

ESG dynamics in real estate: temporal patterns and financial implications for REITs returns

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Abstract

Purpose – This paper aims to explore the dynamic relationship between ESG scores and REITs returns. The overarching goal is to provide a better understanding of how ESG considerations impact financial performance across different temporal contexts.

Design/methodology/approach – Using a sample of 175 European Equity REITs, this analysis combines numerical ESG scores with the Fama-French model, employing both random and fixed effects methods. It integrates individual REIT data and the HESGL (High ESG Scores Minus Low ESG Scores) factors to assess their impact on REIT returns.

Findings – The findings highlight divergent patterns between the numerical ESG score and the HESGL factor concerning REIT returns. While the numerical ESG score displays a negative impact in later periods, the HESGL factor demonstrates a positive effect during prosperous times but loses significance during crises.

Originality/value – This research contributes original insights by emphasizing the importance of temporal segmentation in understanding the nuanced and evolving nature of the relationship between ESG scores and REITs' returns. The study provides a comprehensive analysis and highlights divergent outcomes that are essential for a better interpretation of ESG impacts on real estate investments.

Keywords ESG, Real estate, REITS, Fama-French, HSEGL

Paper type Research paper

1. Introduction

The integration of environmental, social, and governance (ESG) considerations into investment decision-making has emerged as a pivotal dimension in the landscape of global finance. Particularly within the realm of Real Estate Investment Trusts (REITs), the relationship between ESG performance and financial returns has become a subject of increasing scrutiny and significance (Morri *et al.*, 2021). As market participants grapple with the complexities of incorporating sustainability factors into their investment strategies, this paper endeavors to contribute a nuanced understanding of the dynamic interplay between ESG scores and REITs returns, employing a temporal segmentation approach to unveil contextual variations.

The journey of ESG integration into financial decision-making can be traced back to the 1970s, with a proliferation of aims and goals coupled with diverse methods to embed these considerations within the investment process (Friede *et al.*, 2015). Over the years, empirical



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studies have sought to elucidate the impact of ESG performance on stock market performance, yielding varying perspectives and mixed results (Mariani *et al.*, 2018).

Despite the growing importance of ESG scores, there remains a significant gap in understanding their effects on the performance of public real estate stocks. This lack of knowledge and evidence may hinder the rapid adoption of ESG evaluations necessary to mobilize investors for social causes. Currently, there exists a spectrum of investor attitudes towards socially responsible investment, ranging from apprehension regarding the initial expenses of sustainability initiatives to a deeper concern about the enduring risks associated with holding unsustainable real estate assets (KPMG, 2023). Unfortunately, the literature on ESG and sustainability at the real estate portfolio level is scarce, particularly outside the US (Morri *et al.*, 2024). Most studies focus primarily on energy efficiency as a sustainability metric, often using energy certification, and have produced conflicting results. Additionally, despite being Europe the continent with the most innovative sustainability legislation, including in the real estate sector, research on this topic remains limited (Brounen and Marcato, 2018; KPMG, 2023). Therefore, the focal point of our investigation is the comprehensive study conducted over an extended period and by using the ESG scores and by incorporating in the Fama-French model the innovative HESGL (High ESG Scores Minus Low ESG Scores) factor (Brounen and Marcato, 2018), which so far has been applied only in the US context. By integrating this factor into the analysis, we seek to capture the impact of sustainable practices on REIT performance.

The results reveal contrasting dynamics between the numerical ESG score and the HESGL factor about REIT returns. While the former shows a negative association over time, the latter demonstrates a positive impact, aligning with similar findings in the US (Brounen and Marcato, 2018), underscoring the temporal sensitivity of REIT-ESG relationships. However, the significance of the HESGL factor diminishes in subsequent periods, reflecting shifting market perceptions influenced by economic conditions. This negative relationship may stem from market aversion to the costs of social policy implementation amid uncertainty and liquidity concerns. Moreover, corporate governance exhibits a positive association with REIT performance, contrary to prior research, suggesting the influence of contextual factors like the post-Covid environment and European corporate governance norms.

The research unfolds through five distinct sections. Following this introduction, the subsequent section delves into a comprehensive literature review encompassing various facets of real estate and ESG. The third segment describes the research methodology, delineating the procedural steps essential for constructing the analytical models. The subsequent two sections are dedicated to the examination and discussion of diverse models, accompanied by reflective considerations and commentary on research findings.

2. Literature review and hypothesis development

2.1 CSR-ESG and company performances

Corporate social responsibility (CSR) encompasses the incorporation of social and environmental considerations into a company's strategic framework, aiming to benefit society and enhance brand reputation. This multifaceted approach addresses various facets related to environmental stewardship, societal well-being, and governance principles (Nirino *et al.*, 2022).

According to stakeholder theory (Freeman, 1984), embedding CSR into a company's operations is essential for its financial prosperity, as it resolves conflicts among stakeholders, ultimately leading to better financial results (Erhemjamts *et al.*, 2013). Additionally, firms engaging in CSR activities are seen to bear lower risk, thereby reducing their capital and debt costs (Dayanandan *et al.*, 2018). On the other side, agency theory (Jensen and Meckling, 1976) presents a counterargument, suggesting that managers, acting as agents for shareholders,

might prioritize their own interests over maximizing shareholder wealth. This viewpoint raises concerns that CSR activities could detract from value creation or shareholder returns.

Numerous prior empirical investigations have centered on the relationship between CSR and corporate financial performance (e.g. [Nirino et al., 2022](#)). Despite variations in measurement methods, there is a consensus that CSR generally has a positive impact on company performance ([Kim et al., 2018](#)). However, it's worth noting that there are studies demonstrating contrasting effects, including negative or statistically insignificant impacts ([Nirino et al., 2019](#)).

Within this domain, ESG serves as a sustainability evaluation framework, utilizing Environmental, Social, and Governance metrics to assess a company's sustainability and resilience, thereby holding it accountable for its sustainability assertions.

In recent times, there has been a surge in interest surrounding the integration of ESG factors into investment strategies ([Morri et al., 2024](#)). While researchers have delved into the relationship between ESG performance and corporate financial outcomes for fifty years, the findings have been a mixed bag due to varying methodologies and timeframes ([Whelan et al., 2021](#)). The debate on ESG has added another layer of complexity, questioning whether it truly enhances or hampers financial performance ([Habermann and Fischer, 2023](#)).

Despite these debates, recent literature increasingly favors a positive association between CSR practices or ESG factors and companies' financial well-being ([Cooper and Uzun, 2019](#); [Sun and Cui, 2014](#)). [Friede et al. \(2015\)](#) conducted a comprehensive analysis of over 2,000 empirical studies, revealing a non-negative relationship between ESG criteria and financial performance in nearly 90% of cases. Such studies emphasize how CSR initiatives can mitigate default risks ([Boubaker, 2020](#)) and potentially lead to higher credit ratings ([Jiraporn et al., 2014](#)), thus enhancing overall financial stability. Furthermore, research by [Harjoto and Laksmana \(2018\)](#) suggests that strong ESG factors correlates with increased company value, attributed to the moderation of excessive risk-taking behaviors. However, amidst the optimism, conflicting viewpoints persist. [Nguyen and Nguyen \(2015\)](#) caution that CSR considerations might inadvertently escalate risks for shareholders, revealing tensions among stakeholders' interests. Moreover, [Habermann and Fischer \(2023\)](#) challenge the notion of a direct link between CSR performance and bankruptcy likelihood, proposing a more intricate relationship than previously assumed.

The stark disparities in findings across literature can be attributed to the multifaceted nature of CSR practices and ESG factors, each with its unique profile, background, and behavior, all of which can influence their relationship with the company performances. In the ongoing discussion about the interplay between ESG factors and performance, the need for industry-specific analysis has become evident ([Autio et al., 2023](#)).

2.2 REITs returns

In the realm of listed real estate investment, early research efforts aimed to understand the relationship between REITs and other asset classes, such as stocks or bonds, within diversified portfolios. For instance, [Gyourko and Linneman \(1988\)](#) examined the comovement of REIT returns with the S&P500 index and bonds, revealing significant positive correlations. Subsequent studies delved deeper into exploring risk and returns in REITs, often leveraging conventional asset pricing models like the Capital Asset Pricing Model (CAPM). However, the limitations of single-factor models like CAPM led to the development of multi-factor models such as the Arbitrage Pricing Theory (APT) and Fama and French's three-factor model. [Chen et al. \(1998\)](#) tested various multi-index models to explain the cross-sectional variation in equity REITs' returns, incorporating macroeconomic and firm-specific factors. [Peterson and Hsieh \(1997\)](#) employed Fama and French's five-factor model to analyze over 168 REITs, identifying significant relationships between risk premiums and

stock-market factors for equity REITs, while mortgage REITs' returns were influenced by both stock and bond-market factors. [Jackson \(2018\)](#) further applied Fama and French's three-factor model to examine lodging REITs, revealing significant correlations with market, size, and value factors.

While CAPM and Fama-French models have provided valuable insights into the risk-return relationship for REITs, recent literature has highlighted the oversight of liquidity risk in previous studies. Scholars like [Amihud \(2002\)](#) and [Chordia et al. \(2002\)](#) have emphasized the positive relationship between liquidity risk and stock returns. [Su and Tavatull \(2021\)](#) found that the Fama and French's three factor model is well-suited for the S-REITs market, offering better insights into SREITs' returns variation compared to traditional models like CAPM and the Carhart four-factor model. On the other hand, [Rottke and Muttl \(2021\)](#) demonstrated the effectiveness of the Fama and French's three factor model, which incorporates real estate-specific factors alongside market capitalization and dividend yield, in analyzing US REITs returns. Their research demonstrated the superior performance of the model compared to Fama and French's three-factor model, echoing the results of [Brounen and Marcato \(2018\)](#), who successfully applied Fama and French's five-factor model to US REITs.

2.3 ESG in the real estate sectors and REITs

Within this context, the real estate sector has gained attention due to its substantial societal impact and the relatively limited exploration of sustainability's financial implications in this domain. In this field, [Cajias et al. \(2011\)](#) propose a negative connection between CSR performance and the returns of U.S. real estate companies, suggesting that higher CSR efforts may not necessarily result in increased financial gains. This perspective is echoed by [Cajias et al. \(2014\)](#), who indicate that a higher ESG rating does not always translate into improved financial returns for real estate firms, a finding that aligns with broader performance trends observed in socially responsible investment funds.

At the individual real estate asset level, studies on green property investment, exemplified by [Kats \(2003\)](#), demonstrate the economic justification of sustainable investments due to reduced operating costs and tenant appeal. The advantages of sustainable commercial buildings, including longer economic lifespans and reduced market risk, make them attractive to investors ([Eichholtz et al., 2010](#)). While individual case studies provide valuable insights, a predominant focus on specific asset types, such as offices, has been observed. Nevertheless, existing studies generally conclude that green real estate assets tend to outperform non-green assets ([Eichholtz et al., 2010](#); [Fuerst and McAllister, 2011](#)). Within the environmental component of the ESG framework, research has predominantly focused on building certifications like LEED and Energy Star. Positive relationships have been found between the sustainability of properties and the operating and stock performance of publicly listed U.S. real estate investment trusts ([Eichholtz et al., 2013](#); [Fuerst and Van de Wetering, 2015](#)). However, the relationship between portfolio greenness and abnormal stock returns is less clear, with indications that stock prices already incorporate the financial benefits of sustainable investments ([Eichholtz et al., 2013](#)). Empirical studies on the social pillar in the real estate sector are limited ([Morri et al., 2021](#)), with a positive association found between ESG ratings and firm valuation in the context of U.S. REITs ([Fuerst and McAllister, 2011](#)). Despite the increasing recognition of ESG in the investment management industry, there remains a need for additional empirical research, particularly in the comprehensive assessment of ESG scores in the real estate literature ([Morri et al., 2021](#); [Cajas et al., 2012](#)). The literature gap between the U.S. and European markets and the need for standardization in testing the relationship is also highlighted, especially for Europe ([Mariani et al., 2018](#)).

In the context of REITs, it's evident that REITs with higher levels of ESG disclosure experience several financial benefits. Research by [Feng and Wu \(2023\)](#) indicates that these

REITs tend to enjoy lower costs of debt, higher credit ratings, and a higher proportion of unsecured debt to total debt, even after accounting for key firm characteristics. This suggests that enhancing ESG disclosure can facilitate better access to capital markets for REITs, thereby enhancing corporate financial flexibility. Lenders are paying closer attention to a firm's ESG disclosure and incorporating ESG factors into their lending decisions. However, the impact of ESG ratings on REIT returns is still not conclusive. While some studies have shown a positive relationship between governance mechanisms and operating performance, others have found no such correlation or even a negative one (Hartzell *et al.*, 2008). Moreover, recent research has delved into the effects of ESG scores on REITs during economic downturns, revealing potential negative implications for firm value and operating cash flow (Chacon *et al.*, 2024).

In the United States, investigations into the impact of governance ratings and agency costs on the financial performance of REITs have produced conflicting findings (Erol *et al.*, 2023). Bauer *et al.* (2010) found no significant correlation between governance strength and financial metrics in U.S. REITs, potentially due to regulatory requirements regarding earnings distribution that help mitigate agency costs. Similarly, Fan *et al.* (2022) discovered that while environmental ratings, considered a material ESG component in REITs, negatively forecast expected returns, social and governance ratings, deemed immaterial ESG components, exhibited a positive association with future returns. Conversely, Brounen *et al.* (2021) and Coen *et al.* (2018) uncovered compelling evidence of a sustainability premium, indicating investors' willingness to pay a premium for companies with superior sustainability ratings.

In the European context, research has revealed mixed findings regarding the relationship between ESG variables and the financial performance of REITs. Mariani *et al.* (2018) identified a negative correlation between energy efficiency and financial performance in European REITs, which contradicts earlier studies. Morri *et al.* (2021) found a positive relationship between greenness indicators and operating performance in European REITs. Conversely, Morri *et al.* (2024) found a positive connection between sustainability initiatives, particularly environmental considerations, and financial performance while governance elements were associated with unfavorable financial outcomes. This uncertainty surrounding the impact of ESG variables persists, not only concerning their overall influence but also with regard to their individual effects within each of the three pillars, as highlighted by Morri *et al.* (2024). Thus, the understanding of how ESG factors affect the financial performance of European REITs remains nuanced and subject to ongoing research and debate.

In the analysis of the relationship between REITs and ESG, it is important to highlight the work of Brounen and Marcato (2018) which introduced a new factor, HESGL, to the Fama French model as a sixth factor which proved to be significant. This factor was calculated through the quartiles of REIT portfolios based on ESG scores were created using monthly data and annual rebalancing. Final data showed that REITs scoring in the top quartile for ESG managed more than twice as many assets as those in the lower quartile. Through this factor, Brounen and Marcato (2018) provided evidence of a sustainability premium, particularly for the environmental and social pillars within the US REIT market.

The diversity in these findings can be attributed to variations in sample selection, the financial and sustainability variables measured, statistical models employed, and time frames analyzed. Although investors and lenders have increasingly focused on REITs ESG disclosure, there has been a paucity of research examining its impact on REIT debt financing and firm value (Feng and Wu, 2023).

The literature review underscores the need for more comprehensive analyses, particularly addressing specific real estate company types, geographic regions, and dimensions of sustainability, with a predominant focus on American REITs and environmental and governance concerns (Morri *et al.*, 2024).

2.4 Research hypothesis

This study seeks to empirically explore the relationship between ESG scores and the performances of REITS given the mixed results reported in previous literature. In light of these considerations, we formulate the following hypotheses:

- H1. ESG factors have a significant impact on the performance of REITs.
- H2. The influence of ESG factors on the performance of REITs is contingent upon the specific time frame under consideration.

3. Materials and methods

3.1 Data

This research utilizes data from the Refinitiv Datastream database both for market and ESG data. The sample consists of the monthly total returns of 175 European Equity REITs obtained from Refinitiv Workspace's database between June 2013 and July 2022. The REIT data collected represents almost all REITs listed on the European market and comply with the following criteria: (1) the REITs' shares are listed on the stock exchange; (2) the REITs' country of exchange is Europe; (3) REITs' returns do not contain outliers (errors or illiquidity); (4) REITs present at least 10 observations throughout the analysis period.

The total number of observations is 19,075 and an unbalanced panel of 11,770 is constructed after eliminating missing observations.

3.2 Research design

To quantify the impact of ESG ratings on the financial performance of REITs, firms' specific returns are examined in an asset pricing framework with panel data using a five-factor model as the standard of reference.

The classic Fama-French five-factor model (Fama and French, 1993) is employed given its fit to the considered data and for risk assessment of the sector relative to the market. In the analysis, the factors are employed as control variables as validated in previous literature (Brounen and Marcato, 2018; Mariani *et al.*, 2018) to study REITs excess returns. The model used is:

$$R_{it} - RF_t = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \varepsilon_{it} \quad (1)$$

where MKT, SMB, HML, RMW, and CMA, respectively refer to the monthly return of the stock market index less the risk-free rate and the monthly premia of book-to-market, size, operating profitability and conservative investment factors, i represents the i th observation and t the time at which the observation refers.

By using the Fama-French five-factor model (FF5), several analyses were carried out in order to test the importance of ESG factors. Firstly, the ESG total score is added to the model to identify the effect of the latter. The introduction of this variable will be both as a numerical score (Model 1) and as a factor (HESGL) constructed mimicking the Fama and French method (Model 2), following the methodology of Brounen and Marcato (2018). The estimated models are therefore:

Model 1:

$$R_{it} - RF_t = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \beta_6 ESG_{it} + \varepsilon_{it} \quad (2)$$

Model 2:

$$R_{it} - RF_t = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \beta_6 HESGL_t + \varepsilon_{it} \quad (3)$$

Regarding Model 1, it is important to specify that while ESG is a firm-level variable, there are compelling reasons to examine its impact at the market level (Brounen and Marcato, 2018). Firstly, ESG factors can have systematic effects across industries and sectors, influencing market-wide risk and return dynamics. For example, shifts in regulatory policies or societal attitudes towards environmental sustainability can affect multiple firms simultaneously, leading to correlated movements in stock prices at the market level. Secondly, investors increasingly incorporate ESG considerations into their portfolio allocation decisions, leading to market-wide adjustments in asset prices based on firms' ESG performance. However, it's important to approach the interpretation of these ESG coefficients with caution, as they may still covary with other firm characteristics. Consequently, Model 2 should be prioritized over Model 1 to ensure a more robust analysis.

Regarding Model 2, we opted to utilize the FF5 as our benchmark, despite the availability of various alternative models in theory, because past research has demonstrated its efficacy in capturing the returns of REITs. Previous studies by Brounen and Marcato (2018) and Mariani *et al.* (2018) have highlighted the superior performance of the FF5 in the context of REIT returns analysis. The decision to employ this specific model stems from its ability to account for a broader range of factors that influence REIT performance beyond traditional market risk factors. By incorporating additional factors such as size, value, profitability, and investment, the FF5 offers a more comprehensive framework for understanding the drivers of REIT returns.

This approach enhances our ability to comprehensively evaluate the impacts of ESG. Concurrently, we introduce a time series that delineates the return difference between REIT portfolios with high and low ESG ratings (factor HESGL), integrating this discrepancy as the sixth factor. The HESGL factor is computed by taking the difference in excess returns between the top 25% ESG-rated portfolio and the bottom 25% ESG-rated portfolio. This calculation, often referred to as "top minus bottom", allows us to assess the performance differential between REIT portfolios with the highest and lowest ESG ratings.

This methodology is extended to individual ESG sub-components, allowing for a precise exploration of the distinct roles each plays in influencing stock returns. To ensure the robustness of our empirical model, a series of diagnostic tests have been conducted, focusing on the factors: (1) stationarity, (2) lack of autocorrelation, (3) normality.

Our analytical process involves treating the sample initially as an independently pooled cross-section and subsequently as a panel dataset, as recommended by Brounen and Marcato (2018), employing fixed and random effects. According to Baltagi (2008), the utilization of panel data, in contrast to time-series or cross-sectional data, offers several advantages, including enhanced control over individual heterogeneity. To address panel-specific issues, we employ various methodologies such as the first differencing method, as well as fixed and random effect transformations.

3.3 Variable description

Fama-French factors are based on monthly European data and are taken from the Kenneth R. French Data Library. From a timing perspective, the database encompasses information gathered over ten years, specifically from 2013 through 2022.

In this study, the ESG variables, which are disclosure scores, were evaluated using Refinitiv ESG scores obtained from the widely recognized Refinitiv database, a tool frequently employed in academic research (e.g. Dyck *et al.*, 2019). Renowned for their reduced susceptibility to selection bias, Refinitiv ESG scores are preferred for their ability to yield more informative outcomes regarding variability and distribution compared to similar ESG ratings (Desender and Epure, 2015). Refinitiv ESG scores undergo a meticulous assessment process, wherein companies are evaluated based on an extensive set of over 630 ESG metrics

at the company level. Of these metrics, 186 are identified as the most comparable and material within their respective industries. These metrics are classified into ten groups, aligning with the three pillars of ESG. The final ESG score encapsulates a company’s comprehensive ESG performance, commitment, and effectiveness, all derived from publicly reported information. Notably, the categories within the environmental and social pillars have industry-specific weights, while governance maintains consistent weights across all industries. To standardize, the weights of the pillars are normalized to percentages ranging from 0 to 100, where 0 signifies the lowest possible performance and 100 denotes the highest possible performance.

Data was collected spanning from 2015 to 2022 to ensure a consistent dataset. The number of REITs associated with an ESG score witnessed significant growth over this period, nearly doubling by 2022. Despite this substantial increase, the average rating maintained a stable value around 55. Please refer to Figure 1 below.

For a more in-depth analysis, refer to Table 1 below that shows the descriptive statistics. REITs are stratified based on the Global Industry Classification Standard (GICS) and categorized according to the presence of at least one ESG score, where “0” corresponds to ESG non-compliant and “1” to ESG-compliant REITs.

Regarding the average monthly return, it appears that REITs with an ESG score may have an influence, despite potentially experiencing higher volatility in some cases. However, it’s important to note that these findings lack confirmation through *t*-tests.

4. Results

4.1 Model 1

In Model 1, regressions are run only for ESG-compliant REITs, resulting in 3,929 observations.

Moreover, in order to run a consistent analysis, annual ESG rating data are transformed into monthly data, resulting in two different analyses, assuming: (1) that the score assigned at year *t* remains the same each month of the year (Model 1.1), (2) a constant REIT evolution towards the rating of year *t*+1, by linearly interpolating the score each month (Model 1.2) which required access to the previous ESG score, which was not consistently available, and thus reduced the number of observations to 3,268.

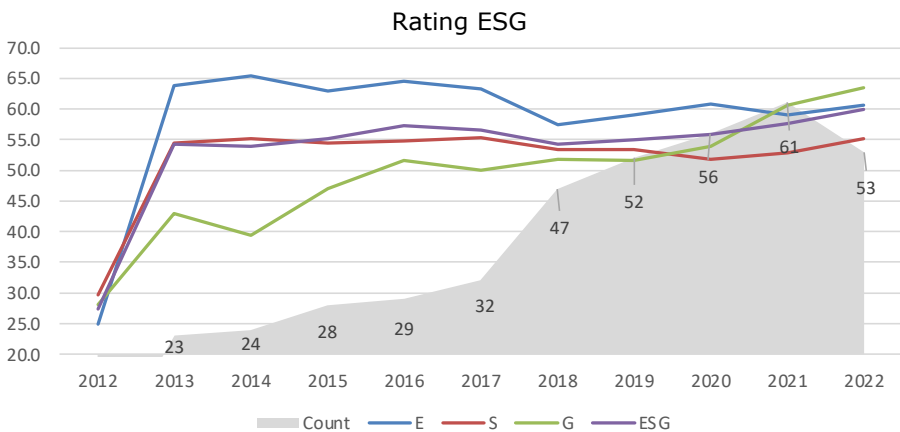


Figure 1.
Evolution of ESG ratings

Source(s): Authors’ own work based on Refinitiv

Returns by GICS industry	Monthly average	St Dev	Min	Max
Diversified REITs	0.34	5.87	-54.95	50.00
0	0.32	6.05	-54.95	50.00
1	0.37	5.28	-22.24	23.14
Health care REITs	0.59	4.12	-16.71	16.90
0	-0.07	2.68	-10.47	7.67
1	0.72	4.34	-16.71	16.90
Hotel and resort REITs	0.06	4.43	-17.71	11.43
0	-0.32	3.56	-13.64	11.43
1	0.47	5.22	-17.71	11.21
Industrial REITs	1.24	4.78	-20.15	16.88
0	1.23	4.12	-12.13	14.15
1	1.24	5.17	-20.15	16.88
Office REITs	0.23	7.21	-46.67	66.67
0	-0.11	8.85	-46.67	66.67
1	0.41	6.13	-32.91	22.51
Residential REITs	0.12	7.47	-50.00	56.56
0	-0.25	8.61	-50.00	56.56
1	0.66	5.31	-22.92	18.82
Retail REITs	0.19	6.05	-31.07	30.50
0	0.23	4.59	-29.63	16.81
1	0.17	6.94	-31.07	30.50
Specialized REITs	0.60	10.80	-58.00	56.13
0	-0.68	14.13	-58.00	56.13
1	1.82	5.98	-20.30	23.83

Source(s): Authors' own work

Table 1.
Monthly returns
statistics by GICS
industry and ESG
compliance

For results of models Model 1.1 and Model 1.2 please refer to [Tables 2 and 3](#).

The estimated impact shows a negative relationship during the observation period (2015–2022) between ESG scores, sub-components, and REIT returns. The coefficient estimates a negative significant effect of -0.009% points on REIT returns for each one-point increase in the ESG rating. The overall effect is negative and moderate on a monthly basis: therefore, on average an increase in the ESG score results in a decreased market performance. This result suggests that over the entire period – when considering the numeric score (Model 1.1) – the costs incurred for implementing ESG-compliant practices were higher than the actual benefits. Using interpolated ratings (Model 1.2), the same impact is more modest (-0.007) and not statistically significant.

When isolating the contributions of the different subcomponents of the ESG score (“E”, “S”, “G”) in Model 1.1, as [Table 2](#) shows, none of the three coefficients are statistically significant. Shifting to the model with interpolated ratings ([Table 3](#)), the sub-components indicate a non-significant positive effect attributed to “E” and “G” components, while the Social component becomes significant and equals -0.015 .

4.2 Model 2

For the effects of the HESGL factor over the entire period (2015–2022) please refer to [Table 4](#) (Model 2.1).

Results show that the model produces a positive, significant, and relatively low factor loading, equal to 0.125. This means that when adding the HESGL factor, market returns have on average a positive relationship with a higher ESG score, in contrast to the results of the model with the numeric score (Model 1.1).

	Random effects				
	ESG	E	S	G	Subcomponents
Mkt-RF	0.533*** (0.024)	0.534*** (0.024)	0.534*** (0.024)	0.533*** (0.024)	0.534*** (0.024)
SMB	0.170** (0.072)	0.173** (0.072)	0.170** (0.072)	0.168** (0.072)	0.171** (0.071)
HML	0.478*** (0.081)	0.475*** (0.081)	0.476*** (0.081)	0.482*** (0.081)	0.476*** (0.081)
RMW	0.614*** (0.108)	0.610*** (0.108)	0.611*** (0.108)	0.616*** (0.109)	0.611*** (0.109)
CMA	-0.404*** (0.110)	-0.403*** (0.110)	-0.403*** (0.110)	-0.409*** (0.110)	-0.402*** (0.110)
ESG score	-0.009** (0.004)				
E_score		-0.007** (0.003)			-0.003 (0.004)
S_score			-0.008** (0.004)		-0.005 (0.006)
G_score				-0.006 (0.004)	-0.000 (0.005)
const	0.138 (0.240)	0.008 (0.198)	0.029 (0.210)	-0.068 (0.243)	0.097 (0.254)
BIC	25017.85	25018.43	25018.0	25020.55	25034.1
Obs	3,929	3,929	3,929	3,929	3,929
R ²	0.230	0.230	0.230	0.230	0.230
F-stat	195.311	195.185	195.279	194.729	146.458
LogLik	-12.475.822	-12.476.113	-12.475.896	-12.477.169	-12.475.670

Note(s): The dependent variable is return of REITs. In this model, ESG rating data are transformed into monthly data, resulting in two different analyses, assuming that the score assigned at year t remains the same each month of the year. The market factor is calculated as the difference between MKT and the risk free rate. Figures in parentheses show standard error. The subcomponents column represents the regression where all the three ESG pillars are analyzed together. Signs ***, **, * represent significant level at 1, 5, 10% respectively

Source(s): Authors' own work

Table 2.
Model 1.1

The analysis is performed in sub-periods to better investigate the relationship between market returns and the HESGL factors and to eventually detect time variation. Results are shown in Table 5 (Model 2.2).

In the pre-COVID period (2015–2019), HESGL factor's coefficient is significant, and the correlation between having a high ESG score and the returns of REITs is positive. One possible interpretation is related to the market's recognition and reward for REITs that effectively implement sustainability policies, leading to an increase in stock prices and returns (holding dividends constant). According to the analysis, it can be inferred that a high ESG score positively impacts the returns of these REITs. As regards the second period (2020–2022) the coefficient of the HESGL factor is positive but not statistically significant.

5. Discussion

The comprehensive study conducted over the entire period, incorporating the numerical ESG score, reveals a noteworthy negative and statistically significant relationship between the ESG score and REITS returns. In contrast, the study utilizing the HESGL factor depicts a positive and significant relationship. While the effects observed may appear divergent, the segmentation of the entire period into sub-periods allows for a more granular examination, uncovering variations in the relationship between ESG scores and REITs returns. This

	ESG	E	Random effects		Subcomponents
			S	G	
Mkt-RF	0.556*** (0.028)	0.556*** (0.028)	0.556*** (0.028)	0.556*** (0.028)	0.556*** (0.028)
SMB	0.093 (0.081)	0.095 (0.081)	0.093 (0.081)	0.092 (0.081)	0.092 (0.081)
HML	0.502*** (0.093)	0.500*** (0.093)	0.499*** (0.093)	0.503*** (0.093)	0.497*** (0.093)
RMW	0.598*** (0.124)	0.596*** (0.124)	0.596*** (0.124)	0.598*** (0.125)	0.591*** (0.124)
CMA	-0.440*** (0.124)	-0.442*** (0.124)	-0.438*** (0.124)	-0.445*** (0.124)	-0.439*** (0.124)
ESG_score	-0.007 (0.005)				
E_score		-0.003 (0.004)			0.006 (0.006)
S_score			-0.009** (0.004)		-0.015** (0.007)
G_score				-0.005 (0.005)	0.002 (0.006)
const	0.019 (0.295)	-0.200 (0.252)	0.098 (0.257)	-0.149 (0.280)	-0.043 (0.305)
BIC	20962.63	20963.95	20960.45	20963.82	20975.47
Obs	3,268	3,268	3,268	3,268	3,268
R ²	0.229	0.229	0.230	0.229	0.230
F-stat	161.517	161.233	161.989	161.262	121.604
LogLik	-10448.947	-10449.608	-10447.855	-10449.541	-10447.278

Note(s): The dependent variable is return of REITs. In this model, ESG rating data are transformed into monthly data, resulting in two different analyses, assuming a constant REIT evolution towards the rating of year $t+1$, by linearly interpolating the score each month. The market factor is calculated as the difference between MKT and the risk free rate. The subcomponents column represents the regression where all the three ESG pillars are analyzed together. Figures in parentheses show standard error. Signs ***, **, * represent significant level at 1, 5, 10% respectively

Source(s): Authors' own work

Table 3.
Model 1.2

approach provides a more insightful perspective, highlighting that the impact of ESG considerations on REITs' financial performance may vary across different temporal contexts. The analysis utilizing the numerical ESG score highlights shifting dynamics, with ESG ratings initially lacking statistical significance during the period from 2015 to 2019 and subsequently demonstrating a negative impact on returns. In the initial period (2015–2019), ESG ratings lacked statistical significance and did not significantly influence REITs returns, probably this could be attributed to investors paying less attention to ESG data during that time frame. Conversely, in the subsequent period, incremental changes in the ESG score exhibited a negative and significant impact on REITs' returns. This negative relationship could be attributed to the market's aversion to additional costs and efforts associated with implementing social policies, especially within a negative context characterized by uncertainty and liquidity drainage.

This aligns with the findings of [Chacon et al. \(2024\)](#) indicating that REITs with superior ESG scores experience diminished firm value and decreased operating cash flow, particularly during market stress. Investors in such times may prioritize short-term profitability over long-term goals ([Buchanan et al., 2018](#)). These findings are also consistent with those of [Brounen and Marcato \(2018\)](#). However, caution is warranted in interpreting these ESG

	RE			
	ESG	E	S	G
Mkt-RF	0.282*** (0.017)	0.274*** (0.017)	0.254*** (0.017)	0.303*** (0.016)
SMB	0.223*** (0.044)	0.214*** (0.044)	0.238*** (0.044)	0.214*** (0.044)
HML	0.259*** (0.051)	0.225*** (0.052)	0.198*** (0.051)	0.256*** (0.051)
RMW	0.237*** (0.069)	0.185*** (0.071)	0.153** (0.069)	0.232*** (0.069)
CMA	-0.222*** (0.071)	-0.231*** (0.071)	-0.222*** (0.072)	-0.202*** (0.071)
HESGL	0.125*** (0.025)			
HEL		0.139*** (0.026)		
HSL			0.213*** (0.028)	
HGL				0.106*** (0.029)
const	-0.126 (0.078)	-0.122 (0.078)	-0.046 (0.077)	-0.165** (0.076)
BIC	77107.86	77102.05	77064.91	77122.98
Obs	11,770	11,770	11,770	11,770
R ²	0.085	0.085	0.088	0.083
F-stat	181.242	182.324	189.373	178.583
LogLik	-38516.439	-38513.533	-38494.963	-38523.997

Note(s): The dependent variable is return of REITs. The market factor is calculated as the difference between MKT and the risk free rate. The HESGL is the difference in excess return between top 25% ESG rated portfolio and bottom 25% ESG rated portfolio (top minus bottom). Figures in parentheses show standard error. Signs ***, **, * represent significant level at 1, 5, 10% respectively

Table 4.
Model 2.1

Source(s): Authors' own work

coefficients, as we have observed that the ESG score tends to covary with other firm characteristics.

The significance of the HESGL factor warrants greater attention, especially considering its consistent importance, which holds true not only in Europe but also mirrors findings from the US (Brounen and Marcato, 2018). Notably, significance emerges predominantly in more recent years, implying that investors may have needed time to adjust to the novel insights provided by these ESG measures. However, the model incorporating the HESGL factor reveals a positive and significant impact during the initial period (2015–2019), but this significance diminishes in the subsequent period. This highlights the notion that during prosperous periods, well-executed social policies that lead to a high ESG score are appreciated by the market. However, in times of crisis, the market may lose interest in the ESG standards associated with these investments. Additional efforts to enhance the ESG rating could be perceived negatively, potentially leading to a decline in stock value.

These findings suggest that the short-term impact of HESGL may be influenced by external conditions, such as the Covid pandemic. This underscores a clear correlation indicating that during periods of economic prosperity, REITs with robust and well-executed social policies, contributing to a high ESG score, are duly rewarded by the market (Morri *et al.*, 2024). However, a notable shift occurs in the subsequent period, highlighting a

	2015–2019				2020–2023			
	ESG	E	S	G	ESG	E	S	G
Mkt-RF	0.274*** (0.027)	0.267*** (0.027)	0.247*** (0.027)	0.349*** (0.024)	0.306*** (0.023)	0.306*** (0.024)	0.294*** (0.024)	0.297*** (0.023)
SMB	0.134** (0.058)	0.139** (0.058)	0.176*** (0.058)	0.099* (0.058)	0.215*** (0.072)	0.216*** (0.071)	0.205*** (0.071)	0.206*** (0.071)
HML	0.086 (0.090)	0.027 (0.090)	0.068 (0.089)	0.101 (0.090)	0.342*** (0.088)	0.346*** (0.086)	0.287*** (0.086)	0.271*** (0.088)
RMW	0.022 (0.098)	-0.050 (0.101)	0.009 (0.097)	0.124 (0.099)	0.485*** (0.120)	0.487*** (0.124)	0.422*** (0.120)	0.427*** (0.118)
CMA	-0.329*** (0.114)	-0.297*** (0.113)	-0.296*** (0.112)	-0.233** (0.112)	-0.148 (0.106)	-0.152 (0.101)	-0.132 (0.103)	-0.104 (0.108)
HESGL	0.212*** (0.034)				0.008 (0.044)			
HEL		0.252*** (0.039)				0.004 (0.043)		
HSL			0.288*** (0.038)				0.073 (0.045)	
HGL				0.093** (0.043)				0.091** (0.046)
const	0.301*** (0.079)	0.373*** (0.081)	0.305*** (0.078)	0.176** (0.077)	-0.675*** (0.137)	-0.683*** (0.128)	-0.567*** (0.137)	-0.549*** (0.132)
BIC	40252.94	40245.83	40226.9	40288.18	32192.87	32192.91	32189.55	32187.42
Obs	6,302	6,302	6,302	6,302	5,468	5,468	5,468	5,468
R ²	0.059	0.060	0.063	0.054	0.114	0.113	0.113	0.113
F-stat	65.798	67.056	70.414	59.579	100.146	100.139	100.769	101.169
LogLik	-20091.474	-20087.920	-20078.455	-20109.098	-16062.556	-16062.574	-16060.894	-16059.828

Note(s): The dependent variable is return of REITs. The market factor is calculated as the difference between MKT and the risk free rate. The HESGL is the difference in excess return between top 25% ESG rated portfolio and bottom 25% ESG rated portfolio (top minus bottom). Figures in parentheses show standard error. Signs ***, **, * represent significant level at 1, 5, 10% respectively

Source(s): Authors' own work

Table 5.
Model 2.2

crucial dynamic in market behavior during times of crisis, where the optimal point appears to shift dramatically. Nonetheless, in the long term, the returns and performance of the HESGL factor remain evident across all models, corroborating the findings of [Brounen and Marcato \(2018\)](#), where ESG is positively correlated with REITs' returns. These results also align with the "doing-well-by-doing-good" hypothesis proposed by [Kramer and Porter \(2011\)](#).

This hypothesis posits that ESG practices are intricately tied to efficient resource utilization and innovative business strategies, thereby resulting in increased profitability and market value ([Artiach et al., 2010](#); [Friedman, 1970](#)). In the contemporary business landscape, where ESG strategies have become integral to decision-making processes, these findings underscore the importance of viewing ESG factors as more than just a "nice-to-have" aspect ([Morri et al., 2021](#)). They emphasize the tangible benefits and competitive advantages that robust ESG practices can confer upon organizations in terms of financial performance and long-term sustainability ([Feng and Wu, 2023](#)). Therefore, our research confirms the existence of a sustainability premium, at least in Europe, as evidenced by findings similar to those of [Morri et al. \(2021\)](#) in the US, as well as those of [Brounen et al. \(2021\)](#) and [Coen et al. \(2018\)](#).

In terms of the impact of individual variables such as E, S, and G, our study makes several contributions and introduces novel insights compared to existing research. In line with the findings of [Brounen and Marcato \(2018\)](#), we establish that both social and environmental factors exhibit positive and significant factor loadings across each sub-period and the overall sample.

However, concerning corporate governance, our findings diverge from previous research ([Brounen and Marcato, 2018](#)), indicating a positive relationship. This suggests that shareholders benefit from robust corporate governance practices rather than experiencing negative outcomes. The disparity in results could stem from our consideration of a longer time frame, particularly post-Covid, and our focus on a European sample. The European corporate governance system differs significantly from that of the US, potentially explaining the differing outcomes. Similarly, studies by [Bauer et al. \(2010\)](#) and [Fan et al. \(2022\)](#) also failed to find a significant or negative correlation between governance strength and financial metrics in US REITs.

Our results also provide new insights into European REITs, contradicting previous research such as [Mariani et al. \(2018\)](#), which identified a negative correlation between energy efficiency and financial performance in European REITs, or only a positive return for environmental indicators, as found by [Morri et al. \(2021\)](#). Therefore, our findings, in contrast to past research ([Mariani et al., 2018](#); [Morri et al., 2021](#)), demonstrate alignment across all three pillars, confirming their overall positive impact, while literature has traditionally yielded mixed results when analyzing individual variables.

5.1 Robustness checks

In order to control our results, we run several robustness checks.

Firstly, we run [equations \(2\) and \(3\)](#) by applying fixed effects instead of a random effects. For the results please refer to [Table 6](#) and they confirm previous findings of Model 1.1 and Model 2.1.

Furthermore, considering that ESG scores are reported annually, utilizing monthly variables in the regression may not be suitable. This discrepancy could result in misinterpretations of the data and the coefficients. To address this concern, [equations \(2\) and \(3\)](#) were re-run using fixed effect model and annual variables exclusively to maintain consistency and enhance the interpretability of the results. Please refer to [Table 7](#) below.

Also, in this case previous results are confirmed.

	Fixed effects				
	ESG	E	S	G	Subcomponents
Mkt-RF	0.570*** (0.0249)	0.571*** (0.0249)	0.571*** (0.0249)	0.570*** (0.0249)	0.570*** (0.0249)
SMB	-0.00738 (0.0674)	0.00140 (0.0674)	-0.00176 (0.0673)	-0.00433 (0.0674)	-0.00720 (0.0674)
HML	0.387*** (0.0772)	0.368*** (0.0770)	0.372*** (0.0768)	0.381*** (0.0773)	0.385*** (0.0774)
RMW	0.566*** (0.105)	0.551*** (0.105)	0.553*** (0.105)	0.565*** (0.105)	0.564*** (0.105)
CMA	-0.324*** (0.118)	-0.306*** (0.118)	-0.311*** (0.117)	-0.307*** (0.117)	-0.321*** (0.118)
ESG score	-0.0415*** (0.0120)				
E_score		-0.0202** (0.00953)			-0.000649 (0.0114)
S_score			-0.0377*** (0.0107)		-0.0304** (0.0130)
G_score				-0.0233*** (0.00843)	-0.0136 (0.00938)
const	2.255*** (0.692)	1.155* (0.603)	1.966*** (0.598)	1.113** (0.453)	2.316*** (0.705)
Year FE	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES
Obs	3,929	3,929	3,929	3,929	3,929
R ²	0.213	0.212	0.213	0.212	0.214

	FE			
	ESG	E	S	G
Mkt-RF	0.281*** (0.0145)	0.269*** (0.0146)	0.249*** (0.0148)	0.308*** (0.0137)
SMB	0.159*** (0.0365)	0.163*** (0.0364)	0.180*** (0.0364)	0.124*** (0.0363)
HML	0.177*** (0.0418)	0.112*** (0.0430)	0.117*** (0.0422)	0.165*** (0.0426)
RMW	0.169*** (0.0582)	0.0666 (0.0603)	0.0757 (0.0590)	0.142** (0.0598)
CMA	-0.166*** (0.0632)	-0.158** (0.0631)	-0.171*** (0.0630)	-0.159** (0.0632)
HESGL	0.165*** (0.0195)			
HEL		0.193*** (0.0192)		
HSL			0.267*** (0.0220)	
HGL				0.151*** (0.0219)
const	0.124** (0.0579)	0.154*** (0.0580)	0.200*** (0.0583)	0.0784 (0.0572)
Year FE	YES	YES	YES	YES
Company FE	YES	YES	YES	YES
Obs	11,770	11,770	11,770	11,770
R ²	0.076	0.078	0.081	0.074

Note(s): In the following tables [equation \(2\)](#) and [\(3\)](#) are run through a fixed effect model. The dependent variable is return of REITs. The market factor is calculated as the difference between MKT and the risk free rate. Figures in parentheses show standard error. The HESGL is the difference in excess return between top 25% ESG rated portfolio and bottom 25% ESG rated portfolio (top minus bottom). The subcomponents column represents the regression where all the three ESG pillars are analyzed together. Signs ***, **, * represent significant level at 1, 5, 10% respectively

Source(s): Authors' own work

Table 6.
Fixed effect model

	Fixed effects				
	ESG	E	S	G	Subcomponents
Mkt-RF	0.933*** (0.0959)	0.922*** (0.0966)	0.926*** (0.0959)	0.937*** (0.0962)	0.138*** (0.0252)
SMB	-0.763*** (0.250)	-0.676*** (0.249)	-0.704*** (0.247)	-0.769*** (0.252)	0.353*** (0.0659)
HML	-0.304 (0.255)	-0.455* (0.247)	-0.421* (0.243)	-0.281 (0.260)	0.129* (0.0667)
RMW	2.556*** (0.401)	2.636*** (0.403)	2.605*** (0.400)	2.528*** (0.403)	0.102 (0.108)
CMA	1.381*** (0.380)	1.631*** (0.365)	1.568*** (0.358)	1.368*** (0.386)	0.114 (0.101)
ESG score	-0.321** (0.134)				
E_score		-0.118 (0.102)			0.0365 (0.0308)
S_score			-0.245** (0.111)		-0.0123 (0.0349)
G_score				-0.223** (0.0977)	0.0447 (0.0280)
const	11.52 (7.771)	0.679 (6.544)	6.786 (6.281)	4.943 (5.330)	3.301 (2.053)
Year FE	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES
Obs	322	322	322	322	322
R ²	0.535	0.527	0.534	0.534	0.534

	FE				
	ESG	E	S	G	
Mkt-RF	0.273*** (0.0522)	0.450*** (0.0634)	0.156*** (0.0597)	0.335*** (0.0411)	
SMB	0.279** (0.109)	0.0873 (0.120)	0.403*** (0.113)	0.360*** (0.106)	
HML	0.114 (0.121)	-0.169 (0.107)	0.235* (0.123)	0.285** (0.116)	
RMW	1.996*** (0.180)	2.185*** (0.191)	1.710*** (0.190)	1.564*** (0.188)	
CMA	0.419** (0.213)	1.143*** (0.188)	0.00976 (0.236)	-0.104 (0.210)	
HESGL	0.440*** (0.0965)				
HEL		-0.0597 (0.110)			
HSL			0.585*** (0.0968)		
HGL					0.676*** (0.0818)
const	-2.116** (0.870)	-5.246*** (0.990)	-0.807 (0.917)	-2.036*** (0.709)	
Year FE	YES	YES	YES	YES	
Company FE	YES	YES	YES	YES	
Obs	1,501	1,501	1,501	1,501	
R ²	0.239	0.227	0.248	0.265	

Note(s): In the following tables equation (2) and (3) are run through a fixed effect model and by using annual variables. The dependent variable is return of REITs. The market factor is calculated as the difference between MKT and the risk free rate. The HESGL is the difference in excess return between top 25% ESG rated portfolio and bottom 25% ESG rated portfolio (top minus bottom). Figures in parentheses show standard error. The subcomponents column represents the regression where all the three ESG pillars are analyzed together. Signs ***, **, * represent significant level at 1, 5, 10% respectively

Source(s): Authors' own work

Table 7.
Fixed effect model with annual data

Finally, considering the absence of a real estate-specific factor in the Fama-French five-factor model, which is crucial for analyzing REITs, we modified the model based on the approach of [Rottke and Mutl \(2021\)](#). By incorporating additional factors that capture the unique characteristics of the REIT market, we aimed to enhance the model's relevance and accuracy. Research by [Rottke and Mutl \(2021\)](#) has demonstrated that REIT-specific factors can outperform the traditional Fama-French factors in terms of the significance of their coefficients. Therefore, Model 3.1 and Model 3.2 were developed to address this limitation and provide a more comprehensive framework for analyzing REIT returns.

The equations for Model 3.1 and Model 3.2 are presented below:

Model 3.1:

$$R_{it} - RF_t = \alpha + \beta_1 EREIT_t + \beta_2 SIZEREIT_t + \beta_3 HMLREIT_t + \beta_4 ESG_{it} + \varepsilon_{it} \quad (4)$$

Model 3.2:

$$R_{it} - RF_t = \alpha + \beta_1 EREIT_t + \beta_2 SIZEREIT_t + \beta_3 HMLREIT_t + \beta_4 HESGL_t + \varepsilon_{it} \quad (5)$$

Specifically, in Model 3, we introduced three new factors – EREITt, SIZEREIT, and HMLREIT – following the Fama-French framework: (1) EREITt represents the total return of the equity REIT portfolio, (2) SIZEREIT and HMLREIT are modified versions of the traditional Fama-French factors, tailored to our sample of equity REITs. SIZEREIT reflects the REIT market proxy and factor mimicking portfolios for size. As the SMB variable may not fully capture size factors for REITs ([Chen et al., 2012](#)), we calculated SIZEREIT by sorting the equity REIT portfolio based on their market capitalization into top 25% and bottom 25%. HMLREIT accounts for the different characteristics of value and growth stocks, like the traditional value factor used by Fama and French. However, as REITs are expected to mean revert around their Net Asset Value in the long run, the Fama-French book-to-market equity ratio may not adequately represent this characteristic. Instead, we employed dividend yield as a proxy ([Rottke and Mutl, 2021](#)), considering that REITs are required to distribute almost the total of their income annually as dividends. A high dividend yield suggests a higher risk, like a value stock, while a low dividend yield may indicate a REIT investing in prime locations and relying on capital appreciation, resembling a growth stock. Therefore, we calculated HMLREIT by splitting the REITs into top 25% and bottom 25% dividend yield categories.

These modifications allow for a more tailored analysis of REIT returns, capturing the unique characteristics of the REIT market.

Results are shown in the below [Table 8](#) and, also, in this case previous findings are confirmed.

Results of Model 3.2 were also confirmed by re-running the analysis by using specific FF5 factors at country level.

6. Conclusions

This research contributes to the understanding of the relationship between environmental, social, and governance factors and REITs' returns by conducting a comprehensive study over an extended period. The findings reveal a dynamic relationship, with divergent results when utilizing different ESG measurement approaches – the numerical ESG score and the HESGL factor. The segmentation of the entire period into sub-periods enhances the interpretability of these results, highlighting the temporal nuances in the impact of ESG considerations on REITs' financial performance.

	ESG	E	Fixed effects S	G	Subcomponents
<i>Model 3.1</i>					
EREIT-RF	0.531*** (0.0245)	0.533*** (0.0245)	0.532*** (0.0245)	0.532*** (0.0245)	0.531*** (0.0245)
SIZEREIT	0.251*** (0.0184)	0.252*** (0.0184)	0.250*** (0.0184)	0.250*** (0.0184)	0.250*** (0.0184)
HMLREIT	-0.0760*** (0.0753)	-0.0764*** (0.0751)	-0.0758*** (0.0749)	-0.0751*** (0.0754)	-0.0757*** (0.0175)
ESG score	-0.0416*** (0.0117)				
E_score	-0.0226** (0.00929)				
S_score	-0.0366*** (0.0104)				
G_score	-0.0220*** (0.00822)				
const	2.270*** (0.674)	1.309** (0.588)	1.916*** (0.582)	1.052** (0.441)	2.350*** (0.687)
Year FE	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES
Obs	3,929	3,929	3,929	3,929	3,929
R ²	0.254	0.252	0.254	0.252	0.254

	ESG	E	FE S	G
<i>Model 3.2</i>				
EREIT-RF	0.235*** (0.0132)	0.227*** (0.0133)	0.207*** (0.0135)	0.259*** (0.0124)
SIZEREIT	0.296*** (0.00915)	0.294*** (0.00915)	0.293*** (0.00913)	0.296*** (0.00916)
HMLREIT	0.334*** (0.00838)	0.334*** (0.00837)	0.334*** (0.00836)	0.334*** (0.00839)
HESGL	0.153*** (0.0177)			
HEL	0.169*** (0.0175)			
HSL	0.241*** (0.0200)			
HGL	0.141*** (0.0199)			
const	0.145*** (0.0527)	0.164*** (0.0528)	0.210*** (0.0530)	0.103** (0.0520)
Year FE	YES	YES	YES	YES
Company FE	YES	YES	YES	YES
Obs	11,770	11,770	11,770	11,770
R ²	0.239	0.227	0.248	0.265

Note(s): The market factor is calculated as the difference between EREIT and the risk free rate. Figures in parentheses show standard error. The HESGL is the difference in excess return between top 25% ESG rated portfolio and bottom 25% ESG rated portfolio (top minus bottom). The subcomponents column represents the regression where all the three ESG pillars are analyzed together. Signs ***, **, * represent significant level at 1, 5, 10% respectively

Source(s): Authors' own work

Table 8.
Model 3.1–3.2

The theoretical contribution of this study lies in its exploration of the varying effects of ESG scores on REITs' returns during different temporal contexts (Morri *et al.*, 2021). The analysis using the numerical ESG score underscores the changing dynamics, with ESG ratings lacking statistical significance in the initial period (2015–2019) and exhibiting a negative impact on returns in the subsequent period. This implies that, while maintaining ESG compliance is advantageous, there seems to be a point of diminishing returns where further enhancements in the ESG score might not contribute positively to financial performance. In other words, the initial efforts to align with ESG principles and attain a certain level of compliance are rewarded by the market. However, pushing beyond this optimal threshold with continuous improvements in the score may not yield proportionate financial benefits and could even lead to diminishing or adverse effects on the overall financial performance of REITs, similar to the effect of an excessive financial leverage. However, simultaneously, caution is warranted in interpreting these ESG coefficients, as we have observed that the ESG score tends to covary with other firm characteristics.

Therefore, more importance should be given to the HESGL factor, which emphasizes well-implemented social policies, demonstrates a positive relationship during prosperous periods (Brounen and Marcato, 2018) but loses significance during crises, shedding light on the context-dependent nature of ESG effects (Artiach *et al.*, 2010). This highlights a clear correlation suggesting that in times of economic prosperity, REITs with robust and well-implemented social policies, contributing to a high ESG score, are duly rewarded by the market. However, a noteworthy shift occurs in the subsequent period, emphasizing a crucial dynamic in market behavior during times of crisis as if the optimal point was to shift dramatically. The importance of the HESGL factor deserves heightened consideration, given its consistent relevance, observed not just in Europe but also echoing findings from the US (Brounen and Marcato, 2018). This emphasizes the complex interplay between REITs and ESG variables, which appears to depend on the specific time period being analyzed.

These findings hold significance for investors and market participants navigating the complexities of ESG integration. The market's aversion to additional costs associated with ESG during economic downturns and its penalization of incremental changes in scores add a layer of complexity to investment decisions. Furthermore, the acknowledgment of a premium for REITs with a rating but the offsetting effects of incremental changes highlight the market's nuanced response to ESG considerations. This insight underscores the importance of strategic and targeted ESG initiatives, emphasizing the need for companies to strike a balance between achieving and maintaining compliance without overextending resources for marginal gains.

However, this study has some limitations. The primary challenge lies in the type and amount of available ESG data, with disparities among providers leading to inconsistencies. The lack of global regulation and transparency in ESG ratings poses a challenge to the reliability of the results. The annual release of Refinitiv's score data also limits the precision of the analysis based on monthly data.

Despite these limitations, this research adds valuable insights to the evolving discourse on ESG and REITs by emphasizing the importance of temporal segmentation in understanding the nuanced relationship. Future research could address these limitations by considering a larger and more diverse sample of REITs, incorporating more standardized ESG metrics, and exploring longer data periods. The ongoing efforts for global regulation and transparency in ESG ratings, as proposed by the European Commission, are crucial for enhancing the reliability of future studies in this domain. In the current landscape where ESG strategies are integral to decision-making processes, this research contributes to informed discussions on the practical implications of ESG considerations in the real estate investment sector.

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