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Article

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ENVIRONMENTAL REPORTING, FINANCIAL FUNDAMENTALS, AND COMPANY VALUATION: INSIGHTS FROM THE INDUSTRIAL SECTOR

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Abstract

The paper investigates the effect of environmental policies on the market valuation of companies within the European Union's Industrial sector, along with traditional financial indicators. Taking into account the Corporate Sustainability Reporting Directive imposed by the European Union authorities for the most prominent companies, we used a comprehensive data set of 494 publicly listed companies over the period 2020-2023 to assess the predictive impact of environmental policy adoption (EPO), environmental policy quality scores (EPOS), and financial variables (FV) on the price-to-book (PB) ratio of listed companies. We use a Random Forest regression model to identify and rank the importance of a comprehensive set of variables, underlining the idea of investor attention and priorities. The main findings point to an increase in investor interest in the effectiveness of environmental policies rather than their simple presence, emphasising the strategic importance of integrating measurable environmental outcomes into company valuation frameworks. However, traditional financial variables consistently outperform environmental indicators in explaining market valuation.

Keywords: environmental policies, market valuation, random forests, CSRD.

JEL Classification: G32, Q56, M14, C55

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Introduction

Climate change is one of the greatest challenges of our time. In this context, companies are among the most important players, as they contribute significantly to greenhouse gas emissions through production, energy consumption, transportation, and other activities. Moreover, companies control vast amounts of resources, supply chains, and infrastructure; hence, their decisions affect the environment on a large scale. Consequently, policymakers are increasingly introducing environmental protection regulations, relying on companies' responsibilities to protect the environment.

The European Commission adopted the Corporate Sustainability Reporting Directive (CSRD), a main regulatory framework aimed at enhancing and standardising sustainability reporting among nearly 50.000 European companies. This number includes both large companies and listed small and medium enterprises (SMEs) (Allgeier and Feldmann, 2023; Ruohonen and Kullas, 2024). The implementation of CSRD started in 2023 for large companies and will be extended to smaller companies with at least 250 employees until 2026 (Santilli, 2023). Companies must include sustainability information in specific management reports considering a set of standards named as the European Sustainability Reporting Standards (ESRS) (Brans, Bloembergen and Felder, 2024). Green finance policies improve corporate environmental, social and governance (ESG) performance (Wang, Elahi and Khalid, 2022). However, there is evidence that the implementation of ESG requirements could generate a certain pressure to change business models (Horobet et al., 2024). Specifically, companies need to focus on monitoring factors such as greenhouse emissions, pollution, social issues, and governance policies (Lament, 2024).

The corporate valuation landscape has changed with the implementation of ESG policies. Furthermore, extensive research shows that investors, both institutional and retail, recalibrate their investment strategies to include more sustainable characteristics of financial assets (Mirza et al., 2025). Investors and stakeholders increasingly scrutinise not only financial performance but also the sustainability practices of companies, specifically in economic sectors with importance environmental footprints such as industrials (Friede, Busch and Bassen, 2015; Said and El Bannan, 2024; Song and Rimmel, 2025). Therefore, we consider that the link between financial and environmental strategies becomes essential for comprehensive capture of the drivers that influence the valuation of companies by investors or the capital market.

The paper presents an important contribution to the sustainability and finance literature by integrating environmental and financial metrics of firm valuation within the context of the EU's CSRD regulatory framework. We analysed 494 EU-listed companies in the Industrials sector, all of which meet the CSRD requirements. The study has an integrative perspective, using three types of indicators: (i) binary metrics on the corporate adoption of environmental policy; (ii) scores reflecting the quality of these policies; (iii) financial indicators of liquidity, solvency, profitability, efficiency, and market risk. The use of Random Forest regression to assess the importance and ranking of each variable, in each year from 2020 to 2023, provides a robust perspective on the link between environmental policies and market valuation, while addressing issues of nonlinearity and multicollinearity. A key contribution of the study lies in providing empirical evidence that investors increasingly prioritise the effectiveness of environmental policies – particularly those related to emissions and supply chains – over their simple adoption. This finding underscores a shift of investors toward valuing tangible environmental policies and

outcomes, offering a more nuanced and integrative understanding of how environmental strategies influence market valuation under evolving regulatory pressures.

The next section of the article provides an overview of prior research, followed by a section outlining the research methodology used in our approach. The following section shows and discusses the main results of the study, and the last section concludes and outlines the research limitations that may open avenues for future research.

1. Review of the scientific literature

Sustainable development, a concept introduced by the World Commission on Environment and Development in 1987, has a ratchet effect on society's long-term stability and environment, ensuring balanced and perpetual improvement. (Belascu, 2015; Wang, Elahi and Khalid, 2022). Over time, sustainability has made its way into investors' decisions in financial markets. They have started to integrate it, usually through the Environmental, Social, and Governance (ESG) framework, in their decision making (Busch et al., 2015). This also signals a reorientation of investments towards a long-term paradigm for sustainable development (Folqué, Escrig-Olmedo and Santamaría, 2021; Shome et al., 2023).

In line with the global vision toward sustainability, the EU introduced CSRD - as part of the European Green Deal – to foster sustainability practices in the financial and corporate sectors and to grant investors and other stakeholders access to transparent information regarding the company's impact, risks, and opportunities associated with sustainability and ESG issues. Thus, the EU is strengthening mechanisms to avoid an asymmetric flow of information related to sustainability issues by reporting according to the ESRS (Brans, Bloomberg and Felder, 2024; European Commission, 2025).

Although CSRD reporting is a recent EU directive, the literature review is rich in scientific articles, with more than 269 papers published in Web of Science (WOS) confirming an interest among researchers in evaluating, on the one hand, the impact of the new legislation requirement at the company level and, on the other hand, the impact of CSRD reporting on investor sentiment. In this line, Martinčević, Primorac and Dorić (2024) provide a general perspective on sustainability reporting through CSRD reporting and its connection to the ESG concept by addressing today's business environment. Gebhardt et al. (2023) examined the challenges of implementing the Sustainable Finance Disclosure Regulation (SFDR) for institutional investors and how the use of a qualitative approach affects their decision-making. Basile and Ferrari (2024) reinforced the previous results by proposing strategies to effectively integrate sustainability criteria into the investment process.

Several authors evaluated the impact of CSRD from the perspective of reporting requirements at the regional level, and the results reached the same conclusions. For example, Kosi and Relard (2024) validated the nature of efforts required by German companies for CSRD reporting and concluded that this process is "a high burden", especially for companies with no experience in sustainability reporting. Similarly, Brans, Bloomberg and Felder (2024) assessed the impact of CSRD reporting on Dutch companies and emphasised that the new regulations require more context for providing information and explaining risks. Pizzi and Coronella (2024) identified a "mimetic isomorphism" in which Italian companies tend to mimic the sustainability reporting behaviours of other companies. In addition, Baranga and

Ifrim (2023) affirmed the impact of CSRD reporting for companies listed on the Bucharest Stock Exchange.

The connection between corporate environmental and financial performance has received significant attention in the research literature. Socially responsible investing (SRI) is essential to encourage sustainable corporate practices and, consequently, to encourage reasonable practices in environmental policies, consumer protection, and human rights (Horobet and Belascu, 2012; Prelipcean and Boscoianu, 2020; López Vázquez et al., 2025). From a general perspective, the impact of environmental programmes and social practices has been validated for the triple bottom line of environmental, societal, and economic performance (Gimenez, Sierra and Rodon, 2012). Additionally, other studies prove that investors prefer rewarding firms that indicate positive social behaviour (Luz, Schauer and Viehweger, 2024). Friede, Busch and Bassen (2015) scrutinised the findings of approximately 2,200 individual studies and confirmed a positive relationship between ESG and corporate financial performance. Albertini (2013) validated the authors' results on a smaller scale, conducting a meta-analysis of 52 studies over a 35-year period. Baks (2024) highlights the conclusions of Amel-Zadeh and Serafeim (2018) and suggests that sustainability under the CSRD reporting regulations equips investors to better evaluate companies' sustainability performance. In our view, a simple assessment of the existence of environmental policies is of little significance for investment decision making. The quality, nature, and actual impact of these policies matter, but this has not been explored in depth to date.

At the sectoral level, Horobet et al. (2024) investigated the influence of ESG scores in the oil and gas industry on financial performance. They concluded that investors examine sustainability discourse and results when determining a company's value. Moreover, Walther (2018) demonstrated that sustainability efforts have financial importance for companies in the energy industry, identifying several trends such as customers' reorientation toward more sustainable alternatives, stranded asset risk, and climate change. By expanding the research area, other authors validated through quantitative studies the positive impact of green marketing practices on sustainable performance (Chen et al., 2024).

Although the scientific literature is rich in studies evaluating the link between financial performance and sustainability at the company level, there are still unexplored elements on the importance given to environmental policies compared to financial variables, a perspective that provides a deep understanding of the factors that influence investment decisions. Many of the existing studies address the existence of ESG policies, but omit finer-grained aspects such as quality, impact, or how they are evaluated in analogy with traditional financial indicators. Consequently, we believe that these unexplored dimensions require further investigation, analysing both the impact of the existence of environmental policies and the evaluation of the implementation execution and communication process.

Taking into account the existing literature and reporting practices, there is growing investor interest in the impact of sustainability policies, particularly in areas such as gas emissions, supply chain traceability, and climate risk. In this context, this paper aims to explain how investors evaluate companies by analysing in detail the relationship between environmental policies and financial indicators. In line with this perspective, we formulate the following research hypotheses:

I1: Environmental policies are important indicators in the investment decision-making process.

I2: The quality of environmental policies is more important than the presence of these policies in the eyes of investors.

I3: Financial variables dominate environmental policies in explaining the company's market valuation.

2. Research methodology

2.1. Data used

This study uses a data set of 494 companies from the industrial sector of the European Union (according to the TRBC Classification) collected from LSEG-Refinitiv that covers the years 2020–2023. All companies are listed on at least one stock exchange, and their selection considered the fulfilment of two CSRD-related criteria, namely revenues of at least €50 million and assets of at least €25 million earned in 2023. Also, only companies that received an ESG score greater than zero in 2023 were included in the sample. The data set includes market and financial information for each company, along with environmental metrics. The dependent variable is the price-to-book (P/B) ratio, a well-known market valuation indicator, which compares the stock price to its accounting value. The independent variables are included in three categories provided by Refinitiv:

(1) Environmental Policies (EPO) – This category includes binary indicators that indicate the presence of specific environmental or sustainability policies at the firm level. These variables were encoded as 1 (Yes) or 0 (No) to signify the presence or absence of each policy.

(2) Environmental Policy Scores (EPOS) – This category includes scores (from 0 to 100) that measure the quality or performance of the company's environmental policies and practices considered in the EPO. EPOS variables capture the effectiveness of environmental initiatives at the corporate level, with higher scores showing improved better environmental performance, allowing us to measure the quality of environmental policies implemented, not just whether such policies exist. The nine indicators included in EPOS are matched with those included in EPO, so that we consider both its existence and its quality for each specific environmental policy. The LSEG-Refinitiv database includes more than nine indicators, but we selected those with at least 100 companies offering data. When data for EPO were not available, we entered zero for EPOS. Table 1 details the EPO and EPOS variables.

(3) Financial Variables (FV) – This category includes five financial metrics that influence company performance and valuation that refer to liquidity, solvency, asset use efficiency, profitability, and systematic risk – see Table 2 for details. These were chosen based on prior research that reflected their role in driving market valuations; see, for example, Horobet et al. (2024), Bon and Hartoko (2022), Jihadi et al. (2021). Furthermore, by incorporating these FVs, we control the traditional drivers of firm value so that the incremental relationship of environmental policies with the market value of company stocks can be assessed.

Table no. 1. EPO and EPOS variables

Variable	Significance	EPO notation	EPOS notation
Environment Management Team	Does the company have an environmental management team that performs the functions dedicated to environmental issues?	EMT	EMTS
Environmental Materials Sourcing	Does the company have a policy to improve its water efficiency? This refers to processes, mechanisms, or procedures to improve water use in operation efficiently.	EMS	EMSS
Environmental Products	Does the company report at least one product line or service that is designed to have positive effects on the environment or is environmentally labelled/marketed?	EP	EPS
Environmental Supply Chain Management	Does the company use environmental criteria (ISO 14000, energy consumption, etc.) in the selection process of its suppliers or sourcing partners?	ESCM	ESCMS
Policy Emissions	Does the company have a policy to improve emission reduction? This includes processes, mechanisms, or programmes in place to reduce emissions from land, air, or water from the company's core activities.	PE	PES
Policy Energy Efficiency	Does the company have a policy to improve its energy efficiency? This refers to processes, mechanisms, or procedures to improve energy use in operations.	PEE	PEES
Policy Environmental Supply Chain	Does the company have a policy to include its supply chain in the company's efforts to lessen its overall environmental impact?	PESC	PESCS
Policy Water Efficiency	Does the company have a policy to improve its water efficiency? This refers to processes, mechanisms, or procedures to improve water use in operations.	PWE	PWES
Resource Reduction Policy	Does the company have a policy to reduce the use of natural resources or to reduce the environmental impact of its supply chain?	RR	RRS

Source: Authors' work based on information from LSEG-Refinitiv

2.2. Research methodology

The combination of environmental indicators (policies and scores) with financial variables provides a rich framework for investigating their importance to investors when valuing companies in the stock market. For predictive modelling, we use the Random Forest (RF) algorithm as our primary approach. We choose RF regression because of its robustness and ability to handle diverse types of input (binary, categorical, and continuous) without requiring strong assumptions about their relationships, which makes it ideal for our mix of environmental policy variables and financial ratios. RF algorithms have gained widespread adoption in financial research due to their robust predictive capabilities (Kumbure et al., 2023) in areas such as sovereign default risk patterns (Wang et al., 2021), insolvency risk in insurance companies (Khalil et al., 2022), consumer credit risk assessment (Amarnadh and Moparthy, 2023), stock prices (Sadorsky, 2021), corporate profitability (Almaskati, 2022), or inflation prediction (Mirza et al., 2024). Their ability to handle high-dimensional feature spaces while providing easy-to-understand results in a decision-tree framework has also expanded their application across diverse forecasting domains. For example, Chae (2024)

employed RF to predict Korean high-growth firms using both strategic and financial indicators, Ilie et al. (2023) used them to assess the reliance of EU countries on energy imports, while Yan et al. (2022) applied it to traffic accident severity.

Table no. 2. Financial variables (FV) description

Variable	Notation	Description
Liquidity	CR	Measures a company's ability to pay its short-term (usually one year) financial obligations. Calculated by dividing current assets by current liabilities (current ratio).
Solvency	DE	Measures a company's level of indebtedness and is an indicator of financial distress and potential default. Calculated as the ratio between total debt and total equity.
Profitability	PROF	Measures a company's ability to control costs in relation to revenue and turnover. Calculated as EBIT margin.
Assets use efficiency	TAT	Measures management's ability to generate revenues from assets in use. Calculated as the ratio between turnover and total assets.
Systematic risk	BETA	Measures the risk of a company in relation to market risk. Calculated as beta.

Source: Authors' work

Additionally, RF inherently uses bootstrap aggregation (bagging) across many decision trees. Our modelling used 100 trees, which improves generalisation and reduces overfitting. For each year in the timeframe of our analysis (2020-2023), we employed RF to determine the rank and importance of EPO, EPOS and FV indicators for PB prediction for all firms included in the sample. The variable rank output of the RF cannot be used to compare models because it is normalised within each model; therefore, we have allocated ranks to variables from 1 to 23 that indicate their importance in predicting PB (1 the highest). Predictor Importance (Importance from now on) is, on the other hand, more suitable for cross-model importance, as it takes values between 0 and 1. Higher values indicate a higher predictive power of the variable for the dependent variable, PB in our case. Compared to rank, which only orders variables, variable importance quantifies the actual magnitude of predictive power of indicators, as it is calculated based on how much prediction error increases when that variable is permuted. Continuous variables (EPOS and FV) were standardised to zero mean and unit variance, while binary EPO variables are already on a consistent scale (0/1). Following the methodology established in seminal work on RF, our implementation incorporates both bootstrap aggregation (bagging) and random feature selection techniques. One-third of the observations were utilised for model training, and the remaining data was reserved for validation (test) purposes.

3. Results and discussion

Preliminary analysis

The distribution of environmental policies (EPO) adoption in the industrial sector is shown in Figure 1. Across almost all types of EPO, except for Resource Reduction (RR) between 2021 and 2023, the number of EPO adopters is lower than the number of nonadopters, as the NO values range between 250 and 300, while the YES responses fall between 100 and 250. This suggests that most of these companies have not yet implemented EP, although the number of adopters is expected to increase steadily from 2020 to 2023 for all EPO. Moreover,

there is substantially higher adoption of EPO such as Resource Reduction (RR), Policy Energy Efficiency (PEE), Policy Environmental Supply Chain (PESC), or Policy Emissions (PE) across the sample, which may indicate that these policies were the easiest and/or the most stringent to implement than the others.

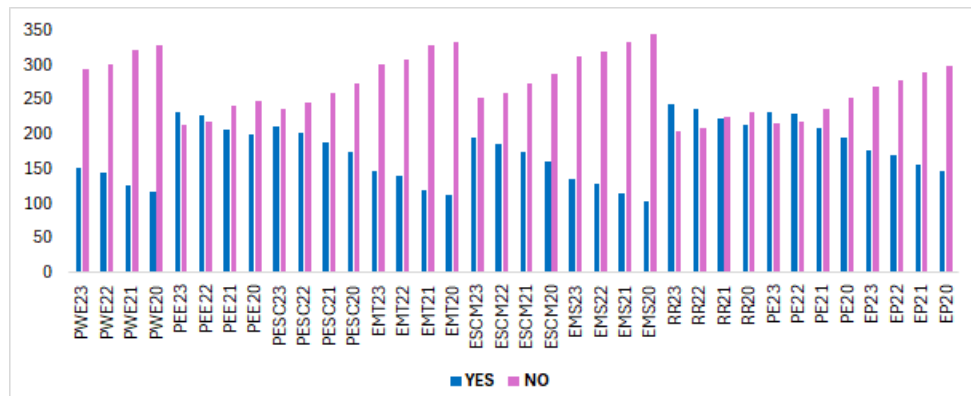


Figure no. 1. Number of companies with or without Environmental Policies

Source: Authors' work based on data from LSEG-Refinitiv

This finding is consistent with the broader trend observed in the existing literature on ESG, where policies directly related to cost reduction or regulatory compliance tend to have higher adoption rates (Song and Rimmel, 2025; Sengupta, 2010). Although this upward adoption trend is positive, it raises questions about potential gaps in the depth of implementation. As noted by Callery (2023), companies are likely to adopt sustainability policies to meet disclosure requirements rather than to undergo a proactive transformation of their operational practices.

Figure 2 shows the distribution of Environmental Policy Scores (EPOS) at the top and Financial Variables (FV) at the bottom. Each boxplot represents a type of policy and a year, the boxes indicate the range (minimum-maximum), and the whiskers show the mean squared deviation. Squares indicate mean values, which generally fall between 20 and 40. Their evolution shows an increase in EP quality in the industrial sector. This observation is consistent with the findings of Gupta et al. (2021), who noted increased investor scrutiny of environmental policy effectiveness. Moreover, studies by Friede, Busch and Bassen (2015) have demonstrated that well-documented environmental strategies have been shown to correlate with improved financial performance, thereby reinforcing the positive trend observed in EPOS values over time.

The spread of scores indicates significant variability in EPOS among the 448 companies analysed, with some policies displaying heightened variance (EPSS, EMSS, or PWES). Discrepancies in EPOS may give rise to investor scepticism, as such inconsistencies can be indicative of a fragmented sustainability strategy (Friede, Busch and Bassen, 2015). Consequently, firms aspiring to enhance market valuation should prioritise aligning their environmental performance more closely with strategic objectives, ensuring coherence between policies and practices. Practical evidence suggests that companies integrating environmental goals into core business strategies often achieve better financial results (Flammer, 2021).

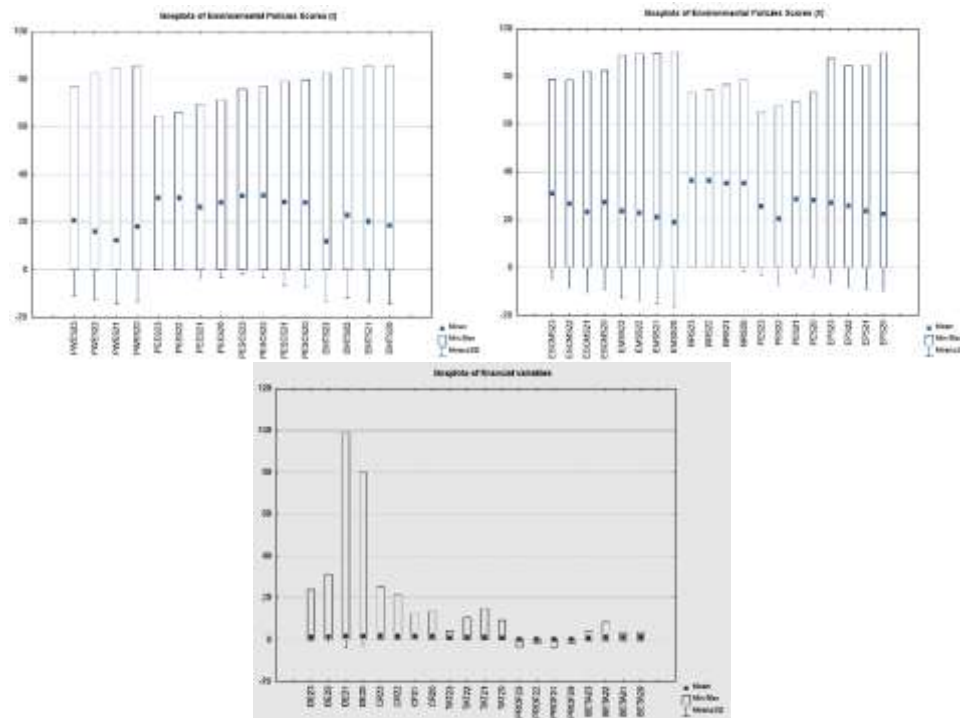


Figure no. 2. Boxplots of environmental policy scores and financial indicators

Source: Authors' work based on data from LSEG-Refinitiv

The means of correlation coefficients between EPOS and FV over the 2020-2023 period are presented in Table no. 3. Overall, there are no concerns regarding the correlations, but for the RF algorithm even high correlations are generally not an issue, and this is an advantage of this modelling compared to other methodologies such as linear or panel regression, for example. The RF handles multicollinearity well because the algorithm selects a subset of features at each split, thus diminishing the chance that all variables with high correlations between them are included simultaneously in the estimation, and the decisions are made based on the best individual variable at each node rather than estimating coefficients for all variables at the same time. Moreover, when RF encounters multiple correlated variables, it will typically distribute importance among them as an alternative to assigning importance to only one (Cao, Li and Yang, 2022).

Random forests results

Figure 3 shows the distribution of the ranks for each variable included in the RF algorithm during the period 2020-2023. Lower values indicate a better ranking of the variables of importance assigned by RF. At the means level, profitability (PROF) was by far the most important variable in all years for market valuation (PB), with ranks of 1 in 2021-2023 and 3 in 2020. Systematic risk (BETA) also shows a constantly high importance with ranks of 2 in 2020, 3 in 2021-2022, and 4 in 2023, for an average rank of 3 over the entire period. It is followed by assets use efficiency (TAT), which has an average rank of 3.25 and yearly ranks

between 2 in 2022 and 4 in 2020. Overall, the average ranks of financial variables dominate the ranks of EPO and EPOS, but two of FV – CR and DE - show a high variation over the period due to their rank of 18 for CR in 2020, and 10 and 23 in 2021 and 2022, respectively, for DE.

Table no. 3. Means of correlation coefficients between EPOS and FV (2020-2023)

	PWE	PEES	PESC	EMT	ESCM	EMSS	RRS	PES	EPS	DE	CR	TAT	PROF	BETA
PWES	1.000	0.542	0.540	0.428	0.504	0.423	0.538	0.430	0.426	0.044	-0.113	-0.155	0.040	0.177
PEES	0.542	1.000	0.739	0.554	0.716	0.547	0.922	0.759	0.670	0.007	-0.120	-0.148	0.078	0.311
PESCS	0.540	0.739	1.000	0.613	0.770	0.600	0.768	0.643	0.608	0.044	-0.118	-0.145	0.075	0.284
EMTS	0.428	0.554	0.613	1.000	0.531	0.480	0.528	0.447	0.486	0.061	-0.123	-0.177	0.058	0.209
ESCMS	0.504	0.716	0.770	0.531	1.000	0.621	0.735	0.581	0.577	0.028	-0.119	-0.165	0.063	0.285
EMSS	0.423	0.547	0.600	0.480	0.621	1.000	0.564	0.462	0.539	0.003	-0.087	-0.096	0.067	0.185
RRS	0.538	0.922	0.768	0.528	0.735	0.564	1.000	0.782	0.684	0.021	-0.118	-0.132	0.088	0.330
PES	0.430	0.759	0.643	0.447	0.581	0.462	0.782	1.000	0.573	0.047	-0.134	-0.121	0.071	0.279
EPS	0.426	0.670	0.608	0.486	0.577	0.539	0.684	0.573	1.000	0.002	-0.077	-0.105	0.065	0.256
DE	0.044	0.007	0.044	0.061	0.028	0.003	0.021	0.047	0.002	1.000	-0.096	-0.134	-0.113	0.057
CR	-0.113	-0.120	-0.118	-0.123	-0.119	-0.087	-0.118	-0.134	-0.077	-0.096	1.000	-0.016	0.023	-0.076
TAT	-0.155	-0.148	-0.145	-0.177	-0.165	-0.096	-0.132	-0.121	-0.105	-0.134	-0.016	1.000	-0.032	-0.019
PROF	0.040	0.078	0.075	0.058	0.063	0.067	0.088	0.071	0.065	-0.113	0.023	0.023	1.000	-0.082
BETA	0.177	0.311	0.284	0.209	0.285	0.185	0.330	0.279	0.256	0.057	-0.076	-0.019	-0.082	1.000

Source: Authors' work based on data from LSEG-Refinitiv

For what concerns EPOS, PEES (Policy Energy Efficiency Score) and EPS (Environmental Products Score) display the lowest (which is why best) ranks over time, with an average of 9.5 and 9.75, respectively. On the contrary, EMTS (Environment Management Team Score) and EMSS (Environmental Materials Sourcing Score) show the highest (hence worse) mean ranks of 18 and 16, respectively. The other EPOS ranks vary between 11.5 and 13.75, indicating an intermediate interest of investors in the quality of these policies, also accompanied by important variations over 2020-2023.

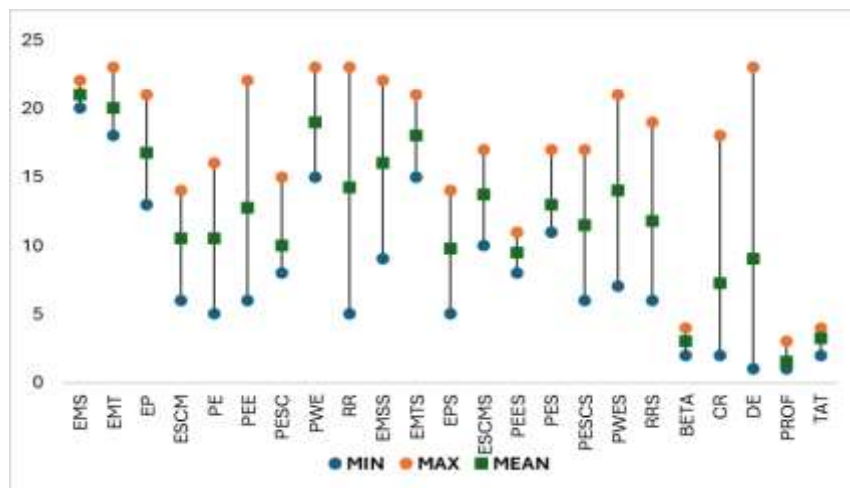


Figure no. 3. Random forests results – Ranks of variables, 2020-2023

Source: Authors' work based on data from LSEG-Refinitiv

Continuing the analysis, Figure 4 shows the distribution of the importance of the variables for the 23 variables in 2020-2023. As in the case of ranks, all FV show higher means than EPO and EPOS, clearly indicating their dominance in market valuations in the eyes of financial markets investors. PROF has the highest mean importance (0.8229), followed by the other four FV - DE (0.4451), BETA (0.4234), TAT (0.3999), and CR (0.3581). The EPO and EPOS variables do not show significant differences in importance at mean levels, although the variation in importance for EPOS is slightly higher than for EPO. PE (Policy Emissions) is the EPO variable with the highest mean importance (0.1115), immediately followed by PES (Policy Environmental Supply Chain) with a mean of 0.1110 and ESCM (Environmental Supply Chain Management) with a mean of 0.1098. The EPO variables with the lowest predictive power for PB, on average, are EMS (Environmental Materials Sourcing) – importance mean of 0.0472 – and EMT (Environment Management Team) – importance mean of 0.0542, confirming their low ranks discussed above. For EPOS, PESCS (Policy Environmental Supply Chain Score), EPS (Environmental Products) and PEES (Policy Energy Efficiency Score) show the highest mean importance – 0.1367, 0.1269 and 0.1253, respectively. The lowest mean importance is encountered for EMTS (Environment Management Team Score) and EMSS (Environmental Materials Sourcing Score), as in the case of EPO.

What differs in the case of importance from ranks is that FVs demonstrate increased variability across years when importance is considered and also substantially higher variation than the EPO and EPOS variables. This consolidates the consistently lower predictive power of EPO and EPOS compared to FV for market valuation, but also signals the attention of investors towards particular FV indicators in the valuation process depending on specific market conditions.

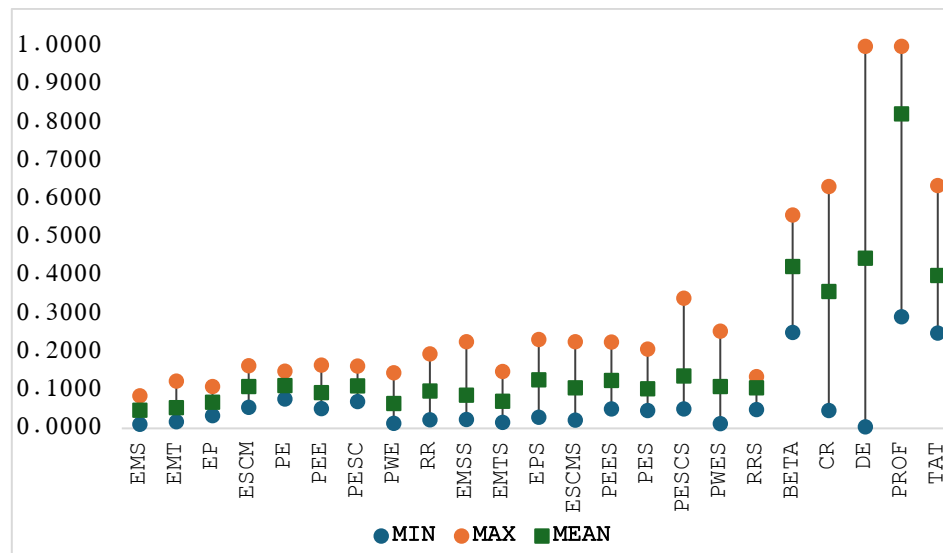


Figure no. 4. Random forests results – Importance of variables, 2020-2023

Source: Authors' work based on data from LSEG-Refinitiv

To illustrate the consistency between ranks and importance in the variables significance for predicting PB of companies in the Industrial sector, Figure no. 5 displays the scatter plot of mean importance versus mean rank for EPO, EPOS, and FV indicators. The negative slope of the linear trend line clearly indicates that higher ranks are accompanied by lower importance of the variables, particularly for the EPO variables. At the same time, FV dominates the prediction both in importance (the highest of all variables) and rank (the lowest of all variables).

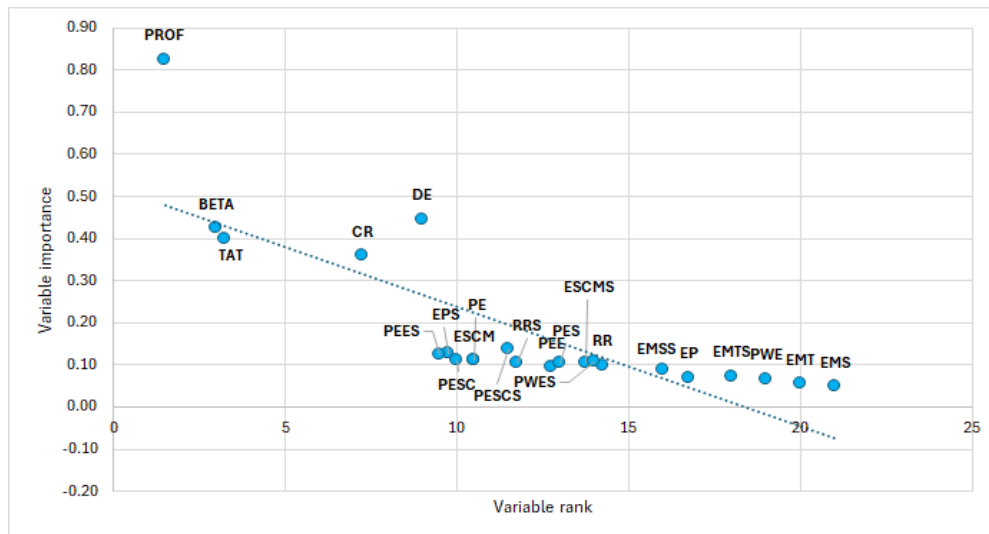


Figure no. 5. Ranks versus importance of variables, means for 2020-2023

Source: Authors' work based on data from LSEG-Refinitiv

When all variables included in the main categories (EPO, EPOS and FV) are considered, FV were the most important predictors of PB both in terms of ranks and importance for each year in our timeframe, while EPO and EPOS disputed the second place over time – see Figure no. 6. In 2020 and 2023 the EPO variables have higher mean ranks and lower mean importance, while the reverse is true for EPOS in 2021 and 2022. At the same time, except for 2023, the mean ranks and importance are rather similar, indicating that one category of variables has no major predictive power compared to the other. In 2023, the difference in favour of scores may indicate an increased maturity of investors with respect to environmental and resource policies of firms, reflected in more attention dedicated to the quality of these policies reflected in scores than to the mere mention of these policies in corporate annual reports.

The dominance of financial variables in both ranking and importance highlights their crucial role in explaining firm valuation within the industrial sector. Among these, PROF emerged as the most influential factor, followed by BETA and TAT. These findings align with previous research (Bon and Hartoko, 2022; Jihadi et al., 2021), which supports the prevailing view that traditional financial indicators continue to be key determinants in investor decision-making.

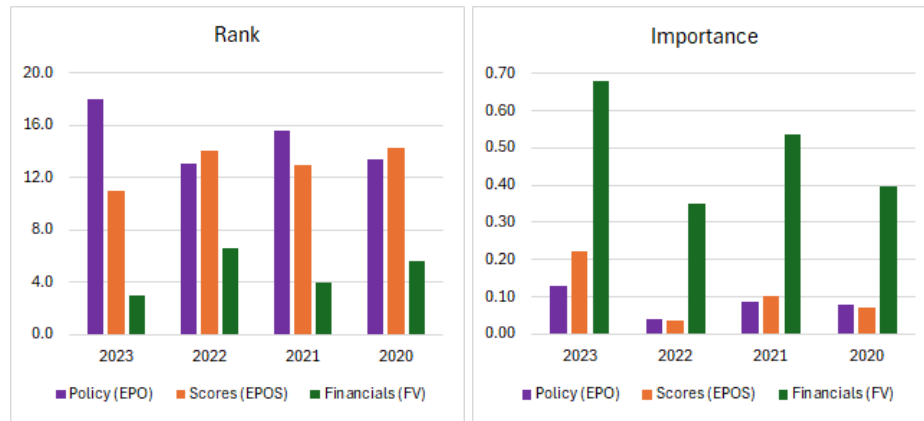


Figure no. 6. Rank and importance of variables, annual means for 2020-2023

Source: The authors' work based on data from LSEG-Refinitiv

An important observation is the consistent importance of PROF in guiding market valuation strategies, particularly in sectors characterised by stable cash flows and predictable revenue patterns. Although the importance of profitability is well documented, more recent studies (Schaltegger and Wagner, 2017) emphasise that incorporating environmental performance metrics alongside profitability can provide strategic investors with enhanced insights. Consequently, firms that successfully combine financial stability with sustainability initiatives may achieve superior long-term valuation growth. A widely adopted strategy in this regard involves linking executive bonuses to sustainability milestones, a practice that has proven effective in balancing financial objectives with environmental performance (Flammer, 2021).

Among the environmental variables analysed, PE and PESC emerged as the most relevant. This result suggests that investors pay particular attention to corporate efforts to reduce emissions and manage environmental risks within supply chains. This finding is consistent with the results reported by Krüger (2015), who identified that environmental risk mitigation policies have a measurable impact on firm valuation by improving investor confidence. On the contrary, policies with a less direct financial impact, such as EMS and EMT, ranked lower. This outcome aligns with the conclusions of Grewatsch and Kleindienst (2017), who highlighted that symbolic ESG initiatives without clear financial outcomes tend to attract less investor attention. Similarly, Flammer (2021) emphasised that investors respond more favourably to environmental strategies that produce measurable returns than symbolic gestures.

The increasing prominence of EPOS variables over time, particularly PEES, EPS, and PESCS, reflects a shift in investor preferences towards policy effectiveness rather than mere policy adoption. This trend signals a maturing investment landscape where investors increasingly reward companies that demonstrate tangible environmental outcomes. This observation is further supported by Giese et al. (2019), who found that investors place greater value on firms that provide transparent metrics detailing sustainability outcomes.

The results are consistent with the literature, which has demonstrated the fundamental importance of traditional financial indicators in explaining the market valuation of companies

(Bon and Hartoko, 2022; Jihadi et al., 2021). Additionally, this study extends these results by including sustainability variables, analysing not only the presence but also the quality of environmental policies. The findings support the evidence presented by Giese et al. (2019) that investors respond favourably to companies that report environmental performance effectively, as well as Krüger's (2015) findings on the positive impact of environmental risk mitigation strategies on market valuation.

In addition, the differentiation between the EPO and EPOS variables presents an original contribution, highlighting that investors are attaching increasing importance to qualitative outcomes. This trend is consistent with the observations of Callery (2023) and Flammer (2021), which signal the market's preference for measurable performance, marking the transition from compliance-based to outcome-centred valuation.

The notable variability observed in the importance of financial variables across the analysed period reinforces the idea that investor preferences fluctuate based on market conditions and economic uncertainty. This conclusion aligns with the findings of Iannone, Duttalo and Gattone (2025), who reported that financial indicators tend to show greater variability during periods of economic instability, influencing the relative importance of environmental factors in firm valuations.

The findings of our study confirm the consistent dominance of financial variables in determining the valuation of the firm. At the same time, they emphasise the increasing relevance of high-quality environmental policies in investment decision-making processes. Although these results align with the existing literature, they also underscore the need for companies to adopt environmental strategies that generate measurable impact rather than symbolic gestures.

Conclusions

This study examined how environmental policies and financial factors influence the market valuation of EU-listed firms in the industrial sector. By employing a Random Forest regression model, we identified that financial indicators - particularly profitability, systematic risk, and asset utilisation efficiency - play the most significant role in explaining firm valuation. However, our findings also reveal a notable shift in investor preferences. Among environmental indicators, emission reduction policies and environmental supply chain management emerged as key factors that attracted growing investor attention. This trend suggests that investors increasingly value environmental strategies that deliver tangible results rather than superficial policy adoption. Additionally, environmental policy quality scores gained relevance over time, reinforcing the idea that investors prioritise policy effectiveness.

This study makes a substantial contribution to the literature by an integrative exploration of environmental policies, their quality, and financial indicators in relation to the market value of companies using a robust machine learning methodology. From a theoretical perspective, the clear differentiation between the existence and effectiveness of environmental policies confirms that investors value measurable outcomes more than formal compliance. These findings extend previous ESG research and provide an updated perspective on the role of non-financial information in investment appraisal in the era of CSRD. Practical implications highlight the need for companies to align sustainability with clear financial objectives and

for regulators to strengthen reporting standards, with a focus on the relevance and quality of information in ESG reports.

These insights offer practical guidance for both corporate leaders and policymakers. For companies, integrating sustainability objectives into their core business strategies can strengthen investor confidence, particularly when environmental policies are tied to measurable outcomes. Firms that demonstrate clear links between sustainability initiatives and financial stability are likely to enhance their market positioning. Meanwhile, regulators can improve transparency and investor trust by promoting clear and standardised sustainability reporting frameworks, such as those established under the CSRD.

Our research results were inherently limited by the lack of reporting data for all companies in the EU industrial sector, as well as the focus on environmental policies, although CSRD refers to social policies as well. These are both interesting avenues for future research. Furthermore, further insights could be provided by examining how ESG integration differs between various industries, helping firms tailor their strategies to specific market dynamics. Additionally, exploring how investor behaviour changes during economic uncertainty may reveal additional insights into the relationship between financial performance and environmental policies.

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