	Compensation Policy	Does the company require that shareholder approval is obtained prior to the adoption of any stock based compensation plans?
Corporate Governance	Management	Compensation Policy	Number of controversies published in the media linked to high executive or board compensation.
Corporate Governance	Management	Compensation Policy	Number of controversies published in the media linked to high executive or board compensation published since the last fiscal year company update..
Corporate Governance	Management	Compensation Policy	Does the company provide information about the total individual compensation of all executives and board members?
Corporate Governance	Management	Compensation Policy	Highest remuneration package within the company in US dollars.
Corporate Governance	Management	Compensation Policy	Total compensation of the non-executive board members in US dollars.
Corporate Governance	Management	Compensation Policy	Is the management and board members remuneration partly linked to objectives or targets which are more than two years forward looking?
Corporate Governance	Management	Compensation Policy	Is the company under the spotlight of the media because of a controversy linked to high executive or board compensation?
Corporate Governance	Management	Compensation Policy	Is the senior executive's compensation linked to CSR/H&S/Sustainability targets?
Corporate Governance	CSR strategy	Vision & Strategy	Does the company have a CSR committee or team?
Corporate Governance	CSR strategy	Vision & Strategy	Does the company explicitly integrate financial and extra-financial factors in its management discussion and analysis (MD&A) section in the annual report?
Corporate Governance	CSR strategy	Vision & Strategy	Has the company signed the UN Global Compact?
Corporate Governance	CSR strategy	Vision & Strategy	Does the company explain how it engages with its stakeholders?
Corporate Governance	CSR strategy	Vision & Strategy	Does the company publish a separate sustainability report or publish a section in its annual report on sustainability?
Corporate Governance	CSR strategy	Vision & Strategy	Is the company's sustainability report published in accordance with the GRI guidelines?
Corporate Governance	CSR strategy	Vision & Strategy	Does the company's sustainability report take into account the global activities of the company?
Corporate Governance	CSR strategy	Vision & Strategy	Does the company have an external auditor of its sustainability report?
Corporate Governance	CSR strategy	Vision & Strategy	The name of the external auditor of the sustainability report.
Corporate Governance	CSR strategy	Vision & Strategy	The percentage of the company's activities covered in its Environmental and Social reporting.
Corporate Governance	Shareholders	Shareholder Rights	Does the company have a policy for ensuring equal treatment of minority shareholders, facilitating shareholder engagement or limiting the use of anti-takeover devices?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have a policy to apply the one-share, one-vote principle?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have a policy to facilitate shareholder engagement, resolutions or proposals?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have different class stocks with different voting rights?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have shares with a voting cap (ceilings) clause, ownership ceilings or control share acquisition provision?
Corporate Governance	Shareholders	Shareholder Rights	The percentage of maximum voting rights allowed or ownership rights.
Corporate Governance	Shareholders	Shareholder Rights	Has the company set requirements for a minimum number of shares to vote?
Corporate Governance	Shareholders	Shareholder Rights	Are the company's board members elected with a majority vote?
Corporate Governance	Shareholders	Shareholder Rights	Do the company's shareholders have the right to vote on executive compensation?
Corporate Governance	Shareholders	Shareholder Rights	Are the company's articles of association, statutes or bylaws publicly available?
Corporate Governance	Shareholders	Shareholder Rights	Does the biggest owner (by voting power) hold the veto power or own golden shares?
Corporate Governance	Shareholders	Shareholder Rights	Is the company a State Owned Enterprise (SOE)?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have a poison pill (shareholder rights plan, macaroni defense, etc.)?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have unlimited authorized capital or a blank check?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have a classified board structure?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have a staggered board structure?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have a supermajority vote requirement or qualified majority (for amendments of charters and bylaws or lock-in provisions)?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have a golden parachute or other restrictive clauses related to changes of control (compensation plan for accelerated pay-out)?
Corporate Governance	Shareholders	Shareholder Rights	Has the company limited the rights of shareholders to call special meetings?
Corporate Governance	Shareholders	Shareholder Rights	Has the company reduced or eliminated cumulative voting in regard to the election of board members?
Corporate Governance	Shareholders	Shareholder Rights	Does the company grant pre-emptive rights to existing shareholders?

Corporate Governance	Shareholders	Shareholder Rights	Does the company have significant cross shareholding that can prevent takeovers?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have a confidential voting policy (i.e., management cannot view the results of shareholder votes)?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have a limitation of director liability?
Corporate Governance	Shareholders	Shareholder Rights	Number of controversies linked to shareholder rights infringements published in the media.
Corporate Governance	Shareholders	Shareholder Rights	Number of controversies linked to shareholder rights infringements published since the last fiscal year company update.
Corporate Governance	Shareholders	Shareholder Rights	Limitations to the shareholders right to approve significant company transitions such as M&As (no rights to vote or supermajority required)?
Corporate Governance	Shareholders	Shareholder Rights	Is the company subject to fair price provision, either under applicable law or as stated in the company documents (charter or bylaws)?
Corporate Governance	Shareholders	Shareholder Rights	Are there limitations on the shareholders' right to remove board members (i.e., only for cause, supermajority vote required, etc.)?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have deadlines relating to shareholder proposals?
Corporate Governance	Shareholders	Shareholder Rights	What is the minimum interval (in days) prior to the next shareholder meeting beyond which a shareholder proposal will not be accepted?
Corporate Governance	Shareholders	Shareholder Rights	Does the company permit actions to be taken without meeting by written consent?
Corporate Governance	Shareholders	Shareholder Rights	Does the company have expanded-constituency provisions in place?
Corporate Governance	Shareholders	Shareholder Rights	The adoption date of the poison pill.
Corporate Governance	Shareholders	Shareholder Rights	The expiration date of the poison pill.
Corporate Governance	Shareholders	Shareholder Rights	Are all shares of the company providing equal voting rights?
Corporate Governance	Shareholders	Shareholder Rights	The number of anti-takeover devices in place in excess of two.
Environmental	Emission	Emission Reduction	Does the company have a policy to improve emissions reduction?
Environmental	Emission	Emission Reduction	Has the company set targets or objectives to be achieved on emissions reduction?
Environmental	Emission	Emission Reduction	Does the company report on its impact or on activities to reduce its impact on biodiversity?
Environmental	Emission	Emission Reduction	Total CO2 and CO2 equivalents emissions
Environmental	Emission	Emission Reduction	Direct CO2 and CO2 equivalents emissions
Environmental	Emission	Emission Reduction	Indirect of CO2 and CO2 equivalents emissions
Environmental	Emission	Emission Reduction	Total direct flaring or venting of natural gas emissions
Environmental	Emission	Emission Reduction	Total CO2 and CO2 equivalents emission in tonnes per tonne of cement produced.
Environmental	Emission	Emission Reduction	Total amount of ozone depleting (CFC-11 equivalents) substances emitted
Environmental	Emission	Emission Reduction	Does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SOx (sulfur oxides) or NOx (nitrogen oxides) emissions?
Environmental	Emission	Emission Reduction	Total amount of NOx emissions emitted
Environmental	Emission	Emission Reduction	Total amount of SOx emissions emitted
Environmental	Emission	Emission Reduction	Does the company report on initiatives to reduce, substitute, or phase out volatile organic compounds (VOC)?
Environmental	Emission	Emission Reduction	Does the company report on initiatives to reduce, substitute, or phase out particulate matter less than ten microns in diameter (PM10)?
Environmental	Emission	Emission Reduction	Total amount of volatile organic compounds (VOC) emissions
Environmental	Emission	Emission Reduction	Total amount of waste produced
Environmental	Emission	Emission Reduction	Total amount of non-hazardous waste produced
Environmental	Emission	Emission Reduction	Total recycled and reused waste
Environmental	Emission	Emission Reduction	Total amount of hazardous waste produced
Environmental	Emission	Emission Reduction	Total volume of water discharged
Environmental	Emission	Emission Reduction	Total weight of water pollutant emissions
Environmental	Emission	Emission Reduction	Does the company report on initiatives to recycle, reduce, reuse, substitute, treat or phase out any type of waste?
Environmental	Emission	Emission Reduction	Does the company report on initiatives to recycle, reduce, reuse, substitute, treat or phase out e-waste?
Environmental	Emission	Emission Reduction	Does the company participate in any emissions trading initiative, as reported by the company?
Environmental	Emission	Emission Reduction	Does the company report on partnerships or initiatives with specialized NGOs, industry organizations, governmental or supra-governmental organizations, which are focused on improving environmental issues?
Environmental	Emission	Emission Reduction	Does the company claim to have a certified Environmental Management System?
Environmental	Emission	Emission Reduction	The percentage of company sites or subsidiaries that are certified with any environmental management system.
Environmental	Emission	Emission Reduction	Does the company report or provide information on sizable company-generated initiatives to restore the environment?
Environmental	Emission	Emission Reduction	Does the company report on initiatives to reduce the environmental impact of transportation used for its staff?
Environmental	Emission	Emission Reduction	Direct and accidental oil and other hydrocarbon spills
Environmental	Emission	Emission Reduction	Is the company aware that climate change can represent commercial risks and/or opportunities?
Environmental	Emission	Emission Reduction	Total amount of environmental expenditures.
Environmental	Emission	Emission Reduction	Environmental provisions as reported within the balance sheet.

Environmental	Emission	Emission Reduction	Does the company report on making environmental investments to reduce future risks or increase opportunities?
Environmental	Emission	Emission Reduction	Total CO2 and CO2 equivalent Scope Three emissions
Environmental	Emission	Emission Reduction	The equivalent of the CO2 offsets, credits and allowances purchased and/or produced by the company during the fiscal year.
Environmental	Emission	Emission Reduction	The waste recycling ratio as reported by the company.
Environmental	Emission	Emission Reduction	Environmental fines as reported by the company
Environmental	Emission	Emission Reduction	The estimated total CO2 and CO2 equivalents emission in tonnes.
Environmental	Emission	Emission Reduction	CO2 estimate method
Environmental	Emission	Emission Reduction	TRBC code used to calculate estimate if the Median model is used
Environmental	Emission	Emission Reduction	Total CO2 and CO2 equivalents emission in tonnes divided by net sales or revenue in US dollars.
Environmental	Emission	Emission Reduction	Does the company report on initiatives to reduce, substitute, or phase out volatile organic compounds (VOC) or particulate matter less than ten microns in diameter (PM10)?
Environmental	Emission	Emission Reduction	Total amount of waste produced in tonnes divided by net sales or revenue in US dollars.
Environmental	Emission	Emission Reduction	Total recycled and reused waste produced in tonnes divided by total waste produced in tonnes.
Environmental	Emission	Emission Reduction	Total amount of hazardous waste produced in tonnes divided by net sales or revenue in US dollars.
Environmental	Emission	Emission Reduction	Total weight of water pollutant emissions in tonnes divided by net sales or revenue in US dollars.
Environmental	Emission	Emission Reduction	Does the company report on its environmental expenditures or does the company report to make proactive environmental investments to reduce future risks or increase future opportunities?
Environmental	Innovation	Product Innovation	Does the company report on at least one product line or service that is designed to have positive effect on the environment or which is environmentally labeled and marketed?
Environmental	Innovation	Product Innovation	Total amount of environmental R&D costs (without clean up and remediation costs).
Environmental	Innovation	Product Innovation	Does the company develop new products that are marketed as reducing noise emissions?
Environmental	Innovation	Product Innovation	Total fleet's average fuel consumption in l/100km.
Environmental	Innovation	Product Innovation	Is the company developing hybrid technology?
Environmental	Innovation	Product Innovation	Total fleet's average CO2 and CO2 equivalent emissions in g/km.
Environmental	Innovation	Product Innovation	Does the company report on ESG screeened Assets Under Management?
Environmental	Innovation	Product Innovation	Is the company a signatory of the Equator Principles (commitment to manage environmental issues in project financing)?
Environmental	Innovation	Product Innovation	Does the company claim to use ESG criteria as part of its investment or lending or underwriting decisions?
Environmental	Innovation	Product Innovation	Does the company construct nuclear reactors, produce nuclear energy or extract uranium?
Environmental	Innovation	Product Innovation	Percentage of total energy production from nuclear energy.
Environmental	Innovation	Product Innovation	The percentage of labeled wood or forest products from total wood or forest products.
Environmental	Innovation	Product Innovation	Does the company claim to produce or distribute wood or forest products that are labeled?
Environmental	Innovation	Product Innovation	Does the company report or show initiatives to produce or promote organic food or other products?
Environmental	Innovation	Product Innovation	Does the company reports about take-back procedures and recycling programs to reduce the potential risks of products entering the environment?
Environmental	Innovation	Product Innovation	Does the company report about product features and applications or services that will promote responsible and environmentally preferable use?
Environmental	Innovation	Product Innovation	Does the company produce or distribute genetically modified organisms (GMO)?
Environmental	Innovation	Product Innovation	Does the company produce or distribute agrochemicals like pesticides, fungicides or herbicides?
Environmental	Innovation	Product Innovation	Are the revenues generated by the company from agrochemicals 5% or more of company sales?
Environmental	Innovation	Product Innovation	Is the company involved in animal testing?
Environmental	Innovation	Product Innovation	Is the company involved in animal testing for cosmetics?
Environmental	Innovation	Product Innovation	Has the company established a program or an initiative to minimize or phase out animal testing?
Environmental	Innovation	Product Innovation	Is the company developing clean technology (wind, solar, hydro and geo-thermal and biomass power)?
Environmental	Innovation	Product Innovation	Does the company develop products or technologies that are used for water treatment, purification or that improve water use efficiency?
Environmental	Innovation	Product Innovation	Does the company develop products and services that improve the energy efficiency of buildings?
Environmental	Innovation	Product Innovation	Does the company report on specific products which are designed for reuse, recycling or the reduction of environmental impacts?
Environmental	Innovation	Product Innovation	Does the company claim to lease, rent or market buildings that are certified by BREEAM, LEED or any other nationally recognized real estate certification?
Environmental	Innovation	Product Innovation	Total amount of environmental R&D costs (without clean up and remediation costs) divided by net sales or revenue.
Environmental	Innovation	Product Innovation	Is the company a signatory of the Equator Principles (commitment to manage environmental issues in project financing)? OR Does the company claim to evaluate projects on the basis of environmental or biodiversity risks as well?
Environmental	Innovation	Product Innovation	Total energy distributed or produced from renewable energy sources divided by the total energy distributed or produced.
Environmental	Innovation	Product Innovation	Does the company reports about take-back procedures and recycling programs to reduce the potential risks of products entering the environment? OR Does the company report about product features and applications or services that will promote responsible, efficient, cost-effective and environmentally preferable use?
Environmental	Resources	Resource Reduction	Does the company have a policy for reducing the use of natural resources or to lessen the environmental impact of its supply chain?
Environmental	Resources	Resource Reduction	Does the company set specific objectives to be achieved on resource efficiency?

Environmental	Resources	Resource Reduction	Does the company have an environmental management team?
Environmental	Resources	Resource Reduction	Does the company train its employees on environmental issues?
Environmental	Resources	Resource Reduction	Does the company have a policy to improve its water efficiency?
Environmental	Resources	Resource Reduction	Does the company have a policy to improve its energy efficiency?
Environmental	Resources	Resource Reduction	Does the company have a policy to improve its use of sustainable packaging?
Environmental	Resources	Resource Reduction	Does the company have a policy to include its supply chain in the company's efforts to lessen its overall environmental impact?
Environmental	Resources	Resource Reduction	Has the company set targets or objectives to be achieved on water efficiency?
Environmental	Resources	Resource Reduction	Has the company set targets or objectives to be achieved on energy efficiency?
Environmental	Resources	Resource Reduction	Does the company claim to use environmental criteria to source materials?
Environmental	Resources	Resource Reduction	Does the company report on initiatives to reduce, reuse, substitute or phase out toxic chemicals or substances?
Environmental	Resources	Resource Reduction	Total direct and indirect energy consumption
Environmental	Resources	Resource Reduction	Direct energy purchased
Environmental	Resources	Resource Reduction	Direct energy produced
Environmental	Resources	Resource Reduction	Indirect energy consumption
Environmental	Resources	Resource Reduction	Electricity purchased
Environmental	Resources	Resource Reduction	Electricity produced
Environmental	Resources	Resource Reduction	Total energy use in gigajoules per tonne of clinker produced.
Environmental	Resources	Resource Reduction	Total primary renewable energy purchased
Environmental	Resources	Resource Reduction	Total primary renewable energy produced
Environmental	Resources	Resource Reduction	Does the company make use of renewable energy?
Environmental	Resources	Resource Reduction	Does the company report about environmentally friendly or green sites or offices?
Environmental	Resources	Resource Reduction	Total water withdrawal
Environmental	Resources	Resource Reduction	Total fresh water withdrawal
Environmental	Resources	Resource Reduction	Amount of water recycled or reused
Environmental	Resources	Resource Reduction	Does the company use environmental or sustainable criteria in the selection process of its suppliers or sourcing partners?
Environmental	Resources	Resource Reduction	Does the company report or show to be ready to end a partnership with a sourcing partner, in the case of severe environmental negligence and failure to comply with environmental management standards?
Environmental	Resources	Resource Reduction	Does the company report on initiatives to reduce the environmental impact on land owned, leased or managed for production activities or extractive use?
Environmental	Resources	Resource Reduction	Amount of Coal produced in tonnes (raw material)
Environmental	Resources	Resource Reduction	Amount of Natural Gas produced in million m3 (raw material)
Environmental	Resources	Resource Reduction	Amount of Oil Produced in barrels (raw material)
Environmental	Resources	Resource Reduction	Does the company conduct surveys of the environmental performance of its suppliers?
Environmental	Resources	Resource Reduction	Number of controversies related to the environmental impact of the company's operations on natural resources or local communities.
Environmental	Resources	Resource Reduction	Number of controversies related to the environmental impact of the company's operations on natural resources or local communities since the last fiscal year company update.
Environmental	Resources	Resource Reduction	Total direct and indirect energy consumption in gigajoules divided by net sales or revenue in US dollars.
Environmental	Resources	Resource Reduction	Total energy generated from primary renewable energy sources divided by total energy.
Environmental	Resources	Resource Reduction	Total water withdrawal in cubic meters divided by net sales or revenue in US dollars.
Environmental	Resources	Resource Reduction	Is the company under the spotlight of the media because of a controversy linked to the environmental impact of its operations on natural resources or local communities?
Social	Product responsibility	Product Responsibility	Does the company have a policy to protect customer health & safety?
Social	Product responsibility	Product Responsibility	Does the company have a policy to protect customer and general public privacy and integrity?
Social	Product responsibility	Product Responsibility	Does the company have a policy on responsible marketing ensuring protection of children?
Social	Product responsibility	Product Responsibility	Does the company have a policy on fair trade?
Social	Product responsibility	Product Responsibility	Does the company monitor the impact of its products or services on consumers or the community more generally?
Social	Product responsibility	Product Responsibility	Does the company claim to have an ISO 9000 certification or any industry specific certification (QS-9000-automotive, TL 9000-telecommunications, AS9100-aerospace, ISO/TS 16949-automotive, etc.)?
Social	Product responsibility	Product Responsibility	Does the company claim to apply the Six Sigma, Lean Manufacturing, Lean Sigma, TQM or any other similar quality principles?

Social	Product responsibility	Product Responsibility	Does the company distribute any low-priced products or services specifically designed for lower income categories?
Social	Product responsibility	Product Responsibility	Does the company reportedly develop or market products and services that foster specific health and safety benefits for the consumers (healthy, organic or nutritional food, safe cars, etc.)?
Social	Product responsibility	Product Responsibility	Is the company directly or indirectly involved in embryonic stem cell research?
Social	Product responsibility	Product Responsibility	Does the company claim to retail Alcohol or Tobacco?
Social	Product responsibility	Product Responsibility	Does the company produce alcoholic beverages?
Social	Product responsibility	Product Responsibility	The revenues generated by the company from the sale of alcohol.
Social	Product responsibility	Product Responsibility	Does the company generate revenues from gambling?
Social	Product responsibility	Product Responsibility	The revenues generated by the company from gambling.
Social	Product responsibility	Product Responsibility	Does the company produce tobacco?
Social	Product responsibility	Product Responsibility	The revenues generated by the company from the sale of tobacco.
Social	Product responsibility	Product Responsibility	Does the company produce vehicles, planes, armaments or any combat materials used by the military?
Social	Product responsibility	Product Responsibility	The revenues generated by the company from the sale of vehicles, planes, armaments and combat materials used by the military.
Social	Product responsibility	Product Responsibility	Does the company produce or distribute pornography?
Social	Product responsibility	Product Responsibility	Does the company produce hormonal contraceptives?
Social	Product responsibility	Product Responsibility	Does the company claim to fight against the obesity risk?
Social	Product responsibility	Product Responsibility	Number of controversies published in the media linked to customer health & safety.
Social	Product responsibility	Product Responsibility	Number of controversies published in the media linked to responsible R & D.
Social	Product responsibility	Product Responsibility	Number of controversies published in the media linked to employee or customer privacy and integrity.
Social	Product responsibility	Product Responsibility	Number of controversies published in the media linked to the company's marketing practices, such as over marketing of unhealthy food to vulnerable consumers.
Social	Product responsibility	Product Responsibility	Number of controversies published in the media linked to product access.
Social	Product responsibility	Product Responsibility	Number of FDA warning letters received by the company.
Social	Product responsibility	Product Responsibility	Total number of products or services which have been delayed.
Social	Product responsibility	Product Responsibility	Total number of drugs which have not been approved by regulators or similar official bodies.
Social	Product responsibility	Product Responsibility	Has the company announced a mass recall of products or has completely withdrawn a product due to defects or safety reasons?
Social	Product responsibility	Product Responsibility	Are revenues generated from armaments larger than 5% of the total net revenues?
Social	Product responsibility	Product Responsibility	Are revenues/energy generated from nuclear energy activities larger than 5% of the total revenues/energy?
Social	Product responsibility	Product Responsibility	Are revenues generated from gambling activities larger than 5% of the total net revenues?
Social	Product responsibility	Product Responsibility	Are revenues generated from tobacco production larger than 5% of the total net revenues?
Social	Product responsibility	Product Responsibility	Are revenues generated from alcohol production larger than 5% of the total net revenues?
Social	Product responsibility	Product Responsibility	Does the company produce cluster bombs?
Social	Product responsibility	Product Responsibility	Does the company produce Anti-Personnel Landmines?

Social	Product responsibility	Product Responsibility	Number of controversies linked to the elements driving product quality and responsibility published since the last fiscal year company update.
Social	Product responsibility	Product Responsibility	Number of controversies linked to the elements driving product quality and responsibility published since the last fiscal year company update.
Social	Product responsibility	Product Responsibility	Number of controversies linked to the elements driving product quality and responsibility published since the last fiscal year company update.
Social	Product responsibility	Product Responsibility	Number of controversies linked to the elements driving product quality and responsibility published since the last fiscal year company update.
Social	Product responsibility	Product Responsibility	Number of FDA Warning letters since the last fiscal year company update.
Social	Product responsibility	Product Responsibility	The percentage of company sites or subsidiaries that are certified with any widely acknowledged quality management system.
Social	Product responsibility	Product Responsibility	Does the company produce abortifacients?
Social	Product responsibility	Product Responsibility	Does the company claim to apply quality management systems, such as ISO 9000, Six Sigma, Lean Manufacturing, Lean Sigma, TQM or any other similar quality principles?
Social	Product responsibility	Product Responsibility	Is the company under the spotlight of the media because of a controversy linked to the company's marketing practices, such as over marketing of unhealthy food to vulnerable consumers?
Social	Product responsibility	Product Responsibility	Is the company under the spotlight of the media because of a controversy linked to its products or services quality and responsibility?
Social	Product responsibility	Product Responsibility	Total number of products or services which have been delayed or drugs which have not been approved by regulators or similar official bodies.
Social	Community	Community	Does the company describe in the code of conduct that it strives to be a fair competitor?
Social	Community	Community	Does the company describe in the code of conduct that it strives to avoid bribery and corruption at all its operations?
Social	Community	Community	Does the company describe in the code of conduct that it strives to maintain the highest level of general business ethics?
Social	Community	Community	Does the company have appropriate communication tools to improve general business ethics?
Social	Community	Community	Does the company have a provision for protecting whistleblowers?
Social	Community	Community	Does the company have a policy to be involved in the local community in the countries of operation?
Social	Community	Community	Does the company claim to follow the OECD Guidelines for Multinational Enterprises?
Social	Community	Community	Is the company a supporter of the "Extractive Industries Transparency Initiative (EITI)"?
Social	Community	Community	Total amount of all donations by the company.
Social	Community	Community	Total community lending, financing and investments which are not considered donations.
Social	Community	Community	Total amount of political donations, support of political candidates or contributions to parties as reported by the company.
Social	Community	Community	Does the company foster employee engagement in voluntary community work?
Social	Community	Community	Is the company selling some products or services at a discount to normal retail prices in emerging markets?
Social	Community	Community	Does the company claim to conduct research and development on drugs for diseases in the developing world?
Social	Community	Community	Number of controversies published in the media linked to patents and intellectual property infringements.
Social	Community	Community	Does the company report on crisis management systems or reputation disaster recovery plans to reduce or minimize the effects of reputation disasters?
Social	Community	Community	Number of controversies published in the media linked to public health or industrial accidents harming the health & safety of third parties (non-employees and non-customers).
Social	Community	Community	Number of controversies published in the media linked to business ethics in general, political contributions or bribery and corruption.
Social	Community	Community	Number of controversies published in the media linked to tax fraud, parallel imports or money laundering.
Social	Community	Community	Number of controversies published in the media linked to anti-competitive behavior (e.g., anti-trust and monopoly), price-fixing or kickbacks.
Social	Community	Community	Number of controversies published in the media linked to activities in critical, undemocratic countries that do not respect fundamental human rights principles.
Social	Community	Community	Does the company have operations in Burma (Myanmar), Cuba, Iran, Sudan, or Syria (the US sanction regime)?
Social	Community	Community	Number of controversies linked to public health or industrial accidents harming the health & safety of third parties (non-employees and non-customers) published since the last fiscal year company update.
Social	Community	Community	Number of controversies linked to business ethics in general, political contributions or bribery and corruption published since the last fiscal year company update.
Social	Community	Community	Number of controversies linked to tax fraud, parallel imports or money laundering published since the last fiscal year company update.
Social	Community	Community	Number of controversies linked to anti-competitive behavior (e.g., anti-trust and monopoly), price-fixing or kickbacks published since the last fiscal year company update.
Social	Community	Community	Number of controversies linked to activities in critical, undemocratic countries that do not respect fundamental human rights principles published since the last fiscal year company update.
Social	Community	Community	Number of controversies linked to patents and intellectual property infringements published since the last fiscal year company update.
Social	Community	Community	Has the company received an award for its social, ethical, community, or environmental activities or performance?
Social	Community	Community	The total amount of lobbying contributions made by the company or its employees and representatives during the fiscal year.
Social	Community	Community	Total amount of all donations divided by net sales or revenue.

Social	Community	Community	Is the company under the spotlight of the media because of a controversy linked to bribery and corruption, political contributions, improper lobbying, money laundering, parallel imports or any tax fraud?
Social	Human rights	Human Rights	Does the company have a policy for the exclusion of child, forced or compulsory labour, or to guarantee the freedom of association universally applied independent of local laws?
Social	Human rights	Human Rights	Does the company have a policy to ensure the freedom of association of its employees?
Social	Human rights	Human Rights	Does the company have a policy to avoid the use of child labor?
Social	Human rights	Human Rights	Does the company have a policy to avoid the use of forced labor?
Social	Human rights	Human Rights	Does the company have a policy to ensure the respect of human rights in general?
Social	Human rights	Human Rights	Does the company claim to comply with the fundamental human rights convention of the ILO or support the UN declaration of human rights?
Social	Human rights	Human Rights	Does the company report or show to use human rights criteria in the selection or monitoring process of its suppliers or sourcing partners?
Social	Human rights	Human Rights	Is the company a member of the Ethical Trading Initiative (ETI)?
Social	Human rights	Human Rights	Does the company report or show to be ready to end a partnership with a sourcing partner if human rights criteria are not met?
Social	Human rights	Human Rights	Number of controversies published in the media linked to human rights issues.
Social	Human rights	Human Rights	Number of controversies published in the media linked to freedom of association issues.
Social	Human rights	Human Rights	Number of controversies published in the media linked to use of child labor issues.
Social	Human rights	Human Rights	Number of controversies linked to human rights issues published since the last fiscal year company update.
Social	Human rights	Human Rights	Number of controversies linked to use of child labor issues published since the last fiscal year company update.
Social	Workforce	Diversity & Opportunity	Does the company have a policy to drive diversity and equal opportunity?
Social	Workforce	Diversity & Opportunity	Has the company set targets or objectives to be achieved on diversity and equal opportunity?
Social	Workforce	Diversity & Opportunity	Percentage of women employees.
Social	Workforce	Diversity & Opportunity	Percentage of new women employees.
Social	Workforce	Diversity & Opportunity	Percentage of women managers.
Social	Workforce	Diversity & Opportunity	The score of the company in the HRC corporate equality index from the Human Rights Campaign Foundation.
Social	Workforce	Diversity & Opportunity	Does the company provide flexible working schemes?
Social	Workforce	Diversity & Opportunity	Does the company claim to provide day care services for its employees?
Social	Workforce	Diversity & Opportunity	Number of controversies published in the media linked to workforce diversity and opportunity (e.g., wages, promotion, discrimination and harassment).
Social	Workforce	Diversity & Opportunity	Percentage of employees with disabilities or special needs.
Social	Workforce	Diversity & Opportunity	Number of controversies linked to workforce diversity and opportunity (e.g., wages, promotion, discrimination and harassment) published since the last fiscal year company update.
Social	Workforce	Employment Quality	Total value of salaries and wages paid to all employees and officers, including all benefits, as reported by the company in its CSR reporting.
Social	Workforce	Employment Quality	Number of employees as reported by the company in its CSR reporting.
Social	Workforce	Employment Quality	Total value of the stock based compensation of employees during the year as reported by the company.
Social	Workforce	Employment Quality	Percentage of employees represented by independent trade union organizations or covered by collective bargaining agreements.
Social	Workforce	Employment Quality	Percentage of employee turnover.
Social	Workforce	Employment Quality	Total number of announced layoffs by the company.
Social	Workforce	Employment Quality	Has an important executive management team member or a key team member announced a voluntary departure (other than for retirement) or has been ousted?
Social	Workforce	Employment Quality	Has there has been a strike or an industrial dispute that led to lost working days?
Social	Workforce	Employment Quality	Number of part-time employees.
Social	Workforce	Employment Quality	Number of controversies published in the media linked to the company's relations with employees or relating to wages or wage disputes.
Social	Workforce	Employment Quality	Number of controversies linked to the company's relations with employees or relating to wages or wage disputes published since the last fiscal year company update.
Social	Workforce	Employment Quality	CEO's total salary (or other highest salary) divided by average wage (Highest Salary (US dollars) /Average Salaries and Benefits in (US dollars)).
Social	Workforce	Employment Quality	Employment growth over the last year.
Social	Workforce	Employment Quality	Total number of announced lay-offs by the company divided by the total number of employees.
Social	Workforce	Employment Quality	Is the company under the spotlight of the media because of a controversy linked to the company's employees, contractors or suppliers due to wage, layoff disputes or working conditions?
Social	Workforce	Health & Safety	Does the company have a policy to improve employee health & safety within the company and its supply chain?

Social	Workforce	Health & Safety	Does the company have an employee health & safety team?
Social	Workforce	Health & Safety	Does the company train its executives or key employees on health & safety?
Social	Workforce	Health & Safety	Does the company train its executives or key employees on employee health & safety in the supply chain?
Social	Workforce	Health & Safety	Total hours of health & safety training
Social	Workforce	Health & Safety	Does the company have a policy to improve employee health & safety?
Social	Workforce	Health & Safety	Does the company have a policy to improve employee health & safety in its supply chain?
Social	Workforce	Health & Safety	Does the company have health and safety management systems in place like the OHSAS 18001 (Occupational Health & Safety Management System)?
Social	Workforce	Health & Safety	Does the company show through the use of surveys or measurements that it is improving the level of employee health & safety in its supply chain?
Social	Workforce	Health & Safety	Total number of injuries and fatalities including no-lost-time injuries relative to one million hours worked.
Social	Workforce	Health & Safety	Number of injuries and fatalities including no-lost-time injuries reported for contractors relative to one million hours worked.
Social	Workforce	Health & Safety	Number of injuries and fatalities including no-lost-time injuries reported for employees relative to one million hours worked.
Social	Workforce	Health & Safety	Number of injuries and fatalities reported by employees and contractors while working for the company.
Social	Workforce	Health & Safety	Number of injuries and fatalities reported for contractors while working for the company.
Social	Workforce	Health & Safety	Number of injuries and fatalities reported for employees while working for the company.
Social	Workforce	Health & Safety	Number of occupational diseases or any disease caused by continued exposure to conditions inherent in a person's occupation reported relative to one million hours worked
Social	Workforce	Health & Safety	Number of employee fatalities resulting from operational accidents.
Social	Workforce	Health & Safety	Number of contractor fatalities resulting from operational accidents.
Social	Workforce	Health & Safety	Total number of injuries that caused the employees and contractors to lose at least a working day relative to one million hours worked.
Social	Workforce	Health & Safety	Number of injuries that caused the contractors to lose at least a working day relative to one million hours worked.
Social	Workforce	Health & Safety	Number of injuries that caused the employees to lose at least a working day relative to one million hours worked.
Social	Workforce	Health & Safety	Number of lost working days of the employees and contractors.
Social	Workforce	Health & Safety	Number of lost working days of the employees only.
Social	Workforce	Health & Safety	Number of lost working days of the contractors only.
Social	Workforce	Health & Safety	Does the company report on policies or programs on HIV/AIDS for the workplace or beyond?
Social	Workforce	Health & Safety	Number of controversies published in the media linked to workforce health and safety.
Social	Workforce	Health & Safety	Number of controversies linked to workforce health and safety published since the last fiscal year company update.
Social	Workforce	Health & Safety	Total number of injuries and fatalities including no-lost-time injuries relative to one million hours worked.
Social	Workforce	Health & Safety	Total lost days at work divided by total working days. (Refers to an employee absent from work because of incapacity of any kind, not just as the result of occupational injury or disease)
Social	Workforce	Training & Development	Does the company have a policy to support the skills training or career development of its employees?
Social	Workforce	Training & Development	Does the company have a policy to improve the skills training of its employees?
Social	Workforce	Training & Development	Does the company have a policy to improve the career development paths of its employees?
Social	Workforce	Training & Development	Average hours of training per year per employee.
Social	Workforce	Training & Development	Total training hours performed by all employees.
Social	Workforce	Training & Development	Total training costs from all the training performed by all employees.
Social	Workforce	Training & Development	Does the company claim to favor promotion from within?
Social	Workforce	Training & Development	Does the company claim to provide regular staff and business management training for its managers?
Social	Workforce	Training & Development	Does the company provide training in environmental, social or governance factors for its suppliers?
Social	Workforce	Diversity & Opportunity	Training costs per employee in US dollars.