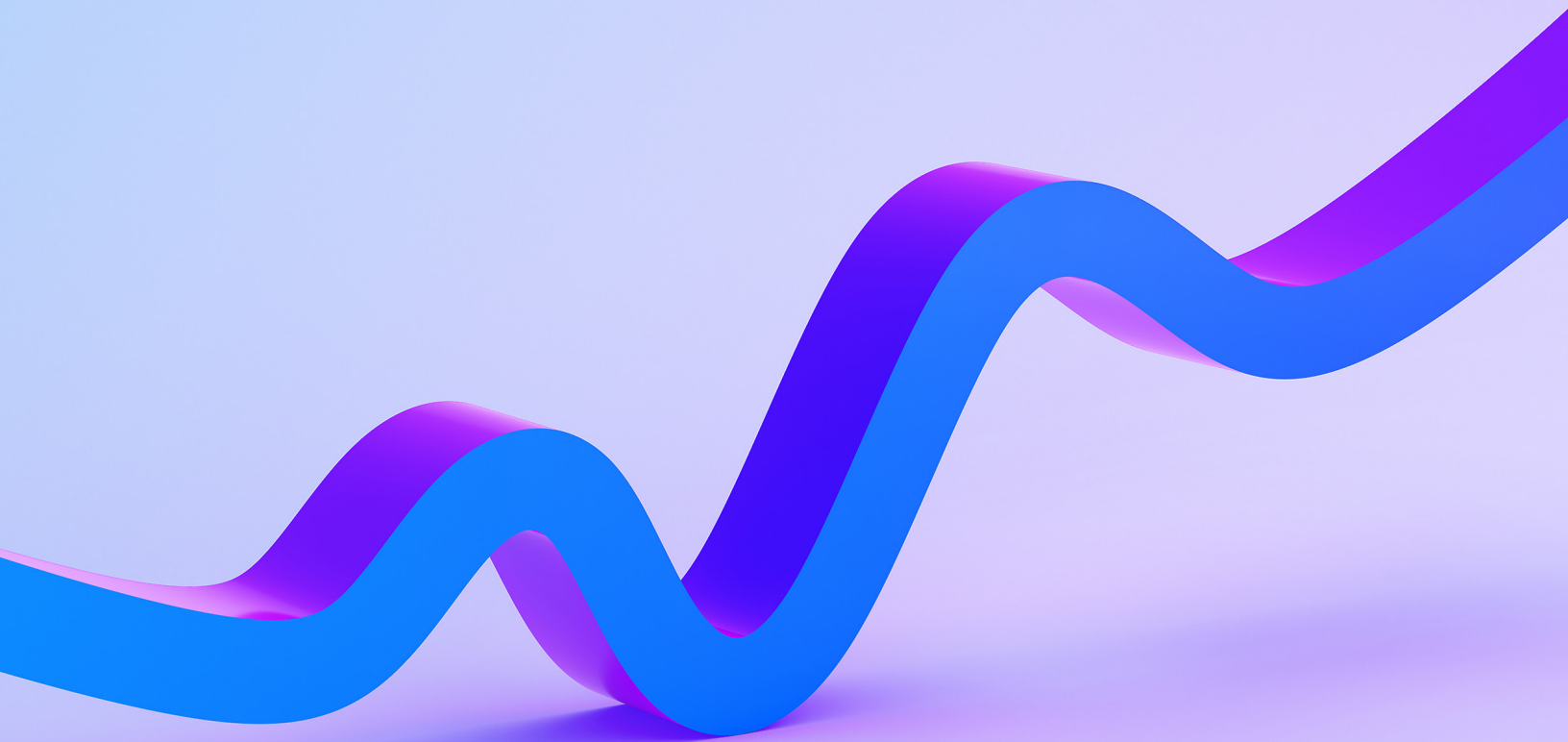
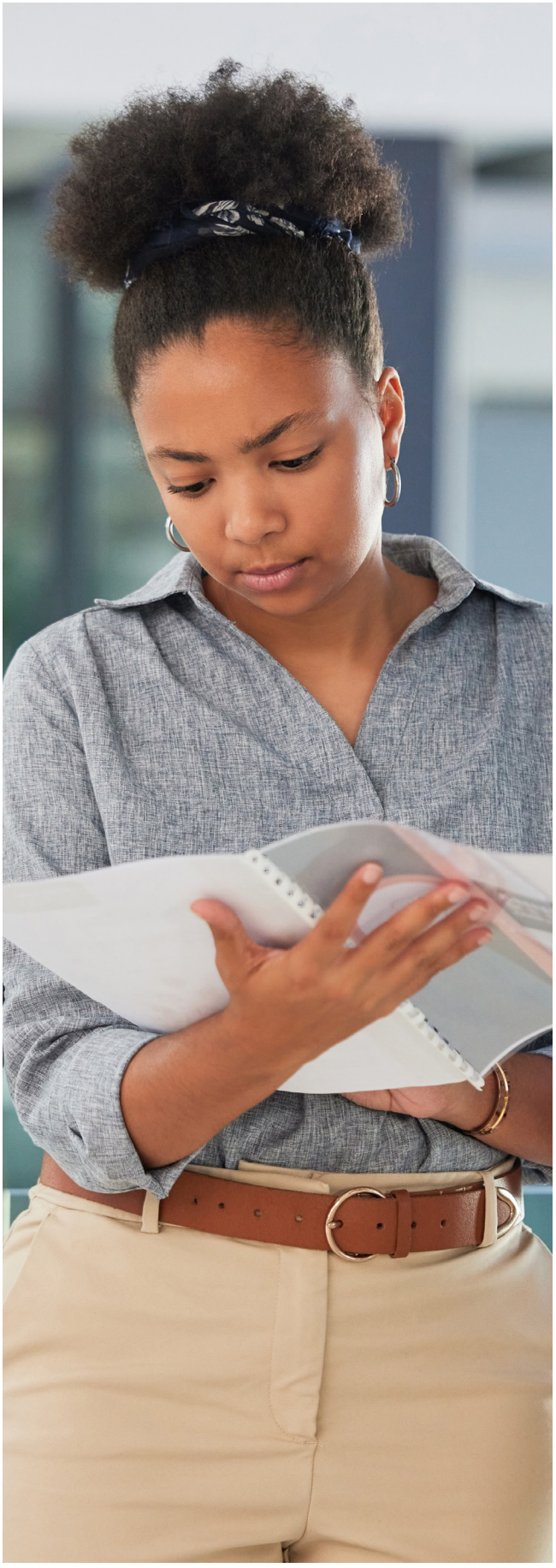
KPMG

Is sustainability good for financial performance?





Contents

Introduction

In recent years, the value proposition for investing in sustainable business practices has grown rapidly. Regulators and businesses have strengthened norms around disclosure, and investors have become more interested in firms' approach to incorporating sustainability into business strategy. The compliance and reputational benefits of these investments are apparent, not to mention the positive first-order environmental and social impacts these initiatives may have.[1]

At the same time, business leaders may wish to better understand the impact these decisions have on the company's bottom line. CEOs face limited resources with which to make investments, and in the era of compound volatility, they must navigate a myriad of opportunities and challenges, from geopolitical risks to AI, inflation, tight labor markets, and more.[2]

Understanding the return on investment of various sustainability policies is important to enhancing a business' overall strategy. Reflecting that desire, a plurality of CEOs surveyed in the 2024 KPMG US CEO Outlook Pulse Survey named "execution of ESG initiatives" as their top operational priority for the next year, with 74% expecting to see significant returns on sustainability investments within five years.[3]

KPMG has invested considerable effort into better understanding the financial returns of sustainability, conducting the ESG and Financial Value Survey of business leaders[4] and studying the most valuable ESG efforts for companies in different sectors to pursue.[5] In this paper, as part of a value creation framework around sustainable initiatives, sometimes called Environmental, Social, and Governance (ESG) initiatives, we assessed the linkages between sustainability investments and their potential impact on financial outcomes.

We leverage large-scale financial data to examine how sustainability indicators tend to associate with these outcomes, applying a linear regression approach in concert with a variable selection method. Given the data limitations at hand, our methodology is not intended to capture a causal relationship between sustainability investments and financial outcomes; instead, it estimates correlations that still yield useful insight to business leaders. As the data required to conduct such econometric studies (as opposed to surveys or other methods) has been maturing only in recent years, we expect that the evidence base in published literature will grow in the coming years and potentially include causal analyses.

Our findings provide a series of coefficients that quantify the relative magnitude of improvement in profit margins that tend to correlate with unit improvements in each sustainability indicator/metric, controlling for other drivers of company performance. We ultimately identified 21 indicators that have a strong statistical association with robust financial performance and quantified the strength of that relationship.

---

[1] For the purposes of this paper, we consider a company's sustainability strategy to be a collection of its relevant initiatives, policies, or investments, and may use these phrases interchangeably.

[2] Compound volatility is the combination of near-term risks, such as geopolitical and technology-driven disruption, and longer-term structural changes to the U.S. economy, the energy transition, tight lab or markets, new regulation, and sticky inflation.

[3] KPMG 2024 US CEO Outlook – Pulse Survey

[4] KPMG U.S. ESG and Financial Value Survey

[5] How to Determine Where ESG Can Create Value – KPMG United States

Highlights of findings and conclusions

- As business leaders seek to integrate sustainability into their business strategy to gain a competitive advantage, a critical challenge for C-Suite decision makers is understanding the connection between actions and financial value.
- In fact, a recent KPMG survey found that a key challenge for practitioners is measuring the ROI for sustainability.
- This study aims to bring clarity to leaders by assessing 60 sustainability metrics' potential impact on gross profit margin (GPM) by conducting an econometric analysis of more than 2,500 businesses across 18 industries and 60+ countries.
- We find 21 sustainability indicators appear to have a significant relationship with GPM.
  - Among environmental indicators, lower Carbon Dioxide (CO2) equivalents emissions is associated with higher GPM. Additionally, land environmental impact reduction initiatives and e-waste reduction initiatives have some of the greatest associations.
  - Among social indicators, some of the largest positive impacts are observed for business ethics policies, staff transportation impact reduction initiatives, and day care services for employees.
  - Among governance indicators, companies that publish board-member attendance, have a one-share one-vote policy, do not have management turnover, and have a higher share of women executives tend to have higher GPM.
- While these results do not necessarily capture a causal relationship, they serve as a helpful guide for business leaders as they apply rigor to their sustainability strategy to grow their business.

Background

Substantial literature has studied the relationship between sustainability efforts and the financial outcomes associated with a company. Generally, the object of study tends to be measures of shareholder value, as measured by stock performance or market valuation (Hillman and Keim 2001; Barnett and Salomon 2006). In more recent work, Serafeim et al. (2015) show that companies with high ESG performance tend to have a high market value over the book value of equity, as well as a high return on equity. On a more aggregate level, Grewal et al. (2019) find that the equity market responded to mandatory ESG disclosure requirements in the European Union by rewarding firms that have strong disclosures. Khan et al. (2015) show that the materiality classification of sustainability issues is relevant, in that stock returns are especially high for firms that invest in issues that are considered material to their industry. Robust sustainability practices may be even more important in times of crisis, as high-ESG portfolios among Chinese stocks tended to perform better than low-ESG counterparts during COVID-19 (Broadstock et al. 2021). Some research finds weak or negative associations. Studying stock data from the U.K., Brammer et al. (2006) find that corporate social performance and its stock returns are negatively correlated, while Barnett and Salomon (2006) study socially responsible investing (SRI) fund performance data and find that – given the restrictions on diversification that SRI poses – the performance of these funds has a nonlinear relationship with the intensity of screening used by the funds.

There are several reasons to believe that investing in sustainability may lead to positive financial outcomes for a company. Giese et al. (2019) summarize the arguments into three channels from the perspective of investors. First, companies that have a strong sustainability profile may have a competitive advantage (through more efficient use of resources, development or retention of human capital, etc.) and perform more strongly. Second, such companies may have better risk management, which reduces the (idiosyncratic, firm-specific) downside risk of severe negative incidents. Lastly, such companies may also be better insulated from systematic risk, caused by macroeconomic or other external shocks.

Additionally, developing a reputation for a proactive stance may improve the company's brand value among consumers and investors externally, while enhancing employee morale and retention internally. On the other hand, sustainability investments may increase costs for the firm without a commensurate return on investment.

Investor-facing outcomes are influenced by external sentiments in addition to firm performance. Given the research challenges involved in measuring such outcomes, this paper examines a more direct performance metric in profit margin, leveraging recent data with very high dimensionality in the form of hundreds of potential sustainability indicators. This is a timely inquiry as the C-Suite faces many challenges, and sustainability investments must drive financial benefits, or by definition, they are not sustainable.

Data and variable selection

Data

Our data comes from LSEG (formerly Refinitiv). The LSEG firm-level data contains information on financial performance, sustainability indicators, and various controls for publicly listed companies. We obtained data on around 24,000 companies as of 2022, though many of these companies are missing observations in key variables, and therefore the actual number used for regression analyses is smaller; our output regression uses 2,617 companies, spanning 18 business sectors as defined by the Refinitiv Business Classification (TRBC) and 61 countries of headquarters. Descriptive statistics are available in **Appendix, Table A1**.

Methodology

Given the data availability from LSEG, we conducted a cross-sectional analysis using companies across the same snapshot year. Thus, our statistical comparison leverages the difference in performance between companies with different levels of sustainability investment (in econometric parlance, this is the "identifying variation"), subject to some control variable to help ensure we are comparing similar kinds of companies.

There are potentially many control variables and many sustainability metrics that determine firm outcomes, and LSEG provides a large number of explanatory variables that cannot be jointly estimated precisely. To address this, we use a variable selection method (i.e., Least Absolute Shrinkage and Selection Operator or LASSO) to filter the most predictively useful variables in a data-driven way.[5] This procedure culled the list of explanatory variables from over 400 to about 60. The final list of variables used is provided in **Appendix, Table A2**, with a brief description of each.

These variables are then used, alongside the pre-selected control variables, in an ordinary least squares regression with GPM as the outcome variable.[6] This allows us to examine which of these variables are strongly statistically predictive of higher gross profit margins, when the effect of firm size, sector, and country of headquarters is controlled for.

More precisely, the regression methodology allows us to jointly examine the association (partial coefficients) of each sustainability indicator while holding constant the other indicators and controls, facilitating "like for like" comparisons between companies.

Specifically, we estimate relationships of the following form:

$$\text{GrossProfitMargin} = \alpha + \beta \cdot \text{SustainabilityIndicators} + \gamma \cdot X + \epsilon$$

Here *SustainabilityIndicators* represents a vector of the indicators selected from LASSO; β captures the change in GPM associated with a one-unit increase in each indicator. The meaning of a one-unit increase will differ depending on indicator: for policies defined in a binary way, as in simply having the policy or not, it would be the increase associated with having the policy versus not having it. For a continuous variable, such as gross carbon emissions, it would be the increase (or decrease) associated with, say, one million tons higher CO2 emissions. We specify the unit of measurement for each non-binary variable presented in the **Results** section below.

Meanwhile, X is a vector of other control variables (firm size, sector, and country of headquarters), and γ the relationship of those variables with gross profit margin. α represents the "intercept" – the baseline level of gross profit margin when all other variables are set to zero – and ϵ captures the variation in gross profit margin for each firm that remains unexplained by the model after each of the above variables is accounted for.

This is not expected to capture a causal relationship, as the simple regression does not rule out endogeneity – i.e. unobserved relationships that confound the true effect of

[5] LASSO requires a fully populated dataset with no missing observations for any independent variable. Prior to applying LASSO, we preemptively drop any variables that have a greater than 80% missingness rate in the dataset, and then keep only those observations that have are fully populated for the remaining variables, which creates the dense dataset needed.

[6] We have examined a number of alternative outcomes but found that they were generally not as well-populated (as in the case of earnings retention, market capitalization or dividend yield) or not as illustrative (as in the case of business activity revenue).

the sustainability-performance relationship, such as omitted variables bias or reverse causation. In our context, such endogeneity might arise from the fact that a well-managed company making sustainability investments may also make prudent decisions in other affairs, and so investments don't necessarily need to cause performance improvements for us to observe both at the same time.

Alternatively, a company facing low profit margins due to some elevated risk or deficiency might be more likely to make an investment to improve those things, in which case companies making sustainability investments would paradoxically appear to have worse financials. (We explore this latter case further as a potential explanation for some of our findings in the next section, alongside other potential mechanisms.)

Thirdly, reporting bias might also be at play: we only observe those companies who report on the sustainability metrics that Refinitiv/LSEG collects (or has enough information to impute on, for some variables), but companies with unflattering metrics may choose not to publicly disclose that information.

These sources of endogeneity are not truly resolvable without access to better data and/or an "exogenous" source of variation in the sustainability investments that is decoupled from other firm characteristics. Still, correlations uncovered through these regression analyses may be suggestive of underlying causal relationships, i.e., investments that are worth investigating as potential impact factors.

Results

We find a total of 21 indicators that return a statistically significant coefficient against gross profit margin, shown in Table 1. We provide the full regression table in Appendix, Table A3, including all sustainability measures and control dummies.

Table 1. Sustainability Indicators That Are Strongly Predictive of Gross Profit Margin (GPM)

Variable	Associated Change in GPM
Environmental Indicators	
Has e-waste reduction initiatives	3.15 percentage point (pp)
Estimated total CO2 equivalent emissions	0.08pp (per 1 million ton reduction)
CO2 estimation method – Energy	-6.37pp (relative to CO2 model)
Has environmental assets under management	9.77pp
Has land environmental impact reduction initiatives	3.66pp
Has at least one product line or service designed to have positive effects on the environment, or is environmentally labeled and marketed	-6.06pp
Social Indicators	
Supports SDG 5, Gender Equality	2.04pp
Received corporate responsibility awards	-2.63pp
Uses human rights criteria in selecting/monitoring suppliers or sourcing partners	-3.15pp
Member of the Ethical Trading Initiative	27.23pp
Provides daycare services to employees	2.21pp
Has employee's health & safety team	-2.80pp
Has staff transportation impact reduction initiatives	2.58pp
Has business ethics policy in code of conduct	3.54pp
Has a policy to improve the career development paths of employees	-3.90pp
Governance Indicators	
Staggered board structure (board members are re-elected in groups, not individually subject to reelection)	-1.84pp
Executive members' gender diversity (% of women executives)	0.06pp (per 1 percentage point increase)
Board-specific skills (% of board members who have either an industry-specific background or strong financial background)	-0.09pp (per 1 percentage point increase)
Voluntary departure (non-retirement) or ousting of a management team member	-3.00pp
Publishes board member attendance	3.39pp
Has a one-share, one-vote policy	3.25pp

Note: Only statistically significant coefficients (p-value under 0.1) are shown.

When interpreting the associated increases in GPM, it is important to reiterate that executive gender diversity, board-specific skills, and CO2 emissions are continuous variables, while the remainder are dichotomous (i.e., having values of either 0 or 1, as in the company either having the specified policy or not.) If we were to think of the above numbers as "effects" of a sustainability-related investment or company initiatives (keeping in mind the caveats above about causal interpretations), for these three variables, the estimated effect would be the product of the coefficients above and the actual percentage increase in the variable.

The majority of coefficients imply that an investment that improves one of these sustainability metrics is associated with an increase in the GPM. While CO2 emissions and management departures have negative coefficients, these are both considered undesirable outcomes (e.g., lower emissions would be considered better) so the direction of the implied association is the same and the coefficient has the expected sign. Another variable with a negative coefficient is "CO2 estimation method." This is Refinitiv's internal indicator for how the emissions figure for a company was obtained, and it can either be listed as "reported" (if the company directly reported data), "CO2" (imputed by Refinitiv based on past emissions reporting by the company), "Energy" (imputed based on energy use reported by the company), or "Median" (imputed from other companies in the same industry). The variable thus speaks to the amount or type of information available from the company's emissions reporting, and so the main inference we can draw from this variable is about reporting practice or capability. The regression points to a more negative GPM if the method is "Energy", compared to the baseline of "CO2."

Some of the coefficients imply considerable statistically significant and positive correlations with GPM associated with these investments/initiatives. Our findings indicate that companies that have instituted a policy to reduce the environmental impact on the land it owns or uses have a GPM 3.66 percentage points higher, on average, than the ones that do not. Also, companies with a 10% higher share of women among executives have a GPM 0.6 percentage points higher, on average. Finally, a reduction of CO2 emissions by 1 million tons per year (considering that the average of this variable in our data is about 1.7 million tons) has a 0.08 percentage point effect on GPM. Although not large in magnitude, this may be especially relevant at the top end of the emissions distribution; the top 4% of companies in our sample have emissions over 10 million tons.

We caution against the interpretation of two of the largest coefficients. Being a member of the Ethical Trading Initiative is associated with a 27 percentage point increase in GPM, while having environmental assets under management is associated with a 9.8 percentage point increase. However, these criteria are only met by two and 57 companies, respectively, in our data. That is to say that those coefficients are driven by a very small number of companies with high GPMs and may not hold up under a larger sample size. (All other statistically significant variables are supported by at least 190 companies (7% of the sample of 2,617) being observed with a nonzero value, and most are supported by 20% or more.)

On the other hand, there are several coefficients in the table above that imply a negative GPM change associated with a (positive) sustainability investment. We propose several different explanations for why this might be the case. While the data available for this analysis does not allow us to explore these mechanisms in depth, it is possible that one or more of these explanations are in play for each of the variables.

- **Costs Outweighing Returns.** Perhaps the most straightforward explanation is that some of these investments simply do not pay for themselves in terms of profit margin; that is, the costs of implementing the policy or improving the measure are larger than the financial returns of doing so. This explanation is especially plausible for investments involving large financial costs, such as maintaining an employee health and safety team. In a somewhat different vein, having a staggered board structure (the board being reelected in cohorts rather than all at once) could come with both benefits and drawbacks – better insulated against hostile takeovers and more stable, but possibly slower to react to poor board performance and/or changes in direction – and the negative coefficient could be indicative of the drawback being greater than the benefit for companies in our sample.
- **Endogeneity of Investment Decisions.** The investments and initiatives we observe in our data are not randomly determined, which leads to some important caveats in interpretation. One such consideration is that for certain kinds of sustainability investments, the companies that choose to make that investment do so because they are already particularly at risk or disadvantaged in some way that affects profit margin. (This kind of endogeneity is a case of omitted variables bias.) Again, taking the "has employee health & safety team" variable as an example, firms that have

this kind of policy may be ones that have particularly high exposure to risks such as employee injuries or mechanical failures – and that is why they needed to have such a policy to begin with. Such companies may also have a lower profit margin because of reputational damage incurred from past incidents, or other related reasons, which would cause us to observe a negative association.

Similar reasoning could be applied to other variables: "human rights contractor" may have a negative association with profit margin, if the companies that have a system in place to vet the human rights policies of suppliers are precisely those companies that are most at risk of having a human rights violator in the supply chain, and "has environmental products" may have a negative association if the companies that sell at least one environmental product are ones that otherwise generate many polluting products and are looking to improve in that area.

What each of these hypotheses has in common is that the observed relationship (in our regression coefficients) does not necessarily describe the true relationship. Perhaps having the employee health and safety team really does improve profit margin as well, but because the firms that need that policy are worse off, to begin with, those firms still show a lower profit margin than firms that don't have such a team.

Does this threaten the validity of the other (positive) observed relationships as well? The bias as hypothesized above is a "downward" bias, in that it tends to understate any positive impacts of the "true" relationship by making it appear more negative than it is. Therefore, if the relationship observed is already positive, then the true relationship could be even more positive.

- **Competitive and Established Firms.** Another form of endogeneity arises from the age and market position of the companies in our data, which we do not directly observe. Taking the "received corporate responsibility awards" variable as an example, the likely recipients of these awards are older and more established companies, which may no longer be in high-growth phases and may not have as high of a profit margin. Even controlling the sector and employee count as we have done would not entirely capture this influence.

Further Commentary

The variables that do *not* exhibit statistically significant coefficients could be explained in a few different ways: they truly do not have any association with GPM, or the association exists but is too infrequently or inconsistently observed in the data, or any association they have is already being captured by another (competing) variable in the model. Yet another possibility is that endogeneity as described above masks a relationship that does exist.

Our research design does not provide us with much leeway to disentangle these cases for a given variable. For example, the finding related to the "total senior executives' compensation" variable can be explained by the former two possibilities. This variable carries a negative coefficient (which would imply that higher executive compensation is associated with lower GPM), but it is imprecisely estimated. This does, however, turn significant for some subsets of industries, implying that the indicator may matter more for those sectors. Additionally, simple correlation analysis suggests that the third competing-variable explanation likely holds for many variables – for example, the "flexible working hours" policy variable turned out to be strongly correlated with the "human rights contractor" variable, and so the model did not select both to be included at the same time.

The regression specification tested in this paper represents only one of many possible specifications, any of which might best describe the true relationship. For one example, it can be argued that GPM differs greatly across industries. The revenue and cost structure of a manufacturing firm likely would not resemble those of a financial services firm. We controlled for the sector in our main regression so that we can isolate the statistical relationship between GPM and sustainability indicators: that is, we allow firms to have different baseline expected GPM depending on the sector they are in. Indeed, we observe significant differences across industries (as detailed in **Appendix Table A3**), with Banking & Investment Services having the highest average GPM by some margin and Food & Drug Retailing and Renewable Energy having some of the lowest GPM. In a similar way, we also control for country of headquarters, though only a handful of jurisdictions show statistically significantly higher GPMs (e.g., Belgium, Cayman Islands, France).

But in addition to affecting the average baseline GPM, it is also possible that the association between GPM and sustainability indicators also differs across sectors. This is not directly tested in the main regression, but we performed some exploratory analysis by subdividing the sample into goods-producing or manufacturing sectors and services-oriented sectors and fitting the regression separately in these segments.[7] The results imply, for instance, that the observed relationship of GPM with executive members' gender diversity is more acute for and primarily driven by the service-sector firms, while the land environmental impact reduction relationship is primarily driven by goods-sector firms. This line of inquiry would greatly benefit from access to repeated time data where we can observe within-firm changes over time, and as such we leave this exploration to future study.

[5] This is similar to estimating an "interaction effect" between sustainability indicators and sector, though more flexible in the sense that we are also allowing the control variables' coefficients to vary across sector.

Conclusions

We have examined the relationship between a battery of sustainability metrics and key financial metrics in GPM. The analysis reveals 21 indicators with a statistically significant (strongly predictive) correlation with GPM. This set of indicators generally makes intuitive sense and may be a useful starting point in considering the "highest ROI" investments that a firm could prioritize.

One key limitation of this analysis is that it does not attempt a causal inference based on external sources of variation in sustainability investments. Another is that our data may be selectively incomplete: it is possible that companies with the worst track record on sustainability are more likely to avoid reporting metrics on such. Having more information on these companies (e.g., through improvements in data availability via voluntary or mandatory disclosures) would add confidence to the robustness of our findings.

It is worth noting we do not explicitly split out the cost element of each investment, instead using a gross profit margin measure to consider the net value of the investment. Improving any of the indicators highlighted in this analysis may each require a very different set of investments in terms of time, money, and effort, which are also likely to look different for different companies. The prioritization of sustainability investments will ideally involve a decision-making process that considers these firm-specific costs as well as the potential returns.

Lastly, our analysis focuses on the GPM as a measure of financial performance. Our econometric approach to measuring the impact of sustainability investments or initiatives on company financials can be extended to analyses of stock performance, revenue growth, total shareholder return, EBIT %, or any other potential definition of financial performance. We leave that for future research.

Contact us

Erkan Erdem, Ph.D.
Principal,
Economic & Valuation Services
703-286-8188
erkanerdem@kpmg.com

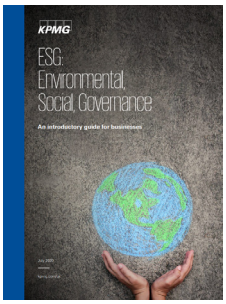
Mark Golovcsenko
Principal,
Infrastructure & Climate Advisory
212-954-2373
mgolovcsenko@kpmg.com

Jung Bae, Ph.D.
Manager,
Economic & Valuation Services
212-954-4073
jungbae@kpmg.com

The authors would like to acknowledge and thank **Olivia Cheung**, Senior Associate in Economic & Valuation Services for her significant contributions to this paper.

Further reading

KPMG Global Valuation Institute – Carbon Footprint Stomps on Firm Value (2012)



KPMG UK – ESG: An Introductory Guide for Businesses (2020)

KPMG International – Survey of Sustainability Reporting (2022)

References

Barnett, Michael L. and Robert M. Salomon. 2006. "Beyond Dichotomy: The Curvilinear Relationship between Social Responsibility and Financial Performance." *Strategic Management Journal* 27(11).

Brammer, Stephen, Chris Brooks, and Stephen Pavelin. 2006. "Corporate Social Performance and Stock Returns: UK Evidence from Disaggregate Measures." *Financial Management* 35(3).

Broadstock, David C., Kalok Chan, Louis T.W. Cheng, and Xiaowei Wang. 2021. "The Role of ESG Performance During Times of Financial Crisis: Evidence from COVID-19 in China." *Finance Research Letters* 38.

Giese, Guido, Linda-Eling Lee, Dimitris Melas, Zoltan Nagy, and Laura Nishikawa. 2019. "Foundations of ESG Investing: How ESG Affects Equity Valuation, Risk, and Performance." *The Journal of Portfolio Management* 45(5).

Grewal, Jody, Edward J. Riedl and George Serafeim. 2019. "Market Reaction to Mandatory Nonfinancial Disclosure." *Management Science* 65(7).

Hillman, Amy J. and Gerald D. Keim. 2001. "Shareholder Value, Stakeholder Management, and Social Issues: What's the Bottom Line?" *Strategic Management Journal* 22(2).

Khan, Mozaffar, George Serafeim, and Aaron Yoon. 2015. "Corporate Sustainability: First Evidence on Materiality." *The Accounting Review* 91(1).

KPMG US. 2024. "2024 KPMG U.S. CEO Outlook Pulse Survey." https://kpmg.com/us/en/articles/2024/kpmg-2024-ceo-outlook-pulse-survey.html

Serafeim, George, Emily Kaiser, Joshua Linder, Ivan Naranjo, and John Streur. 2015. "The Role of the Corporation in Society: Implications for Investors." The Calvert-Serafeim Series.

Appendix

Table A1. Descriptive Statistics of LSEG Data Used

Panel A: Counts	
Number of firms available in snapshot	24,194
Number of firms used in regression (fully populated values for variables in the regression)	2,617
Sectors among regression sample:	
Industrial Goods	412
Industrial & Commercial Services	320
Real Estate	310
Energy – Fossil Fuels	256
Food & Beverages	224
Healthcare Services & Equipment	207
Pharmaceuticals & Medical Research	196
Utilities	172
Transportation	163
Banking & Investment Services	151
All others	206
Country of headquarters among regression sample:	
USA	893
China (Mainland)	349
United Kingdom	158
Canada	111
Japan	102
Sweden	100
India	86
Switzerland	73
Germany	72
France	69
Australia	49
Thailand	45
Italy	44
Malaysia	43
All others	423

Panel B: Means and Standard Deviations of Statistically Significant Predictors		
Variable (0/1 indicator unless specified)	**Mean**	**Std. Dev.**
Gross profit margin (%)	44.5	25.3
Number of employees	17,136	56,917
Staggered board structure	0.332	0.471
Executive members gender diversity (% of women)	18.3	16.1
Board specific skills (% who have industry or financial background)	50.8	20.5
Estimated CO2 equivalents emissions (millions of tons)	1,706,078	10,608,863
CO2 estimation method – Energy	–	–
Company supports SDG 5, Gender Equality	0.416	0.493
Received corporate responsibility awards	0.448	0.497
Uses human rights criteria in selecting/monitoring suppliers or sourcing partners	0.569	0.495
Member of the Ethical Trading Initiative	0.0008	0.028
Provides day care services to employees	0.215	0.411
Has employees health and safety team	0.621	0.485
Has e-waste reduction initiatives	0.203	0.402
Has staff transportation impact reduction initiatives	0.255	0.436
Has at least one product line or service designed to have positive effects on the environment, or is environmentally labeled and marketed	0.477	0.500
Has environmental assets under management	0.022	0.146
Has land environmental impact reduction initiatives	0.076	0.265
Has business ethics policy in code of conduct	0.818	0.386
Has policy to improve career development paths of employees	0.877	0.329
Voluntary departure (non-retirement) or ousting of a management team member	0.073	0.260
Board member attendance is published	0.457	0.498
Has a one-share, one-vote policy	0.891	0.311

Table A2. List of Variables After LASSO Filtering

LASSO-filtered ESG variables	Definitions
Net Employment Creation	Employment growth over the last year.
CEO Board Member	The CEO is a board member.
Total Senior Executives Compensation to Revenues in million	The total compensation paid to all senior executives as reported by the company divided by net sales or revenue in million.
Total Senior Executives Compensation	The total compensation paid to all senior executives as reported by the company.
Staggered Board Structure	Does the company have a staggered board structure?
Executive Members Gender Diversity, Percent	Percentage of female executive members.
Board Gender Diversity, Percent	Percentage of females on the board.
Board Specific Skills, Percent	Percentage of board members who have either an industry specific background or a strong financial background.
Board Member Affiliations	Average number of other corporate affiliations for the board member.
Estimated CO2 Equivalents Emission Total	The estimated total CO2 and CO2 equivalents emission in tons.
CO2 Estimation Method	CO2 estimate method. (Carbon estimate model is structured around four models; each model returns one value (reported or estimated). In the list, the following are various models as below: reported, CO2 model, energy model, and median model.)
SDG 2 Zero Hunger	Does the company support the UN Sustainable Development Goal 2 (SDG 2) Zero Hunger? (Company is supporting Goal 2 of SDG to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture. Data considered only from SDG goals.)
SDG 5 Gender Equality	Does the company support the UN Sustainable Development Goal 5 (SDG 5) Gender Equality? (Company is supporting Goal 5 of SDG to achieve gender equality and empower all women and girls. Data is considered only from SDG Goals.)
SDG 14 Life Below Water	Does the company support the UN Sustainable Development Goal 14 (SDG 14) Life Below Water? (Company is supporting Goal 14 of SDG to conserve and sustainably use the oceans, seas, and marine resources. Data considered only from SDG Goals.)
SDG 15 Life on Land	Does the company support the UN Sustainable Development Goal 15 (SDG 15) Life on Land? (Company is supporting Goal 15 of SDG to sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss. Data considered only from SDG Goals.)

LASSO-filtered ESG variables	Definitions
UNPRI Signatory	Has the company signed the United Nations Principles for Responsible Investment (UNPRI)?
Human Rights Policy	Does the company have a policy for the exclusion of children, forced or compulsory labor or to guarantee the freedom of association universally applied independent of local laws?
Resource Reduction Policy	Does the company have a policy for reducing the use of natural resources or to lessen the environmental impact of its supply chain?
Global Compact Signatory	Has the company signed the UN Global Compact? (The 'United Nations Global Compact' is a non-binding United Nations pact to encourage businesses worldwide to adopt sustainable and socially responsible policies and to report on their implementation.)
Product Sales at Discount to Emerging Markets	Is the company selling some products or services at a discount to normal retail prices in emerging markets? (Products or providing services at a low-price or at a discount to emerging countries; includes flexible pricing and payment plans for middle-income countries.)
Diseases of the Developing World	Does the company claim to conduct research and development on drugs for diseases in the developing world? (Mainly related to pharmaceutical sector companies; conducting research program for diseases, such as HIV/AIDS, Malaria, Tuberculosis, and Cancer, that affect the developing countries.)
Corporate Responsibility Awards	Has the company received an award for its social, ethical, community, or environmental activities or performance? (External award for reporting fiscal year for its social, ethical, community, or environmental activities/performance; includes an external award for CSR programs and initiatives relating to safety, human rights, training and development, diversity and opportunity, good citizenship/community/philanthropy, environmental, environmental product award, etc.)
Policy Child Labor	Does the company have a policy to avoid the use of child labor? (Actions, programs, or initiatives to avoid child labor or the employment of children under legal working age for the company or its suppliers. Consider information from industry code such as the Electronic Industry Citizenship Coalition code of conduct and Pharmaceutical Industry Principles. Legal compliance data is considered.)
Human Rights Contractor	Does the company report or show to use human rights criteria in the selection or monitoring process of its suppliers or sourcing partners? (Information to be on using human rights criteria while selecting a supplier or sourcing materials from sourcing partners. Actions, programs, or initiatives related to the specific principles stipulated in the suppliers' codes. Consider information from industry codes such as the Electronic Industry Citizenship Coalition code of conduct and Pharmaceutical Industry Principles. For UK companies, information from 'Modern Slavery Act 2015' is considered.)
Ethical Trading Initiative ETI	Is the company a member of the Ethical Trading Initiative (ETI)?

LASSO-filtered ESG variables	Definitions
Flexible Working Hours	Does the company claim to provide flexible working hours or working hours that promote a work-life balance? (Programs or processes that help employees have a balance between their work and personal life; includes flexible work arrangements such as telecommuting, flexible working hours, job-share, and reduced and compressed work weeks.)
Day Care Services	Does the company claim to provide daycare services for its employees? (Consider daycare centers provided by the company; include services such as vouchers, referrals, and allowances given for daycare. Consider if the company has partnerships with surrounding daycare centers for its employees. Information on adult/elderly/disabled care is considered. Leaves for childcare are not considered.)
Employees Health & Safety Team	Does the company have an employee health & safety team? (Any individual or team that operates on a day-to-day basis and is responsible for health and safety inspection, incident investigation, making recommendations, implementing best practices, and ensuring proper communication on health and safety. The team has to be responsible for carrying out the implementation of the health and safety strategy, not only decision making; include if the company named the team as a committee and the members of the team are employees of the company, who are operational on a day-to-day basis in the company and are not part of the board committees. The health and safety team is called with different names such as department, unit, division, manager, specialists, council, coordinator, representative, officers, etc.)
Employees Health & Safety OHSAS 18001	Does the company have health and safety management systems in place like the OHSAS 18001 (Occupational Health & Safety Management System)? (Consider if the company claims to have OHSAS 18001 or any internal management system for one site or more; include environment, health, and safety management system. Consider if companies comply with the Occupational Health and Safety Act.)
Particulate Matter Emissions Reduction	Does the company report on initiatives to reduce, substitute, or phase out particulate matter less than ten microns in diameter (PM10)? (Initiatives which the company has put in place to reduce, substitute, or phase out particulate matter less than ten microns in diameter; includes any new project undertaken focusing on reduction of particulate matter emissions. Dust, fugitive dust, and soot are also considered as particulate matter.)
e-Waste Reduction	Does the company report on initiatives to recycle, reduce, reuse, substitute, treat, or phase out e-waste? (Any initiatives that the company has put in place to reduce e-waste. E-waste is used as a generic term embracing all types of waste containing electrically powered components. E-waste may contain hazardous materials which require special handling and recycling methods. Includes all products covered under waste, electrical, and electronic (WEEE) regulations like fluorescent tubes, sodium lamps, computers, mobiles, telephones, fax machines, copiers, printers, washing machines, dryers, refrigerators, air-conditioners, televisions, VCR/DVD/CD players, wi-fi sets, radios, drills, electric saws, sewing machines, batteries, and toner cartridges.)

LASSO-filtered ESG variables	Definitions
Emissions Trading	Does the company report on its participation in any emissions trading initiative? (Emissions trading, cap, and trade, is a market-based approach used to control pollution by providing economic incentives for achieving reductions in the emissions of pollutants. If a company claims to participate in an emission trading scheme in the future, it is graded as false.)
ISO 14000 or EMS	Does the company claim to have an ISO 14000 or EMS certification? (Any of the individual sites that have the ISO-14001 certification is qualified information. Merely stating adherence to ISO 14000 or following ISO 14000 policies does not qualify, certification is required.)
Staff Transportation Impact Reduction	Does the company report on initiatives to reduce the environmental impact of transportation used for its staff? (When the company encourages its staff to use alternate options like carpooling, telephone, video, and web conferencing, encouraging employees to use public transport, cycle-to-work scheme, purchase of environmentally friendlier vehicles or eco-friendly cars for staff and thereby reducing the environmental impact.)
Internal Carbon Pricing	Does the company have an internal price on carbon?
Environmental Products	Does the company report on at least one product line or service that is designed to have positive effects on the environment, or which is environmentally labeled and marketed? (In focus are the products and services that have positive environmental effects or are marketed as solving environmental problems.)
Environmental Assets Under Mgt	Does the company report on assets under management that employ environmental screening criteria or environmental factors in the investment selection process? (Relevant to asset management companies; socially responsible investment (SRI) and ethical funds are under consideration.)
Green Buildings	Does the company report about environmentally friendly or green sites or offices? (Office/green site where the company engages in some operations. LEED/BREEAM certifications for its building. Major refurbishments to improve the environmental aspects of sites/buildings/offices. The building has to be operational at least at the end of the fiscal year; if the building is under construction, then it is graded as 'false.')
Land Environmental Impact Reduction	Does the company report on initiatives to reduce the environmental impact on land owned, leased, or managed for production activities, or extractive use? (Relevant to companies involved in agriculture, mining & oil, and gas. In scope is the information on remediation, reclamation, or remediation of disturbed land by operations.)
Fossil Fuel Divestment Policy	Does the financial company have a public commitment to divest from fossil fuels?
Policy Executive Compensation ESG Performance	Does the company have an extra-financial performance-oriented compensation policy? (The compensation policy includes remuneration for the CEO, executive directors, non-board executives, and other management bodies based on ESG or sustainability factors.)
Different Voting Right Share	Does the company have shares with different voting rights?

LASSO-filtered ESG variables	Definitions
Earnings Restatement	Is the company in the process of a material earnings restatement?
Insider Dealings Controversies	Is the company under the spotlight of the media because of a controversy linked to insider dealings and other share price manipulations?
Accounting Controversies	Is the company under the spotlight of the media because of a controversy linked to aggressive or non-transparent accounting issues?
Policy Fair Competition	Does the company describe in the code of conduct that it strives to be a fair competitor? (Includes respecting other company's patents, copyrights, or intellectual properties, or avoiding anti-competitive behavior, price fixing, or other monopolistic tactics; information from the code of conduct section in any report.)
Policy Business Ethics	Does the company describe in the code of conduct that it strives to maintain the highest level of general business ethics? (Information on respecting general business ethics or integrity; information from the code of conduct section.)
Policy Community Involvement	Does the company have a policy to improve its good corporate citizenship? (Involvement in the community through donations, volunteering, philanthropic activities, and community investments; includes involvement in corporate social responsibility programs in education, health, and the environment.)
Policy Diversity and Opportunity	Does the company have a policy to drive diversity and equal opportunity? (Program or practice to promote diversity and equal opportunities within the workforce. Includes information on the promotion of women, minorities, disabled employees, or employment from any age, ethnicity, race, nationality, and religion. Consider information from the code of conduct mentioning diversity policy together with the reporting of violations.)
Policy Career Development	Does the company have a policy to improve the career development paths of its employees? (Programs or processes that focus on the career progression of the staff. Include if the company encourages and supports employees' career development; information to be on career development for the general workforce. Consider training for non-managers or leaders to develop leadership skills for future managerial or leadership positions.)
Management Departures	Has an important executive management team member or a key team member announced a voluntary departure (other than for retirement) or has been ousted?
Wages Working Condition Controversies	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?
Compensation Committee Mgt Independence	Does the company report that all compensation committee members are non-executives?
External Consultants	Do the board or board committees have the authority to hire external advisors or consultants without management's approval?

LASSO-filtered ESG variables	Definitions
Board Attendance	Does the company publish information about the attendance of the individual board members at board meetings?
Board Size More Ten Less Eight	Total number of board members which is in excess of ten or below eight.
Nomination Board Committee	Does the company have a nomination board committee?
Board Individual Re-election	Are all board members individually subject to re-election (no classified or staggered board structure)?
Executive Compensation LT Objectives	Is the management and board members' remuneration partly linked to objectives or targets that are more than two years forward looking?
Sustainability Compensation Incentives	Is the senior executive's compensation linked to CSR (Corporate Social Responsibility), H&S (Health and Safety), or Sustainability targets?
Policy Equal Voting Right	Does the company have a policy to apply the one-share, one-vote principle? (The company maintains equal rights for every common share. When there is 1 class of shares but no information on voting rights is given, then it is concluded that all the shares contain the same voting right.)
Earnings Retention Rate	Earnings Retention Rate is the proportion of net income that is retained to grow the Company's business. Earnings Retention Rate represents Retained Earnings / Income available to Common excluding Extraordinary Items. (Denominator should be positive. The data item is calculated for all periodicities. It is also available for Cumulative/Year-to-Date periods. It is applicable to all industries.)

Table A3. Full Post-LASSO Regression Table.

Variables	Gross Profit Margin
Net employment creation	0.0118 (0.00851)
CEO board member	-0.483 (1.748)
Total senior executives compensation to revenues in millions	-1.33e-05 (9.99e-06)
Total senior executives compensation	-6.17e-11 (3.28e-10)
Staggered board structure	-1.842* (1.064)
Executive members gender diversity	0.0577** (0.0288)
Board specific skills percent	-0.0896*** (0.0261)
Board member affiliations	0.705 (0.771)
Estimated CO2 equivalents emissions total	-8.26e-08* (4.26e-08)
CO2 estimation method = Energy	-6.367* (3.418)
CO2 estimation method = Median	0.754 (2.880)
CO2 estimation method = Reported	0.614 (2.677)
SDG 2 zero hunger	1.064 (1.514)
SDG 5 gender equality	2.035* (1.089)
SDG 14 life below water	-0.500 (1.552)
SDG 15 life on land	-0.771 (1.372)
UNPRI signatory	3.494 (6.105)

Variables	Gross Profit Margin
Resource reduction policy	-2.779 (1.779)
Global compact signatory	-2.078 (1.407)
Product sales at discount to emerging markets	4.503 (4.293)
Diseases of the developing world	1.838 (4.701)
Corporate responsibility awards	-2.631** (1.031)
Human rights contractor	-3.149*** (1.102)
Ethical trading initiative eti	27.23* (15.22)
Day care services	2.212* (1.169)
Employees health & safety team	-2.796*** (1.047)
Particulate matter emissions reduction	-2.107 (1.502)
e-waste reduction	3.151*** (1.146)
Emissions trading	1.611 (1.661)
Staff transportation impact reduction	2.583** (1.097)
Internal carbon pricing	-1.443 (2.014)
Environmental products	-6.059*** (1.030)
Environmental assets under mgt	9.769*** (3.381)
Green buildings	1.602 (1.040)
Land environmental impact reduction	3.656* (1.878)

Variables	Gross Profit Margin
Fossil fuel divestment policy	1.913 (7.907)
Policy executive compensation esg performance	0.507 (1.115)
Earnings restatement	-13.12 (15.56)
Insider dealings controversies	4.636 (6.207)
Accounting controversies	-5.015 (7.514)
Policy fair competition	-0.214 (1.246)
Policy business ethics	3.542** (1.565)
Policy community involvement	0.256 (1.653)
Policy diversity and opportunity	-0.914 (2.022)
Policy career development	-3.901*** (1.505)
Management departures	-3.000* (1.654)
Wages working condition controversies	-1.181 (2.411)
Compensation committee mgt independence	0.889 (1.176)
External consultants	-1.861 (1.388)
Board attendance	3.391*** (1.107)
Board size more ten less eight	0.0701 (0.295)
Nomination board committee	1.695 (1.217)
Executive compensation lt objectives	-1.695 (1.374)

Variables	Gross Profit Margin
Sustainability compensation incentives	0.0355 (1.142)
Policy equal voting right	3.255* (1.723)
Earnings retention rate	-0.0138 (0.0192)

Sector Dummy Variables

Banking & Investment Services	16.96*** (5.914)
Consumer Goods Conglomerates	-18.69*** (6.966)
Energy - Fossil Fuels	-13.37** (5.826)
Food & Beverages	-17.42*** (5.785)
Food & Drug Retailing	-29.59*** (6.335)
Healthcare Services & Equipment	-2.653 (5.755)
Industrial & Commercial Services	-14.75*** (5.699)
Industrial Goods	-18.19*** (5.714)
Insurance	11.60 (9.556)
Investment Holding Companies	-9.903 (8.855)
Personal & Household Products & Services	-0.953 (6.297)
Pharmaceuticals & Medical Research	4.834 (5.816)
Real Estate	-0.482 (5.705)
Renewable Energy	-21.04*** (6.978)

Variables	Gross Profit Margin
Transportation	-13.35** (5.849)
Uranium	-25.01 (16.13)
Utilities	-9.523 (5.883)

Country of Headquarters Dummies

Australia	26.14 (21.63)
Austria	22.15 (22.76)
Bahamas	4.710 (30.59)
Bahrain	-5.065 (24.81)
Belgium	36.61* (21.89)
Bermuda	38.36* (22.24)
Brazil	25.70 (24.03)
British Virgin Islands	20.40 (22.29)
Canada	27.67 (21.47)
Cayman Islands	43.80* (26.20)
Chile	32.20 (22.69)
China (Mainland)	23.48 (21.51)
Colombia	42.58 (30.34)
Cyprus	21.19 (24.74)

Variables	Gross Profit Margin
Denmark	30.98 (21.84)
Faroe Islands	55.42* (30.29)
Finland	33.52 (21.85)
France	39.59* (21.56)
Germany	25.13 (21.61)
Greece	31.09 (22.90)
Guernsey	45.61* (26.17)
Hong Kong	20.41 (21.75)
Hungary	25.32 (24.03)
Iceland	27.22 (23.49)
India	25.15 (21.59)
Indonesia	61.74** (30.31)
Ireland	22.50 (22.01)
Isle of Man	53.75** (26.20)
Israel	15.53 (24.70)
Italy	30.35 (21.64)
Japan	25.07 (21.62)
Jersey	27.66 (23.96)

Variables	Gross Profit Margin
Luxembourg	28.48 (22.35)
Malaysia	15.71 (21.66)
Mexico	32.61 (22.75)
Monaco	55.27* (30.26)
Mongolia	8.909 (30.25)
Netherlands	31.78 (21.81)
New Zealand	35.55 (22.06)
Nigeria	32.72 (30.31)
Norway	38.88* (21.85)
Panama	46.11* (26.19)
Philippines	21.31 (22.68)
Poland	30.35 (26.27)
Portugal	23.35 (22.58)
Puerto Rico	31.86 (30.28)
Russia	33.24 (24.90)
Singapore	25.36 (22.22)
Slovenia	20.57 (30.36)

Variables	Gross Profit Margin
South Africa	29.49 (21.74)
South Korea	17.20 (30.33)
Spain	37.56* (21.84)
Sweden	31.05 (21.56)
Switzerland	34.00 (21.58)
Thailand	17.23 (21.64)
Turkey	31.47 (26.13)
Uganda	3.689 (30.54)
United Arab Emirates	12.06 (26.17)
United Kingdom	31.97 (21.47)
United States	30.38 (21.37)
Vietnam	23.24 (23.70)

Other

number of employees	-7.46e-06 (8.43e-06)
Constant	32.22 (22.78)
Observations	2,617
R-squared	0.334

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Some or all of the services described herein may not be permissible for KPMG audit clients and their affiliates or related entities.

Learn about us: **kpmg.com**