



Analysis of the Small and Medium-Sized Enterprises ESG Rating in Hungary

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Keywords:

Environmental
ESG
Green investments
Social & governance
Sustainable investments.

JEL Classification

G14; R10; Q01; Q50.

Received: 6 January 2025

Revised: 5 February 2025

Accepted: 27 March 2025

Published: 8 April 2025

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Abstract

In the past decade, numerous studies have established a positive relationship between ESG and financial performance; however, significantly less attention has been directed toward SMEs, the causal relationship, and the industries driving ESG changes. This study aims to identify which industries are associated with ESG changes among Hungarian SMEs and to examine whether there is a relationship between financial performance and ESG changes. The assumption of a causal relationship has so strongly dominated the research that the possibility of a reverse effect has rarely been considered, namely that companies with a strong financial background could become leaders in ESG. This study, addressing the above research gap, analyzes a sample of 1,200 SMEs and provides evidence that, in terms of ESG and its individual components, companies with a strong financial position are more likely to perform well than those with weaker financial performance. Analysis of companies' financial data shows a link between financial results and changes in ESG ratings. It is found that improving revenue, profit, and ROE from 2022 to 2024 statistically significantly reduces the likelihood of a decrease in the company's ESG rating and increases the probability of an increase in the ESG rating. Our findings suggest the importance of integrating ESG goals into strategic financial planning for practitioners. SMEs with higher financial performance are better positioned to adopt ESG initiatives, emphasizing the need for robust financial health as a foundation for sustainability.

Funding: This research is supported by EU special program devoted (Grant number: TKP2021-NKTA-19) and National Research, Development, and Innovation Fund of Hungary (Grant number: TKP2021-NKTA).

Institutional Review Board Statement: Not applicable.

Transparency: The authors declare that the manuscript is honest, truthful and transparent, that no important aspects of the study have been omitted and that all deviations from the planned study have been made clear. This study followed all rules of writing ethics.

Data Availability Statement: The corresponding author may provide study data upon reasonable request.

Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

1. Introduction

The mindset of environmental awareness, social responsibility, and corporate governance, or ESG, has become increasingly popular among businesses over the past decade. While Milton Friedman argued that corporate social responsibility is about maximizing the wealth of the owners, it is now widely accepted that companies should not only consider the interests of the owners but also take responsibility for environmental and social issues. The purpose of the above is twofold. On the one hand, ESG efforts are seen by decision-makers as one of the main means to achieve the environmental, energy, and climate policy goals for 2050. Secondly, a wide range of studies in recent years have found a positive relationship between ESG and corporate financial performance (Whelan, Atz, Van Holt, & Clark, 2021). At the same time, most research primarily uses ESG components as explanatory variables, with the demonstrated positive relationship suggesting that higher ESG scores positively impact company profitability (Aydoğmuş, Gülay, & Ergun, 2022; De Lucia, Pazienza, &

Bartlett, 2020). The reverse causality—whereby strong financial performance supports ESG initiatives—rarely appears in research studies. In addition, several other relationships beyond financial performance are also positively affected by ESG efforts. Among others, ESG can promote more effective employee retention, have a positive impact on cost management (Fu & Li, 2023), and lead to reduced costs, more motivated employees, and increased competitiveness (Henisz, Koller, & Nuttall, 2019).

Less attention is given to small and medium-sized enterprises (SMEs) in the literature, but they are vital to the global economy, significantly contributing to employment, innovation, and economic growth, while also holding substantial potential for driving long-term sustainable development (Abosede, Obasan, & Alese, 2016; Rotar, Kontošić Pamić, & Bojneč, 2019). However, SMEs often face considerable obstacles in adopting sustainable business practices, including limited funding, inadequate technical expertise, and restricted access to markets and information (Caldera, Desha, & Dawes, 2019; Costache, Dumitrescu, & Maniu, 2021). However, it is unclear which industries and regions are leading in ESG practices, nor is it evident whether a relationship between ESG and financial performance can be established among SMEs.

The many visible benefits of ESG have triggered strong ESG efforts among businesses. However, most analyses focus primarily on large, listed companies, primarily because expectations of ESG efforts are emerging from the investor perspective. On the other hand, from an economy-wide perspective, these companies play a key role in shaping economic performance. At the same time, at the regional level, small and medium-sized enterprises also play a significant role (Lengyel, Szakálné Kanó, Vas, & Lengyel, 2016), for example, in employment and the development of the regional economy, but much less information is available on the ESG efforts of these companies. While large corporations have been the focal point of most ESG studies, there remains a significant gap in understanding how SMEs, which play a pivotal role in regional economies, integrate ESG principles into their operations. Furthermore, existing literature often neglects the reverse causality between financial performance and ESG, leaving unexplored how financial strength might drive proactive ESG engagement. To our knowledge, this is the first comprehensive analysis of ESG efforts among Hungarian SMEs, utilizing data from the OPTEN ESG rating system, tailored specifically to the SME context.

Our research question aims to uncover which industries and regions are associated with positive and negative ESG changes among Hungarian SMEs. Furthermore, similar to findings in international literature, we seek to determine whether a correlation exists between ESG scores and financial performance among SMEs, taking into account the possibility of reverse causality. This investigation is unique as Hungary implemented its ESG law in January 2024, making the examined period the last phase where SMEs' ESG initiatives are guided by voluntary processes rather than legal obligations.

For the analysis, we used the OPTEN ESG rating, given the limited or non-existent availability of data on domestic small companies in the databases of international ESG agencies (FTSE – Financial Times Stock Exchange, ISS – Institutional Shareholder Services, MSCI IVA – MSCI Intangible Value Assessment, Refinitiv, RepRisk, S&P Global - Standard & Poor's Global Inc., and Sustainalytics). Our study uses data from the Small and Medium Enterprises Competitiveness Index (SMECI) to analyze the changes in ESG data and the relationship between ESG and the financial performance of 1,171 Hungarian small and medium-sized enterprises between two sample dates: 19 September 2022 and 4 July 2024.

Given the global emphasis on sustainable development, understanding how SMEs contribute to ESG efforts is critical for aligning local economic activities with broader climate and environmental objectives. The evidence identifies new insights. It has been revealed that significant ESG improvement/worsening and moderate ESG improvement/worsening can be attributed to only a few industries. Additionally, ESG changes exhibit a regional nature, with significant shifts being associated with a few regions. The results confirm the possibility of reverse causality between ESG and financial performance, a topic that has been less explored in the literature, meaning that companies with strong financial performance tend to have higher ESG ratings.

2. Literature Review

In recent years, the international community has increasingly focused on the urgent need to transition toward a greener and more sustainable economy, alongside critical environmental concerns (Huang, Ali, & Solangi, 2023). The role of ESG (environmental, social, governance) has gained significant traction among businesses and investors over the past decade. This is largely because decision-makers view ESG as a crucial tool for achieving the environmental, energy, and climate policy goals for 2050. In response, countries are striving to implement policies that integrate economic development with environmental protection (Ali, Xu, Yang, & Solangi, 2022). Additionally, numerous studies in recent years have established a positive link between ESG and corporate financial performance.

Despite these encouraging findings, early studies on the subject (1980-2000) revealed several contradictions. For instance, Walley and Whitehead (1994) argue that increasing regulation leads to rising costs, the returns on which are questionable, and that these costs tie up valuable resources and divert investments that could yield a return. These doubts about corporate efforts to be environmentally conscious are not limited to the theoretical level; several empirical studies have also failed to show a relationship between environmental performance and profitability (Fogler & Nuttall, 1975). Contrarily, other studies have reached

opposite conclusions. For example, [Bragdon and Marlin \(1972\)](#) found that companies with lower environmental burdens had higher profitability.

The first major analysis on this topic was conducted by [Margolis and Walsh \(2003\)](#). They analyzed 126 studies from the 1980s and found that 42.9% reported a positive relationship between ESG and corporate financial performance. Although empirical studies on this topic were limited before the 2000s, the focus of research has shifted since the 2010s to explore the relationship between ESG and corporate financial performance, resulting in a significant increase in the number of studies.

[Friede, Busch, and Bassen \(2015\)](#) summarized the results of 35 previous analyses, covering 1816 studies. Their data showed that 48.2 percent of the studies found a positive relationship between ESG and corporate financial performance, while 10.7 percent found a negative relationship. [Whelan et al. \(2021\)](#) confirmed these findings by reviewing over 1000 research papers on the relationship between ESG and financial performance from 2015 to 2020. Their analysis revealed that 58 percent of the studies found a positive relationship between ESG and financial performance, while 8 percent found a negative relationship.

Based on these findings, the relationship between ESG and financial performance is positive and robust, demonstrable across different countries using various financial indicators. For instance, [Velte \(2017\)](#) observed that ESG positively impacts the valuation of German companies (based on Tobin's Q) and shows a positive relationship using commonly studied profitability indicators (Return on Assets, ROE). [De Lucia et al. \(2020\)](#) found a positive relationship between ESG ratings and ROE and ROA during 2018-2019, studying 1038 European companies. The above results are also confirmed by the studies.

There are also conflicting results on this topic. One potential reason is that ESG combines factors with differing ultimate purposes into a single indicator, making their positive impact challenging to demonstrate clearly. A good example is the study by [Aydoğmuş et al. \(2022\)](#), which examined the relationship between ESG ratings and financial performance (ROA and Tobin's Q) of 1720 companies from 2013-2021. They found a statistically significant positive relationship between companies' ESG rating and their valuation (Tobin Q), particularly for the social ("S") and corporate governance ("G") components, but no positive relationship for the environmental ("E") factor alone and company valuation. This could be because the effects of environmental measures take longer to become apparent, and the high costs associated with these measures may result in lower scores. However, this contradiction was not observed regarding profitability (ROA – Return on Assets), where a statistically significant positive relationship was found for both the ESG aggregate and sub-components and financial performance. Furthermore, contradictory results might arise because some ESG ratings are inappropriate for cross-industry comparisons ([Fain, 2020](#)).

Beyond financial performance, ESG has positive impacts in many other areas. [Fu and Li \(2023\)](#) argue that ESG helps retain employees more effectively, plays a positive role in cost management, and contributes to more sustainable growth prospects. [Henisz et al. \(2019\)](#) link ESG considerations to reduced costs, increased productivity due to motivated employees, and more efficient investments. [Hur, Moon, and Ko \(2018\)](#) showed a relationship between employee creativity, satisfaction, motivation, and social responsibility. [Albuquerque, Koskinen, and Zhang \(2019\)](#) found that Corporate Social Responsibility (CSR) increases the uniqueness of a company's products, allowing for higher profit margins. [Li, Jiang, and Hu \(2024\)](#) studying Chinese companies from 2014-2023, found that ESG effectively reduces external financing constraints, increasing productivity and resulting in higher quality products. [Su, Guan, Liu, and Liu \(2024\)](#) demonstrated that high ESG ratings reduced the number of abuses committed by companies from 2014 to 2021. [Handayati, Sumarsono, and Narmaditya \(2022\)](#) reveal that corporate social responsibility disclosure has a significant effect on firm value. [Baranova, Kulich, Dutchak, Zvonar, and Denyshchenko \(2021\)](#) found that the development of corporate social responsibility has a positive impact on the profitability of a business, which is manifested in an increase in tax payments.

Small and medium-sized enterprises (SMEs) play a crucial role in generating employment, fostering innovation, and driving economic growth in the global economy ([Abosede et al., 2016](#)). Moreover, SMEs can play a significant role in long-term sustainable growth ([Rotar et al., 2019](#)). Despite their crucial role, SMEs often encounter a range of problems and challenges when trying to implement sustainable business practices and manage natural resources. Some of these challenges include insufficient funding, a lack of technical expertise, and limited access to markets and information ([Calderá et al., 2019; Costache et al., 2021](#)).

Numerous previous studies affirm that ESG practices among SMEs are associated with enhanced competitiveness ([Alsayegh, Abdul Rahman, & Homayoun, 2020](#)). Additionally, the adoption of green supply chain management methods by SMEs has been shown to improve their economic and environmental performance ([Gao et al., 2022](#)). According to [Khoruzhy, Katkov, Romanova, Katkova, and Dzhikiya \(2022\)](#), integrating ESG principles into the management reporting system (especially by calculating the environmental (E) index) helps evaluate a company's impact on the ecosystem, including emissions and resource efficiency in agricultural production. In recent years, there has been a growing emphasis from the international community on the pressing need to shift towards a more sustainable and environmentally friendly economy. The urgency for SMEs to actively participate in sustainable practices and contribute to global goals is increasing. In addition, international studies indicate that ESG positively impacts companies' financial performance and various non-

financial performance factors. Alongside international studies, there is a growing focus on local drivers of sustainability and the role of municipalities, cities, and regions in global sustainability issues (Balázs, 2024).

The existing literature broadly confirms the positive relationship between ESG and corporate performance; however, these findings are not free from contradictions and limitations. Margolis and Walsh (2003) and Friede et al. (2015) reinforce the positive impact of ESG on financial performance but also highlight the inconsistency of results. Early studies, such as those by Walley and Whitehead (1994), questioned the return on ESG initiatives, while others (e.g., Bragdon & Marlin, 1972) presented opposing evidence. These contradictions partly stem from the differing nature of ESG components, industry-specific dynamics, regional and cultural factors, firm-specific characteristics, and the quality and transparency of ESG data.

For small and medium-sized enterprises (SMEs), the literature on ESG practices remains relatively limited. Although studies like Alsayegh et al. (2020) and Gao et al. (2022) highlight the positive impacts of ESG initiatives on competitiveness and socio-economic outcomes, challenges faced by SMEs, such as limited funding and lack of technical expertise (Caldera et al., 2019; Costache et al., 2021) are often overlooked. Addressing these gaps is crucial, as SMEs play a vital role in promoting sustainable development (Rotar et al., 2019). Based on the literature, the following key areas require further research: (1) exploring the industry-specific and regional characteristics of ESG initiatives, with a particular focus on the role of SMEs, and (2) investigating the reverse causality between ESG and financial performance in greater detail. These aspects underline the necessity for a broader and more critical examination of ESG practices, particularly concerning Hungarian SMEs.

3. Data and Methodology

Based on the OPTEN (Hungarian Company Database) ESG and the Small and Medium Enterprises Competitiveness Index (SMECI) data, our study presents the distribution and concentration of regional ESG ratings, financial data, and competitiveness scores of SMEs in Hungary. Although the largest international ESG agencies (FTSE – Financial Times Stock Exchange, ISS – Institutional Shareholder Services, MSCI IVA – MSCI Intangible Value Assessment, Refinitiv, RepRisk, S&P Global - Standard & Poor's Global Inc., and Sustainalytics) also have databases of ESG data for several Hungarian companies, there is no doubt that the above databases cannot be fully relied upon for a wide range of domestic SME companies. For the above reasons, our analysis was based on the OPTEN ESG index, which has the advantage of striving for an SME-specific design, thus avoiding the inclusion of only large companies with high ESG ratings in the database.

OPTEN ESG is assessed based on 75 parameters, with sector- and company-specific assessments, integrating environmental, social, and governance aspects. For example, under the environmental ("E") factors, the company's CO₂e emissions, waste management practices, and membership in relevant sustainability organizations are assessed. In the area of social responsibility ("S"), among other things, the revenue per employee, the moral value of the company's core business, the personnel costs per employee, staff turnover, consumer protection rulings, undeclared work, the ratio of male to female managers, and fines for labor protection and labor law are taken into account. In corporate governance ("G"), tax liabilities, possible enforcement, reliability/exemption, taxpayers with no public debt, and operating profit trends (among many others) are also important factors in the rating. OPTEN scores companies' ESG ratings on a scale of 1-10, and in addition to ESG, the three sub-components are also reported separately. As part of OPTEN's rating system, companies have the option to specify and add specific information to their data, which is incorporated into the company's ESG rating.

In addition to the OPTEN database, data from the Small and Medium Enterprises Competitiveness Index (SMECI) were used in our study. The Small Business Competitiveness Index (SBCI), based on Barney's resource-based view and Miller's configuration theory, consists of ten pillars (financial metrics, market position, innovation, sustainability, organizational structure, human resources, technological application, relationships, strategic planning, and risk management) and 56 variables that encompass all essential areas of business operations. The SBCI aims to provide a comprehensive picture of the competitiveness of small and medium-sized enterprises (SMEs), allowing decision-makers to formulate effective strategies for the development of the SME sector (Szerb & Hornyák, 2016). The SMECI is primarily utilized in our study to ensure that our sampling aligns with methodologically verifiable standards, and our study does not aim to investigate factors related to competitiveness. The index allows for the analysis of regional differences of firms in the small firm sector at the NUTS 2 level using a stratified representative sample of initially 809, now 1243 items (Szerb, Lafuente, Horváth, & Páger, 2019). The above sample excludes the smallest firms (1-4 employees) with hardly any formal operational structure and large firms with more than 249 employees, making it an excellent way to identify small firms. Although competitiveness indicators are available, ESG indicators for the companies in the sample are not known.

Due to the aforementioned reasons, we collect ESG ratings of the companies that make up the index in conjunction with the competitiveness index to evaluate changes in these ratings and analyze the potential factors contributing to these changes. This will give us a comprehensive picture of the processes shaping the ESG rating of domestic small companies, the problems encountered, and the constraints.

First, on 19 September 2022, we extracted ESG data for 1,171 companies from the OPTEN database, both for the E, S, and G components and for aggregated data. The second data collection date was 4 July 2024. The

selection of the sample period was constrained by two key factors. One was the economic crisis caused by the coronavirus, the effects of which were still measurable in the 2021 fiscal year. The other constraint was the ESG regulation that came into effect in January 2024. Therefore, the sampling of the years 2022 and 2023 provides a unique opportunity to examine the sample in a period free from the above-mentioned distortions and economic turbulence, during which SMEs' ESG initiatives were guided by voluntary processes rather than legal obligations. The original sample of 1,243 companies was reduced to 1,171 due to the closure of some businesses and incomplete ESG data. In addition to examining the regional and industry factors influencing ESG changes, we also explored the determinants of financial performance. The revenue, pre-tax profit, and return on equity (ROE) data recorded in the financial statements of the companies included in the study were collected from the CrefoPort database, aligning with the sampling periods of the ESG data (19 September 2022 and 4 July 2024). For the analysis of financial data, the sample size was reduced from 1,171 to 1,033 due to the exclusion of companies with incomplete financial data and outliers. For the statistical analysis, we focused on the changes between the two sampling periods in relation to revenue, profit, and return on equity (ROE). The change in revenue and profit was measured as the relative change compared to the previous period, while the change in ROE was assessed using the first difference method. The definition of outliers in our analysis was based on values exceeding three standard deviations from the mean.

We applied multinomial logistic regression with the maximum likelihood estimation method to examine the relationship between financial performance and ESG, where the dependent variable was the change in ESG (dESG) measured over the period, and the explanatory variables were the changes in revenue (d_Revenue), profit (d_Profit), and ROE (d_ROE). The OPTEN ESG rating ranges from 1 to 10 (as ESG ratings for Hungarian SMEs are not available from other rating agencies), and the magnitude of ESG changes during the examined period did not exceed values between -3 and 3. The above factors (as the dependent variable is discrete) necessitate the use of multinomial logistic regression, which is a method also employed in other studies to examine the relationship between ESG and financial performance (De Lucia et al., 2020; Tian, 2021; Whelan et al., 2021).

In our analysis, if the ESG score did not change, the dependent variable was coded as 0; if the ESG score decreased, it was assigned a value of 1; and if it increased, it received a value of 2. The analyses were conducted to examine the changes in ESG scores, as well as independently for the components of E, G, and S. For the E component, we did not obtain statistically significant results. The multinomial logistic regression model can be formally written as:

$$\log \left(\frac{P(dESG=j)}{P(dESG=0)} \right) = \beta_{j0} + \beta_{j1} \cdot d_Revenue + \beta_{j2} \cdot d_Profit + \beta_{j3} \cdot d_ROE \quad (1)$$

Where:

$j \in \{1, 2\}$ represents the categories of the dependent variable:

- dESG=0: no change in the ESG score (reference category).
- dESG=1: ESG score decreased.
- dESG=2: ESG score increased.

Additionally, we conducted separate analyses for the changes in the individual components of ESG (E, G, and S).

4. Results

For 48% of companies, no change in ESG rating could be observed over the period. At the same time, 22% of companies show a one-point increase, and 24% show a one-point reduction in ESG scores. A significantly smaller fraction of businesses has a two-unit reduction (3.3%) or increase (1.7%) in their rating. When examining the whole sample, firms showing significant improvement (ESG change > 1) or deterioration (ESG change < -1) cannot be distinguished by spatial factors, but characteristics can be observed by industry.

These show that 27 percent of firms with substantial improvements are in the professional, scientific, and technical activities, 16 percent in administrative and support service activities, and 14 percent in the wholesale and retail trade industry (Figure 1). A different picture is obtained if we look at the companies with the largest ESG reduction (change < -1) in the total sample. 30% of companies are in construction, 15% in manufacturing, and a similar percentage in agriculture, forestry, fishing, and accommodation and food services.

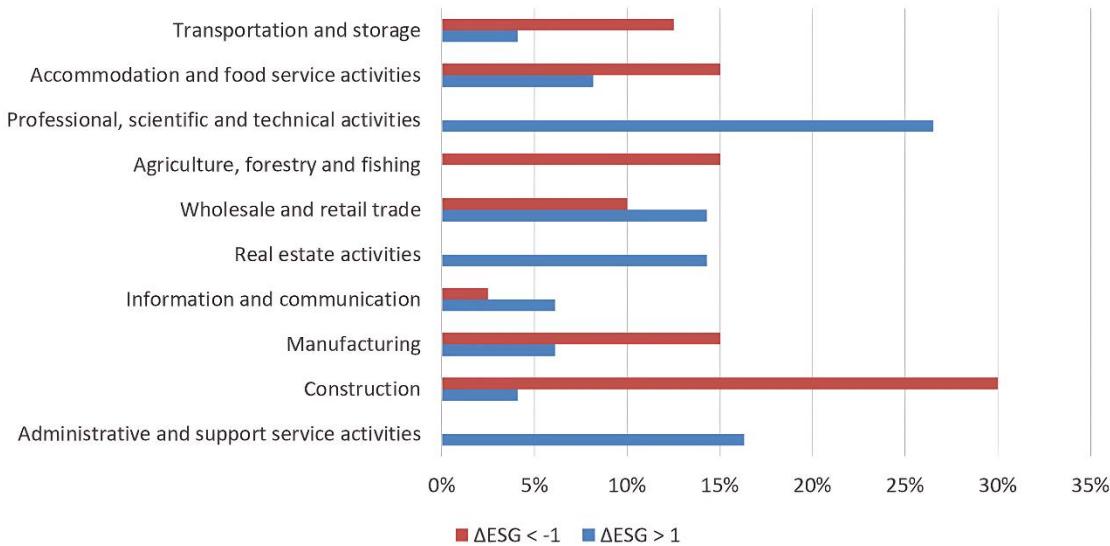


Figure 1. Industries characterized by significant ESG improvement/deterioration.

Note: The figure shows the industry classification of companies with significant improvement (ESG change > 1) and deterioration (ESG change < -1). Designations and notations are based on the Hungarian sectoral nomenclature (TEÁOR'08).

Source: OPTEN, author's work.

Companies with one point of ESG improvement account for 22% of the total sample. A similar proportion (24 percent) of companies show a one-point ESG deterioration. According to the data, 24% of firms showing ESG improvements were in manufacturing, 25% in wholesale and retail trade, and 16% in professional, scientific, and technical activities. In contrast, 26 percent of companies with ESG declines are in wholesale and retail trade, 24 percent in manufacturing, and 23 percent in construction (Figure 2).

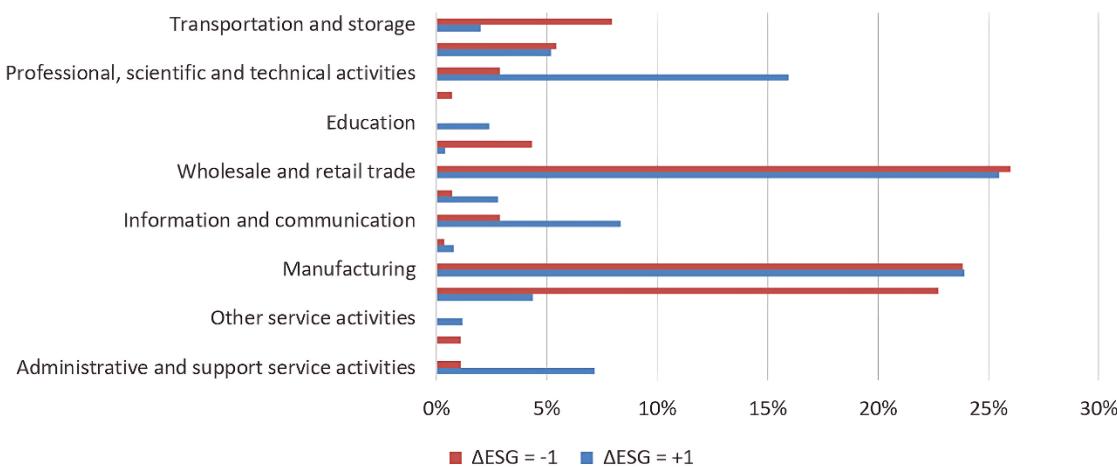


Figure 2. Industries characterized by minor ESG changes.

Note: The figure shows the classification of companies with one one-point change (Negative and positive) in ESG by main activity.

Source: OPTEN, author's work.

Summarized above, we can see that significant ESG improvement/worsening and moderate ESG improvement/worsening can be attributed to only a few industries. ESG improvement is primarily related to professional, scientific, and technical activities, wholesale and retail trade, and manufacturing. ESG deterioration is mainly related to construction, wholesale and retail trade, and manufacturing.

Within-industry analyses also partly confirm the above, with 68 percent of firms in professional, scientific, and technical activities, 24 percent of firms in manufacturing, and 23 percent of firms in accommodation and food service activities being able to improve their ESG rating over the period (see Figure 3). In contrast, 58 percent of firms in construction, 50 percent of firms in the transportation and storage industry, and 26 percent of firms in manufacturing have worsened their ESG rating.

The above data show that the significant ESG improvement is in professional, scientific, and technical activities. The ESG score deterioration is widespread in the construction, transportation, and storage industry.

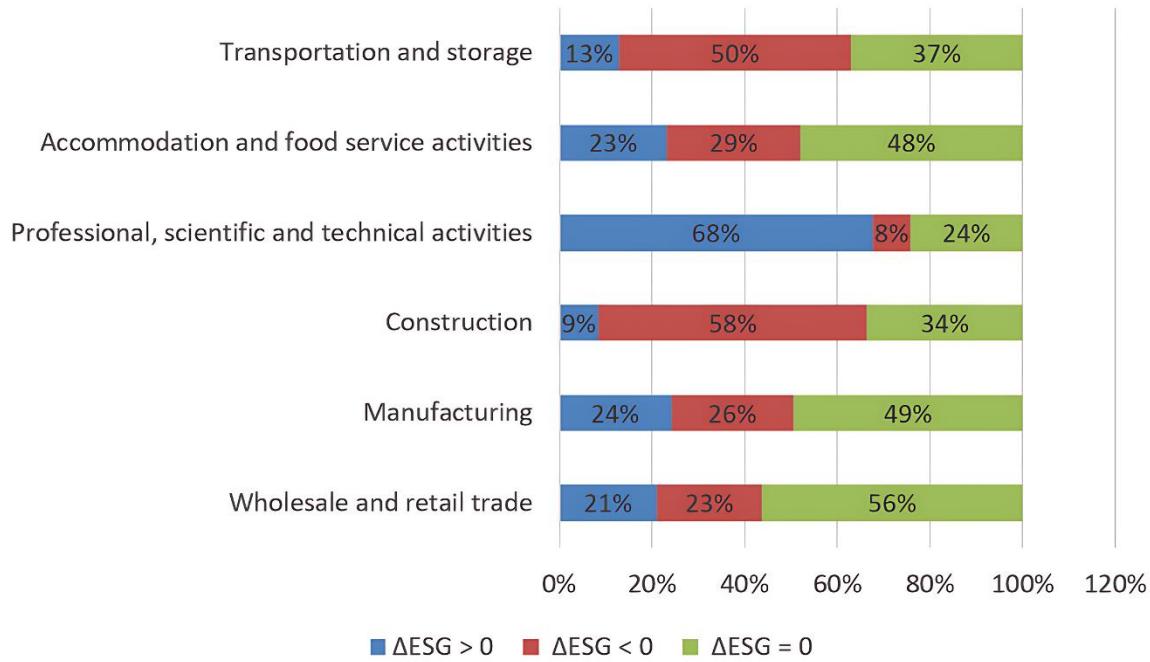


Figure 3. ESG improvement/Deterioration rates within the industry.

Note: The figure shows data for industries with at least 50 companies in the industry. In blue, is the percentage of companies that improved their ESG rating, and in red, is the percentage that worsened their ESG rating. In green, is the percentage of companies whose ESG did not change.

The regionally aggregated ESG data show that the majority of regions have experienced a minor change in ESG ratings (Table 1). The exceptions are the Southern Great Plain (+3.3%), Budapest (+3.1%), and the Northern Great Plain (-3.8%). The region with the highest average ESG score is the Southern Great Plain (6.32), followed by Budapest (6.25), based on the 4 July 2024 sample.

Table 1. Regional ESG changes.

Region	09 19, 2022 ESG score	07 04, 2024 ESG score	Change (%)
Budapest	6.06	6.25	3.1
Southern Transdanubia	6.2	6.16	-0.6
Western Transdanubia	6.15	5.93	-3.6
Central Transdanubia	6.16	6.12	-0.6
Pest	6.03	6.04	0.2
Southern Great Plain	6.12	6.32	3.3
Northern Great Plain	6.08	5.85	-3.8
Northern Hungary	6.23	6.15	-1.3

Based on the within-region analysis, the Southern Great Plain stands out, with 38% of companies improving their ESG score (see Figure 4). Similarly high rates are found in Budapest (33%) and Pest (36%) regions. The Western Transdanubia region has the lowest percentage (21%) of companies that have improved their ESG rating. This region has the highest proportion of ESG-worsened companies (35%) and the 2nd highest ESG deterioration. The data explains the weak performance of the Northern Great Plain (-3.8%), with only 16% of companies improving their ESG score and 33% worsening it.

These figures confirm that a wide range of companies have contributed to the ESG improvement in the Budapest and Southern Great Plain regions. In the context of the Pest region, we find some contradictions, as 36% of companies improved their ESG rating, but the substantial share of ESG deterioration (30%) did not support the region's ESG improvement.

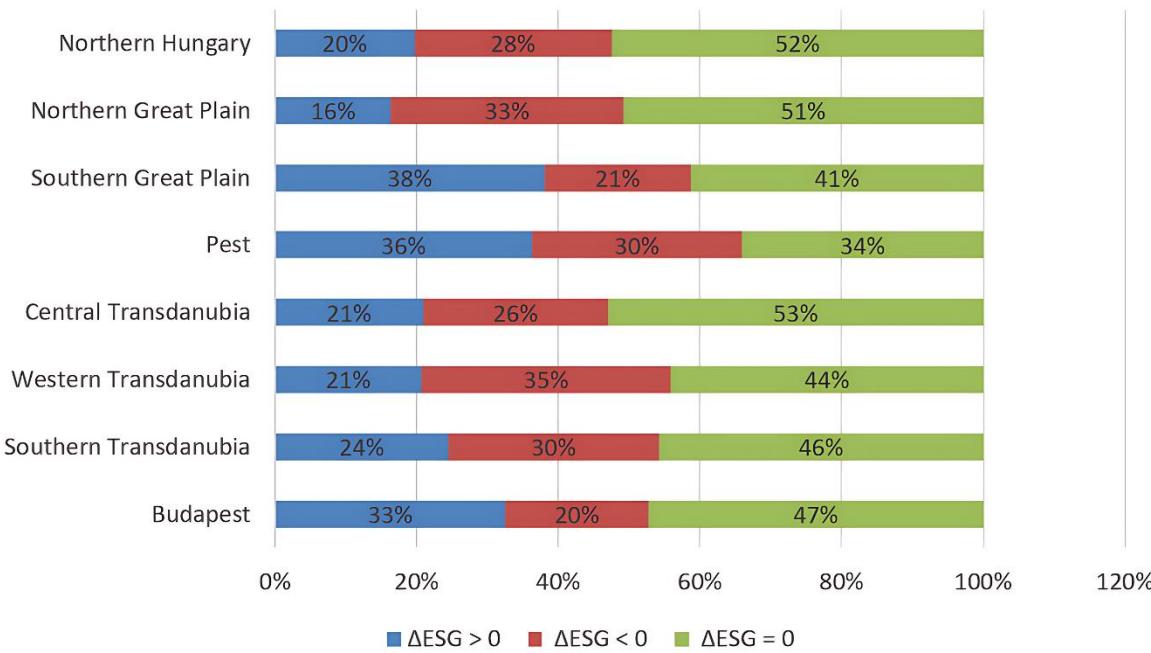


Figure 4. ESG improvement/Deterioration rates within the region.

We examined the changes in revenue (d_revenue), profit (d_profit), and return on equity (d_ROE) for 1,033 companies based on samples from 2022 to 2024. Using a multinomial logit regression with the maximum likelihood estimation method, we investigated whether there is a relationship between these changes and the variations in ESG scores measured during the period. In our analysis, if the ESG score did not change, the dependent variable was coded as 0; if the ESG score decreased, it was assigned a value of 1; and if it increased, it received a value of 2. The analyses were conducted to examine the changes in ESG scores, as well as independently for the components of E, G, and S. For the E component, we did not obtain statistically significant results.

In Model 1, the analysis of the relationship between financial metrics and changes in ESG scores reveals significant insights. Notably, the return on equity (ROE) exhibits a statistically significant negative coefficient of -1.144, with a p-value of 0.012. This suggests that as ROE declines, there is an increased probability of a decrease in ESG scores (dESG3=1), indicating a substantial impact of financial performance on ESG outcomes.

Additionally, in the second scenario of Model 1 (dESG3 = 2), the revenue change (d_Revenue) shows a statistically significant positive coefficient of 0.534, accompanied by a p-value of less than 0.001. This finding indicates that increases in revenue are associated with a higher probability of a rise in ESG scores. Furthermore, the ROE coefficient in this model is also statistically significant at 0.033, suggesting that improvements in ROE correspond to a greater likelihood of an increase in ESG scores (Table 2).

Table 2. Regression results for ESG changes.

Dependent variable	Coefficient	Standard error	Z-statistic	P-value
Model 1: dESG3 = 1				
Constant	-0.668	0.089	-7.516	p < 0.001
Revenue (d_Revenue)	-0.055	0.181	-0.301	0.763
Profit (d_Profit)	-0.022	0.015	-1.411	0.158
ROE (d_ROE)	-1.144	0.454	-2.519	0.012
Model 1: dESG3 = 2				
Constant	-0.802	0.092	-8.697	p < 0.001
Revenue (d_Revenue)	0.534	0.162	3.289	p < 0.001
Profit (d_Profit)	0.0138	0.013	1.052	0.293
ROE (d_ROE)	0.974	0.455	2.138	0.033

Note: Comments: This table summarizes the multinomial logit regression results. The dependent variable indicates changes in the ESG score (dESG3). The constant term represents the expected outcome when all predictors are set to zero. The revenue variable (d_Revenue) measures the company's revenue changes, while profit (d_Profit) reflects net income variations. The return on equity (ROE) assesses profitability relative to shareholders' equity. Significance levels (p-values) indicate the strength of relationships, with p < 0.05 suggesting statistically significant effects (In bold).

In Model 2, the examination of financial metrics and their association with changes in S scores yields significant findings. The return on equity (d_ROE) has a notably large negative coefficient of -2.675, with a p-

value less than 0.001, indicating a strong relationship where declines in ROE are linked to a higher probability of a decrease in S scores ($dS3=1$). In the second scenario of Model 2 ($dS3 = 2$), both revenue change (d_Revenue) and profit change (d_Profit) emerge as statistically significant factors. The revenue change shows a positive coefficient of 0.488, accompanied by a p-value of less than 0.01, suggesting that increases in revenue are associated with a greater likelihood of improvements in S scores. Additionally, the profit change has a positive coefficient of 0.029, with a p-value of 0.033, indicating that higher profits also contribute to an increased probability of better S scores (see Table 3).

Table 3. Regression results for social component changes.

Dependent variable	Coefficient	Standard error	Z-statistic	P-value
Model 2: $dS3 = 1$				
Constant	-1.024	0.097	-10.46	p < 0.001
Revenue (d_Revenue)	-0.089	0.198	-0.4490	0.653
Profit (d_Profit)	-0.031	0.018	-1.653	0.098
ROE (d_ROE)	-2.675	0.536	-4.988	p < 0.001
Model 2: $dS3 = 2$				
Constant	-0.934	0.092	-10.13	p < 0.001
Revenue (d_Revenue)	0.488	0.159	3.053	p < 0.01
Profit (d_Profit)	0.029	0.013	2.123	0.033
ROE (d_ROE)	0.968	0.459	2.106	0.032

Note: Comments: This table summarizes the multinomial logit regression results. The dependent variable indicates changes in the S score ($dS3$). The constant term represents the expected outcome when all predictors are set to zero. The revenue variable (d_Revenue) measures the company's revenue changes, while profit (d_Profit) reflects net income variations. The return on equity (ROE) assesses profitability relative to shareholders' equity. Significance levels (p-values) indicate the strength of relationships, with $p < 0.05$ suggesting statistically significant effects (In bold).

In Model 3, the analysis of financial metrics and their relationship with G scores reveals significant insights. The return on equity (d_ROE) is particularly noteworthy, with a coefficient of -2.094 and a p-value also less than 0.001 in the first scenario ($dG3 = 1$). This suggests a strong negative relationship, where declines in ROE are associated with an increased likelihood of lower G scores. This finding emphasizes the importance of ROE in influencing G outcomes. Additionally, the revenue change (d_Revenue) in the first scenario is significant with a coefficient of -0.374 and a p-value of 0.0410, indicating that decreases in revenue are linked to a higher probability of reduced G scores. In the second scenario ($dG3 = 2$), ROE has a positive coefficient of 1.359 with a p-value of less than 0.01, suggesting that increases in ROE correspond to a higher probability of improved G scores (see Table 4).

Table 4. Regression results for governance component changes.

Dependent variable	Coefficient	Standard error	Z-statistic	P-value
Model 3: $dG3 = 1$				
Constant	-0.461	0.089	-5.167	p < 0.001
Revenue (d_Revenue)	-0.374	0.183	-2.044	0.0410
Profit (d_Profit)	-0.001	0.014	-0.08742	0.9303
ROE (d_ROE)	-2.094	0.508	-4.122	p < 0.001
Model 3: $dG3 = 2$				
Constant	-0.593	0.091	-6.515	p < 0.001
Revenue (d_revenue)	0.236	0.159	1.481	0.1385
Profit (d_profit)	0.000	0.012	0.04728	0.9623
ROE (d_ROE)	1.359	0.494	2.749	p < 0.01

Note: Comments: This table summarizes the multinomial logit regression results. The dependent variable indicates changes in the governance component ($dG3$). The constant term represents the expected outcome when all predictors are set to zero. The revenue variable (d_Revenue) measures the company's revenue changes, while profit (d_Profit) reflects net income variations. The return on equity (ROE) assesses profitability relative to shareholders' equity. Significance levels (p-values) indicate the strength of relationships, with $p < 0.05$ suggesting statistically significant effects (In bold).

In the extended multinomial regression analysis, the 2022 financial results (revenue, net profit, ROE) were assessed in relation to the probabilities of changes in the E, S, G ($dE3$, $dS3$, $dG3$), and overall ESG scores change ($dESG3$) between 2022 and 2024. The results indicate that at a 5% significance level, no statistically significant relationship could be established between 2022 revenue, profit, ROE, and changes in the overall ESG score and S component. However, when examining the E and G components, a statistically significant negative relationship was found between 2022 revenue and the probability of a change in the E score ($dE3$). This suggests that higher revenue in 2022 is associated with a lower likelihood of a decrease (p-value of 0.003) in the E component between 2022 and 2024. For the G component ($dG3$), both the 2022 net profit and revenue demonstrated statistically significant effects. The net profit from 2022 showed a significant negative relationship

with the probability of decreases in the G score ($p = 0.029$) between 2022 and 2024, as did 2022 revenue ($p = 0.021$), implying that better financial outcomes are associated with a lower likelihood of deterioration in the G component.

The analysis reveals significant findings across the models regarding the relationship between financial metrics and probabilities of ESG and component scores. In Model 1, ROE exhibits a significant negative coefficient (-1.144, $p = 0.012$), indicating that lower ROE changes (between 2022 and 2024) correlate with a reduced probability of achieving higher ESG scores. Model 2 similarly highlights ROE's critical role, with a substantial coefficient (-2.675, $p < 0.001$), reinforcing its negative impact on the likelihood of favorable outcomes. Furthermore, Model 3 shows that both ROE (-2.094, $p < 0.001$) and revenue changes (-0.374, $p = 0.041$) significantly influence G scores, emphasizing their relevance in determining governance performance probabilities. These statistically significant results consistently underline the importance of ROE and revenue changes in shaping probabilities related to ESG performance.

While the models identify statistically significant relationships between financial metrics and sustainability scores, there are limitations in their predictive power. The Akaike Information Criterion (AIC) and Schwarz Criterion (SC) values are relatively high, suggesting that the models may not be the most efficient in balancing fit and complexity. The variance in the dependent variable indicates that there is a significant spread in the changes to ESG, S, and G scores, which could challenge the models' ability to capture all the influencing factors accurately. Despite these limitations, the models are suitable for identifying the direction of relationships between the variables.

5. Discussion

Our study contributes to the literature by examining which industries are leaders or laggards in ESG changes among small and medium-sized enterprises (SMEs) in a developing country, specifically Hungary, during the period 2022-2024. Positive ESG changes are dominated by trade, manufacturing, professional, scientific, and technical activities. Most companies showing negative changes are in trade, construction, and manufacturing. The dominance of construction firms in the deterioration of ESG ratings can be linked to the worsening financial situation and increasing competition. This hypothesis is in line with other studies showing that increasing industry competition negatively affects the ESG rating of companies (Pursiainen, Sun, & Xiang, 2023).

Our study further contributes to the literature by reinforcing the relationship between SMEs' financial performance and ESG during a specific period when the ESG law was not yet in effect in Hungary, indicating that the companies' ESG efforts were voluntary. Our study confirmed that improving ESG ratings are preceded by better-than-average financial performance, which strengthens the existence of reverse causality among SMEs.

These findings align with theoretical perspectives that view financial performance as a driver of ESG adoption, supporting the less commonly explored notion that financial stability enables companies to invest in sustainability initiatives (Takács & Erdős, 2023). This highlights the relevance of resource-based views in understanding ESG strategies among SMEs. Our study bridges the gap between theory and practice by demonstrating how theoretical constructs, such as resource-based views and competitive dynamics, manifest in real-world ESG behaviors among SMEs. By identifying specific industries and regions that lead or lag in ESG changes, our findings provide actionable insights for policymakers and practitioners aiming to support sustainability in resource-constrained contexts.

6. Conclusion and Recommendation

An environmental, socially responsible, and governance-oriented approach is important not only as a means to achieve the 2050 environmental, energy, and climate goals but also because a wide range of studies shows a positive link between ESG and financial performance. However, most studies focus on large, listed companies, with much less attention paid to small and medium-sized enterprises.

Our study, focusing on small and medium-sized enterprises (SMEs) with a large sample size, examined which industries and regions are leaders (or laggards) in ESG changes within a developing country—specifically, Hungary. The results for the full sample show that nearly half of the companies (48%) exhibit a change in ESG performance. Positive ESG changes are primarily observed in the trade, manufacturing, and professional, scientific, and technical sectors. In contrast, negative changes are most prevalent among companies in trade, construction, and manufacturing. The regionally aggregated ESG data indicate that the majority of regions have experienced a minor change in ESG ratings. The exceptions are Southern Great Plain (+3.3%), Budapest (+3.1%), and Northern Great Plain (-3.8%). The region with the highest average ESG score is Southern Great Plain (6.32), followed by Budapest (6.25) based on the 4 July 2024 sample.

Regarding the relationship between ESG and financial performance, it can be concluded that higher revenue in 2022 increases the probability of a positive change in the E component between 2022 and 2024. A similar positive relationship is also evident between the profit and revenue data from 2022 and the G component. When examining the changes in revenue, profit, and ROE from 2022 to 2024, it is found that improving performance statistically significantly reduces the likelihood of a decrease in the company's ESG rating and increases the

probability of an increase in the ESG rating. Thus, it can be stated that during the sampling period when the ESG law was not yet in effect in Hungary, meaning that the companies' ESG efforts were voluntary, a statistically significant relationship between financial performance and ESG changes is observable.

Our findings suggest the importance of integrating ESG goals into strategic financial planning for practitioners. SMEs with higher financial performance are better positioned to adopt ESG initiatives, emphasizing the need for robust financial health as a foundation for sustainability. From a policy perspective, it is crucial to design support systems that address the unique challenges of SMEs in adopting ESG practices. For example, tailored financial instruments, such as green loans or sector-specific grants, could incentivize SMEs to prioritize sustainability even in resource-constrained environments.

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