



Master's Degree Program in Corporate Finance

Course of Equity Markets and Alternative Investments

**Do ESG Factors Drive Real Estate Returns? An Empirical Analysis of Global Real  
Estate Investment Trusts (REITs)**

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## Abstract

This study examines the relationship between ESG performance and the financial returns of Real Estate Investment Trusts (REITs). It uses panel data from Bloomberg, which covers 371 REITs globally between 2021 and 2024, to explore the effect of both the total ESG score and of its individual Environmental, Social, and Governance pillars. Fixed effects and random effects models are conducted, with the Hausman test used to determine the more suitable approach. Additionally, lagged models that utilize a subsample of 152 REITs over a longer period of 10 years (2015–2024) are included as a robustness check to capture the delayed effects of ESG initiatives.

The results of the analysis consistently demonstrate that enhanced ESG performance does not guarantee better returns for REITs. On the contrary, total ESG scores show a statistically significant negative relationship with excess returns, which suggests that ESG initiatives may generate costs that outweigh benefits in the REIT sector. At the pillar level, Environmental and Social scores are negatively associated with returns, while Governance is not significant to the analysis. Robustness check with lagged regressions confirms the findings regarding the negative effect of the total ESG score and the Environmental pillar. However, the magnitude of those negative relationships weakens over time, implying that in the longer term, ESG investments might indeed turn beneficial for the firm. Social and Governance factors, on the other hand, change their impact in the lagged regression: S-score becomes insignificant, while G-score demonstrates a significantly negative association with excess returns, suggesting that costs related to improved governance practices are not immediate but become observable over time. These findings contradict the earlier studies which suggest a positive relation between ESG and financial performance, but align with more recent research that states that ESG no longer guarantees financial premia as sustainability has become more mainstream.

This thesis contributes to the academic debate about the ESG effects on REIT financial performance and confirms the less popular stance about the negative linkages between the two variables. These results have important implications both for theory and practice. Theoretically, they support the efficient market theory and suggest that ESG advantages have become priced in over time due to market's adjustment. Practically, they warn investors and managers against assuming the possibility of financial outperformance through ESG integration. Limitations of the study include restricted ESG coverage and unavailable control variables. Hence, future research should consider alternative ESG datasets as well as aim to gain a deeper understanding of the relation between ESG and performance by exploring non-financial indicators such as volatility or operating efficiency of REITs.

*Keywords:* real estate, REITs, ESG, Environmental, Social, Governance, performance, returns

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## Chapter 1. Introduction

### 1.1 Introduction

Real estate has been traditionally viewed as one of the key investment classes due to its relatively low correlation with other types of assets, the stability that it provides in regards to generation of income, and its inflation hedge features during times of economic downturns. These vast benefits of real estate investments have been recognized in practical business settings as well as proven by empirical research. Garay (2016) emphasized that investing in real estate can potentially enhance absolute returns, provide steady cash inflows, increase income tax advantages, as well as reduce portfolio risk. Similarly, Georgiev (2002) concludes that there exist “strong gains from adding real estate to a dynamically managed portfolio of stock and bonds” (p.6).

The aforementioned benefits of real estate investments can be generally achieved either by directly acquiring and managing physical properties or by indirect investments through specialized institutions such as Real Estate Investment Trusts (REITs). Lee and Chow (2025) explain that REITs are a type of investment vehicles that own, manage, or finance income-generating properties across a variety of industries. REITs are listed entities with publicly available standardized data that reflects market perception and investment sentiment, making them greatly suitable for empirical research. Historically, REITs allowed investors to enjoy the stable returns and other benefits of the real estate market without having to face high-transaction costs and active management (Morri & Beretta, 2008). While those factors remain to be of primary importance, over time, REIT investment strategies have evolved and become more complex, accounting for market trends, regulatory developments, and a rising emphasis on corporate social responsibility. Hence, as part of the latter, in recent years, Environmental, Social, and Governance (ESG) factors became a crucially important element when it comes to investor decision-making in real estate.

## 1.2 The Rise of ESG in Real Estate Investment

As awareness regarding climate change, social inequalities, and ethical governance of businesses grew, investors had to adjust their strategies and focus not only on companies' financial metrics but also on how they manage long-term sustainability concerns and ethical risks. While ESG metrics have become central to investment decision-making across all investment classes, this shift is particularly relevant for the real estate sector and REITs as they cover large portfolios of buildings and infrastructure that consume vast amounts of energy and have a critical impact on communities. In fact, according to the International Energy Agency (IEA) (2023), buildings consume around 30% of final energy produced, and the United Nations Environment Programme has determined that real estate is responsible for almost 40% of global carbon dioxide emissions (Carlin, 2022).

Given the aforementioned statistics, the real estate sector inevitably faces advanced regulatory scrutiny and carries undeniable responsibility for the future green transformation of the planet. Hence, as part of the industry, REITs are now assessed not only based on their profitability but also on how well they adhere to ESG standards. It is widely believed among investors that superior ESG performance can lead to higher returns and enhanced portfolio diversification due to more prudent risk management, reduction of systematic risk, and increased capital inflow. Opposing views, however, suggest that additional costs associated with meeting high ESG standards, as well as a shift of the primary focus of the firms might negatively affect their financial performance. Empirical evidence regarding this matter also remains divided. Some studies prove that REITs with higher ESG ratings and higher levels of ESG disclosure achieve more favorable cost of debt, better credit ratings, and tend to outperform the stocks of funds with inferior ESG scores (Alda, 2020; Feng & Wu, 2021). Other findings highlight no significant relationship between REITs' ESG and stock performance, while a third group of academics suggests that REITs with higher ESG ratings

and greater ESG disclosure are often associated with lower operational cash flows, higher return volatility, and lower overall firm values (Chacon et al., 2023; Christensen et al., 2022; Halbritter & Dorfleitner, 2015). Such drastic differences in the results of the aforementioned studies suggest the potential existence of knowledge gaps in this field and invite its further exploration.

### **1.3 Research Question and Significance**

Given the inconclusive empirical evidence from prior research on ESG investing within the real estate sector, this thesis aims to contribute to this field of study and analyze how ESG scores affect financial performance of the firms. Moreover, in order to gain a deeper understanding of the effects of various sustainability initiatives, this paper also strives to understand whether certain individual E, S, and G factors have a stronger impact on REIT financial performance compared to others. Hence, the research questions that this thesis aims to answer are the following:

1. Do ESG scores impact the returns of publicly traded REITs?
2. Do certain factors among the three individual ESG pillars have a stronger effect on REIT returns compared to the other two?

Addressing these questions is both relevant and timely for several reasons. First of all, while the proportion of REIT firms that are ESG-rated in the US reaches around 80% and in other developed countries slightly exceeds 50%, the effectiveness of ESG ratings for REITs remains debated (Neo et al., 2025). Hence, this study provides an empirical foundation that helps to understand whether ESG performance serves as a value-adding criteria or a cost-generating requirement as it comes to real estate. Secondly, by focusing specifically on REITs, an asset class that provides direct liquid exposure to the real estate market, this research can provide actionable insights to investors and portfolio managers who nowadays face an everlasting dilemma of finding a balance between sustainability and financial returns.

Finally, as very little existing work focuses on the role of ESG in portfolio diversification, this paper aims to fill in the gaps in the field and provide a valuable contribution to the modern investing environment where managing systematic risk has become as relevant as chasing returns.

#### **1.4 Research Objectives**

In order to answer the research questions and fulfill the goals of this study, the following research objectives were defined:

1. Examine the relationship between the overall ESG performance of REITs and their stock returns.
2. Analyze whether some of the individual E, S, and G factors have a more significant effect on REIT returns compared to the others.
3. Contribute to the existing literature on sustainable real estate investing and the financial benefits of ESG investing.

#### **1.5 Structure of the Thesis**

This paper is organized into 6 chapters. The first one familiarizes the reader with the background of the topic, defines research questions and objectives, as well as highlights the relevance of this study for the modern investor community. Chapter 2 reviews existing academic literature on the real estate market, ESG investing, and its impact on REIT financial and operating performance. Chapter 3 describes the empirical methodology applied to test the hypotheses, defines the variables and models used for testing, as well as outlines the sources from where the data for the study was obtained. Chapter 4 presents the results of the main test of ESG effects on REIT stock performance as well as the results of the robustness check that explores the lagged effects of sustainable initiatives. Chapter 5 interprets the results and discusses their implications. Finally, the last chapter concludes the study, highlights its main limitations, and provides recommendations for future research.

## Chapter 2. Literature Review

### 2.1 Real Estate as an Investment Asset

Investment in real estate has long been one of the traditional ways to employ excess capital among people. Manganelli (2015) defines real estate investment as the purchase of a property with the purpose of enjoying the income that it generates rather than the utilization of the property for personal needs. The real estate investment market is extremely versatile and can be segmented based on multiple criteria, the most popular of which being property type, geography, and liquidity. Based on the property type, the main segments include commercial, residential, retail, industrial, hospitality, and healthcare real estate. In relation to the geographic segmentation, real estate is most often divided based on continental (e.g., North America, Europe, Asia) or country-specific basis. Finally, liquidity criteria differentiate the real estate market into a private segment that includes direct ownership and private equity real estate, and a public segment with traded REITs and listed real estate companies (Seiler et al., 1999; Garay, 2016).

Such a wide variability of investment options within real estate has made it a particularly valuable asset class for investors. Up until as recently as a century ago, it dominated institutional portfolios and was considered a major building block in any investment strategy. In the latest decades, however, real estate yielded to the growing popularity of intangible investment assets. Stocks and bonds have become the conventional investment instruments. As a result, real estate is now generally classified as an alternative asset class (Garay, 2016). Despite this shift, it continues to play a crucial role in the construction of a diversified portfolio due to a set of its unique characteristics.

#### *2.1.1 Characteristics of Real Estate*

While being considered an alternative investment asset class, real estate possesses a set of unique characteristics that distinguish it from traditional assets such as bonds and

stocks. Those characteristics can be both positive and negative, and hence are closely considered for asset allocation strategies by investors.

Firstly, one of the greatest advantages of real estate investments is their low correlation with other asset classes such as equities and bonds. While exploring the benefits of real estate investments in their research, Vuorenoja (2020) highlights that real estate is noticeably less volatile and, in general, has very low or, for some geographic locations, even negative correlation with other asset classes. Similarly, Hudson-Wilson et al. (2005) characterize real estate as “both a low-risk asset itself and an excellent risk reducer in a stock and bond portfolio” (p.16). Therefore, based on those characteristics, real estate can provide superior benefits when it comes to portfolio diversification. This feature of real estate got widely recognized among the global investment community, and various sources report that investors tend to allocate as much as 5-45% of their portfolio to real estate in order to enjoy the benefits of diversification (Gunther et al., 2022).

Another distinctive positive feature of real estate is its capability to serve as an inflation hedge. As property values and rent prices tend to increase alongside inflation, this provides some degree of protection against it for the investors. Hudson-Wilson et al. (2005) suggest that in the event of unexpected inflation, real estate returns are capable of compensating for the surprise and offsetting underperformance of other assets. In comparison to other assets, studies find that real estate provides a better hedge than bonds, but is, in general, comparable or in some countries even slightly worse than stocks in terms of hedging capabilities (Georgiev, 2002). Nevertheless, if correctly incorporated into a portfolio, real estate tends to provide undisputed benefits in the event of both expected and unexpected inflation.

In addition, real estate offers investors strong and steady income generation. This feature makes it particularly attractive to income-focused institutional investors such as

pension funds and insurance companies because it provides them with consistent cash flows even during periods of equity market volatility. Baum (2015) explains that in real estate, lease contracts are often set for up to 10 years and are usually indexed for inflation, which to a large extent ensures the steady income stream valued by investors. This is confirmed by Hudson-Wilson et al. (2005), who compared the relative income returns of real estate to those of stocks and bonds and concluded that, “if an investor needs to rely on earning a higher proportion of its total portfolio return from realized income versus unrealized capital appreciation, real estate is a winner” (p.19). Hence, it is reasonable to conclude that to those investors who prioritize overall returns, real estate might not be as attractive, but to those who require constant income flows in order to meet current liabilities, it might be a valuable addition to the portfolio.

As for the negative sides of real estate investments, they are generally considered to be illiquid, particularly in private markets. Transactions in private real estate are infrequent, they involve substantial due diligence, specific legal procedures, and thus generate high transaction costs. Stocks, bonds, and other securities are traded on public stock exchanges and have the feature of perfect divisibility, which allows even small investors to participate in the trading process. Real estate, on the other hand, is sold in private settings through negotiations and special arrangements. The prices of transactions are generally high, which makes real estate inaccessible to the majority of investors and further feeds into its illiquidity (Seiler et al., 1999). Considering this, one can conclude that real estate is more suitable for long-term investors as it limits flexibility and does not allow for quick rebalancing of the portfolio in response to market changes.

Another shortcoming of real estate commonly highlighted in academic literature is its heterogeneity. Unlike publicly traded securities, each real estate asset is unique in terms of its location, quality, history, physical structure, tenants, and regulations applied to it. All of those

individual factors, combined with illiquidity and lack of transparency when it comes to selling prices of real estate, make it increasingly difficult to determine the true value of properties. Since the continuous trade is absent, the value of properties is usually determined through appraisal indexes. However, Baum (2015) highlights that appraisals are often unreliable due to their subjective nature and tendency to lag the true underlying market dynamics. Georgiev (2002) confirms this and adds that since appraisers face limited information, they tend to backlog it once it becomes available, which eventually creates a smoothing effect on real prices and distorts the picture of the true volatility of real estate assets for investors. Therefore, such inefficiencies in real estate valuation caused by its heterogeneity need to be closely considered by investors, as on one hand, they can be successfully exploited to achieve superior gains, but on the other hand, they also introduce additional risks and uncertainties.

Finally, real estate investments are usually highly leveraged. Their capital-intensive nature often propels investors to rely on debt financing. Baum (2015) suggests that banks are more willing to lend out large amounts of money against the security of real estate, in contrast to other assets, so leveraging the purchase of property is highly attainable and very common in the market. Such an approach to buying real estate requires less of the own equity from investors and thus ultimately enhances the returns. However, Manganelli (2015) emphasizes that to counterweight the benefit of higher returns, leverage also adds additional risk to the investment. According to the author, “unfavourable financial leverage can turn an investment of modest success into a disaster” (p.54). This is especially common during periods of declining property values. Therefore, it is extremely important for investors to perform extensive analysis and apply the degree of leverage that would enhance the performance of their real estate investments rather than endanger them during times of economic instability.

### ***2.1.2 Direct vs. Indirect Real Estate Investment***

After describing the main characteristics of real estate investments in the previous part, it is important to mention that they don't apply to all types of real estate uniformly. For the purpose of this research, it is important to differentiate between direct and indirect real estate investments and highlight their unique features that make some of the characteristics from previous sections more or less applicable to them.

Direct real estate investment implies the acquisition of physical properties with the goal to generate returns from rental income or capital appreciation. This form of investment allows for greater personal control when it comes to asset management. According to Manganelli (2015), direct real estate investors can and must make decisions in regards to lease contracts, administration, maintenance, and financing options of the properties. This eventually allows them to utilize the inefficiencies of the markets in which they operate and further enhance the returns. In addition to granting personal control, direct real estate investments also tend to be less volatile, which makes them an attractive option for risk-averse investors (Gunther et al., 2022). However, those benefits are counterbalanced by the low liquidity and significant capital requirements of direct real estate investment compared to the alternative.

Indirect real estate investment allows investors to get exposure to real estate assets through securitized financial instruments such as Real Estate Investment Trusts (REITs) and real estate mutual funds. Shares of those companies are publicly traded on financial exchanges with prices available daily (Georgiev, 2002). This not only ensures greater liquidity of indirect real estate but also significantly lowers the capital threshold required to get exposure to real estate, making it much more accessible for smaller investors. In this sense, indirect real estate investments work as a unique instrument that, on one hand, reflects the dynamics of the underlying physical real estate market but, on the other hand, behaves a

lot like regular equity stock. As a result, researchers argue that while still providing great diversification benefits, indirect real estate cannot be treated as an exact substitute for physical real estate in an investment portfolio due to its higher volatility (Yun & Chau, 2013).

Given the unique features of direct and indirect real estate investments, the choice of the most suitable option depends solely on the preferences and goals of individual investors. Long-term investors who look for stable income and have low risk tolerance might prefer direct real estate, but those who value liquidity and flexibility as it comes to portfolio rebalancing might prefer indirect options. Due to the latter reasons, this research focuses primarily on indirect real estate, specifically on REITs. Combined with higher liquidity and flexibility, REITs also offer a great degree of transparency, which is immensely valuable for the purpose of data collection and empirical analysis in this research.

## **2.2 Real Estate Investment Trusts (REITs)**

### **2.2.1 What are REITs?**

REITs are funds that own, operate, or finance real estate properties to generate income and provide their shareholders with returns through dividends or share price appreciation. Initially, REITs were established as a separate investment vehicle in the US in 1960 by the Real Estate Investment Trust Act. The goal of the Act was to allow investors to gain exposure to the real estate market in a way similar to the equity market and hence make it more accessible for smaller investors. Right after the implementation of the Act US Congress waived corporate tax for REITs, which greatly contributed to their development and popularization among the investment community (Chan et al., 2003).

Many years later, in the modern market setting, real estate trusts can still enjoy the tax-exempt treatment. However, in order to be qualified as a REIT, a company needs to meet a set of specific regulatory requirements. First and foremost, 75% of its annual income must come from real estate-related sources such as rent payments, interest on mortgages, sale of

properties, etc. Secondly, 75% of assets owned by the company must also be real estate-related. For example, it can be physical properties or property-backed loans. Finally, in order to obtain REIT status and get a tax waiver, a company must distribute at least 90% of its income in the form of dividends. On top of these three main requirements, REITs also face restrictions related to their shareholding and diversification, limiting the maximum amounts they can invest in a single entity (Nareit, n.d.).

In general, REITs can be classified into 3 main categories: equity, mortgage, and hybrid REITs. Equity REITs are those that directly own and manage income-generating properties. Mortgage REITs, commonly referred to as mREITs, invest in or originate real estate debt such as mortgages and mortgage-backed securities and generate income by receiving interest from those investments. Hybrid REITs combine characteristics of the two to reach an ideal asset allocation mix (Nareit, n.d.). In addition to those 3 structural categories, REITs also tend to specialize in specific sectors such as residential, commercial, industrial, healthcare, hospitality, or other types of real estate, which allows investors to target particular market segments and achieve more granular portfolio diversification (Ambrose & Linneman, 2001).

### ***2.2.2 REITs Market Behavior and Risk-Return Characteristics***

Despite being real estate investment vehicles, due to their unique nature, REITs often behave like equities when it comes to their market performance and volatility. Clayton & MacKinnon (2003) suggest that REITs' returns correlate more with small-cap stocks rather than with direct real estate investments, especially during short-term periods. They are sensitive to broader equity market movements, interest rate changes, and economic cycles. Moreover, Muhlhofer (2012) also explains that REITs are only capable of reflecting the income part of direct real estate return but fail to account for the appreciation component, which causes further disparities in the shorter term. As a result of these factors, both volatility

and returns of REITs tend to be higher compared to direct real estate. In fact, according to Behmaram et al. (2024), during the period of 1998-2022 REITs demonstrated average annual return of 9.74% while direct real estate reached only 7.66%.

Despite the aforementioned discrepancies, the prevailing majority of studies show that in the long-term, there still exists a relationship between REITs and direct real estate markets. In their research, Giliberto (1990) stated that REITs' returns can explain the returns of direct real estate investments after controlling for the influence of financial markets and lagged data. The author also implied that the two markets share some factors that impact both of them, but do not have any effect on other financial assets. Furthermore, Myer and Webb (1993, 1994) found that returns of REITs have a much stronger correlation with returns of direct real estate than stocks and closed-end funds. Finally, Barkham and Geltner (1995) found that REITs prices are indeed correlated with direct real estate, however, they lag behind the underlying market by one to two years depending on the country. As a result, due to this long-term correlation REITs are still considered to be a reasonable approximation for direct real estate. While resembling direct real estate in their income stability and potential for portfolio diversification, REITs grant greater liquidity and transparency at lower entry costs, which historically made them quite an appealing investment asset.

### ***2.2.3 REITs Investment Trends and Expectations***

While traditionally REITs have been valued for their income-generating potential, diversification benefits, and liquidity, in recent years decision-making process among the investors has become more complex. In addition to those traditional factors, investors now tend to account for numerous non-financial factors related to growing awareness of environmental and social issues. This shift is a part of an overall trend for sustainable investing where ESG is no longer viewed as being separate from financial performance but rather serves as a major building block for long-term value creation.

According to research conducted by Bloomberg Intelligence, global ESG assets exceeded USD 30 trillion in 2022 and are projected to reach USD 40 trillion by 2030 (Bloomberg, 2024). As for the investor sentiment, the results of the survey conducted by Morgan Stanley in 2024 state that more than half (54%) of investors state that they are particularly interested in sustainable investing and plan to allocate a higher percentage of their portfolio to it in the upcoming year (Morgan Stanley, 2024). This trend didn't bypass the real estate sector. In fact, due to the nature of their underlying assets — which are physical buildings that consume energy and impact local communities — REITs are particularly exposed to ESG-related risks and opportunities.

Along with the changing investor expectations, REITs also face new regulatory requirements that push them towards greater ESG transparency. Initiatives like the EU's Sustainable Finance Disclosure Regulation (SFDR) and the Task Force on Climate-related Financial Disclosures (TCFD) require listed entities like REITs to disclose sustainability risks and the environmental impact of their operations. As a result, these regulations have caused a steep increase in ESG reporting among REITs. According to the National Association of Real Estate Investment Trusts, a worldwide trade association and an official voice representing the REIT industry, the number of REITs that issue a stand-alone sustainability report has tripled in the period of 2017 to 2022, and the number of those with a dedicated ESG staff grew by more than two times.

Altogether these developments demonstrate that in recent years ESG became fundamental to how REITs are valued, operated, and perceived in the market. This underlines the importance of studying how ESG performance influences REIT returns. Therefore, the next section focuses more closely on ESG in the context of real estate and REITs and discusses the results of previous studies that explored the role of ESG for this industry.

## **2.3 ESG in the Context of Real Estate and REITs**

### ***2.3.1 ESG: History and Background***

Before diving deep into the discussion of ESG within real estate, it is necessary to define the general concept of ESG and provide its brief background. The official website of the European Commission (n.d.) defines ESG as “the framework or criteria to measure the sustainability and ethical impact of an investment or a company focusing on 3 fields: Environmental, Social and Corporate Governance”. While ESG itself is a relatively new concept, its history actually stems from a much older movement of socially responsible investment (SRI), which started all the way back in the 19th century and was particularly popular among the faith-based religious organizations (Eccles et al., 2019). The term ESG itself, however, appeared only in 2004 in a United Nations, The Global Compact report called *Who Cares Wins: Connecting Financial Markets to a Changing World*. For this report a former United Nations Secretary-General invited financial organizations to join forces and “develop guidelines and recommendations on how to better integrate environmental, social and corporate governance issues in asset management, securities brokerage services and associated research functions” (The Global Compact, 2004 p.5). The completed report was endorsed by 23 financial institutions that contributed to its preparation, including the world’s largest banks, asset owners, and asset managers. The following year, the United Nations Environment Programme issued another report that discussed the financial relevance and legal framework of ESG implementation for institutional investors (UNEP Finance Initiative, 2005). These two reports served as the main building blocks in the creation of Principles for Responsible Investment, a UN-backed international organization and network of investors that work to promote sustainable investment decision-making through the incorporation of ESG factors. Ever since the start of the organization in 2006, it attracts more and more

financial organizations as signatories every year which suggests the ever growing awareness of the importance of ESG factors in the financial world (Eccles et al., 2019).

### ***2.3.2 Role of ESG in Real Estate***

While talking about ESG specifically in the context of real estate, it's worth highlighting that the three factors are especially important for this industry because of the direct, tangible, and long-lasting effects that buildings have on the environment, people, and economy. Unlike many other financial assets, real estate is physically embedded in the life of the communities. Hence, taking ESG into consideration is an ethical requirement for the industry.

Starting from the Environmental factor, it's worth noting that buildings are among the largest consumers of energy and contributors to greenhouse gas emissions globally. As it was previously mentioned in this research, real estate is responsible for emission of around 40% the CO<sub>2</sub> and consumption of more than one third of global final energy (International Energy Agency, 2023; Carlin, 2022). Given such statistics in the context of the international goal of reaching carbon neutrality by 2050 stated in the Paris Agreement, real estate faces pressure to accelerate the switch towards more sustainable operations. Many real estate companies and funds have shifted their focus to actively managing climate risk, climate resilience, as well as water, energy and waste efficiency. This, according to Newell et al. (2023) leads to the fact that currently many real estate players are considered to be world leaders in the ESG field, especially those in Europe and Australia. This is further reflected in the industry statistics provided by Global Real Estate Sustainability Benchmark, which suggests that last year saw a 15% growth in the number of real estate companies that set net zero goals, and climate risk adoption reached as high as 94% among the participating companies (GRESB, 2024). Based on these results, it becomes evident that focus on environmental performance is no longer an

optional benefit but rather a required attribute for those real estate players that strive to remain ethical and compliant.

As for the Social aspect of ESG in the context of real estate, it is mostly concerned with well-being and satisfaction of tenants as well as accessibility, affordability, and impact of properties on surrounding communities (Kempeneer et al., 2021). Compared to the more quantifiable effects of the E-component, the impact of the S-factor on real estate is often harder to track and measure. Therefore, in the past, it was less frequently regarded and much less studied than the Environmental factor. In fact, in its methodology, the European Public Real Estate Association (EPRA) allocates only 20% weight to the S factor in the total ESG score calculation (Newell & Marzuki, 2024). However, in recent years, the investor community has come to the realization that the S component cannot be underestimated, and its popularity has begun to gradually increase. IPE Real Estate Global Awards introduced two S-level awards recognizing social impact and social commitment among the other 40 awards that the organization gives out to real estate players on an annual basis (Newell & Marzuki, 2024). Additionally, many real estate players started dedicating whole sections in their ESG reports to S-specific issues and generally improved the depth and granularity of their disclosure further confirming the growing focus on S factor as part of ESG framework (Newell, 2023).

Similar to Social metric, Governance is also less regarded than the E factor. In a broad spectrum, the governance factor deals with a company's structure, leadership, ethical approach to conducting business, compliance with regulations, transparency, etc. Hennisz et al. (2019) define it as “the internal system of practices, controls, and procedures your company adopts in order to govern itself, make effective decisions, comply with the law, and meet the needs of external stakeholders” (p. 1). Compared to the Social factor, the European Public Real Estate Association (EPRA) allocates an even smaller weight of 10% to the Governance

factor while calculating a company's total ESG score. Nevertheless, while researching the Governance factor in real estate, Newell (2023) highlighted that most of the big players in the industry don't neglect the Governance factor but rather take an approach of doing E and S through G. What it means is that those real estate companies don't focus on the G factor as a separate unit but rather achieve their environmental and social goals by using the right governance tactics. Such an approach proves that despite having a relatively low weight in the overall real estate ESG rating calculations, the Governance component cannot be neglected because it serves as a certain "bridge" to the attainment of a company's long-term sustainability goals.

### ***2.3.3 What Makes REITs Perform Well on ESG***

As part of the real estate industry, REITs nowadays tend to strive to perform well on ESG to stay compliant with the regulations and match the contemporary investor sentiment. But what exactly makes REITs perform well on ESG? In fact, there is no one correct method for how to excel at ESG, and REITs employ a plethora of tactics that range from asset-level certifications to firm-level management practices and market-facing disclosures.

One way to score better on environmental metrics for REITs is to increase the share of green-certified buildings in their portfolios. The concept of a green building is a rapidly growing trend in real estate. In essence, green buildings can be defined as the type of buildings that "seek to use land and energy efficiently, conserve water and other resources, improve indoor and outdoor air quality, and increase the use of recycled and renewable materials" (Howe, 2010, p. 1). Third-party certifications such as LEED (Leadership in Energy and Environmental Design), Energy Star, BREEAM (Building Research Establishment Environmental Assessment Method), and WELL Building Standard were established to validate the sustainability level of buildings and evaluate the extent to which certain buildings can be considered green. In their research, Eichholtz et al. (2009) indicate

that buildings with LEED or Energy Star green certification have lower operating costs, higher asset value, and are known for safer and healthier environments that they provide for tenants. In order to obtain the green certifications, buildings have to go through meticulous checks and score high in various criteria that often go beyond the initial environmental concern, which makes investing in green buildings a reliable and straightforward way to improve ESG performance for REITs.

Another approach to how REITs improve their ESG performance is by establishing sustainable internal management practices and goals. ESG-leading REITs align their acquisition strategies with specific sustainability goals laid out in a company's long-term plan. Many REITs have adopted net-zero emission targets, set energy intensity benchmarks, or committed to transforming their portfolios in response to specific social causes. GRESB (2023) reports that a growing number of listed real estate companies, including REITs, are incorporating sustainability screening into M&A deals and capital expenditure decisions. These companies also increasingly tie executive compensation to ESG-related targets, such as emissions reductions or board diversity, embedding sustainability into business decision-making processes (Amel-Zadeh & Serafeim, 2018).

Finally, one more possible way to excel when it comes to ESG for REITs is transparency and a high degree of engagement with the market and the shareholders. Being publicly listed entities obligates REITs to disclose financial and non-financial risks, including those that are ESG related. However, being merely compliant vs. being proactive and fully transparent when it comes to ESG reporting creates a big difference. Many leading REITs voluntarily align with reporting frameworks such as TCFD (Task Force on Climate-related Financial Disclosures) and SASB (Sustainability Accounting Standards Board), offering investors a much deeper understanding of their ESG risks, goals, and performance. Krueger, Sautner, and Starks (2020) find that ESG transparency is positively associated with investor

trust and capital access. Moreover, the REITs that prioritize transparency are often open to active shareholder dialogue and respond positively to shareholder activism. Barko et al. (2022) report that shareholder activism around ESG has become more common and more effective over the years. In the real estate context, scrutiny from institutional investors pushes REITs to introduce advanced sustainability policies, integrate ESG into corporate strategy, and increase transparency around the results. The authors show that compared to their peers, firms that positively responded to shareholder activism demonstrated better ESG performance the following year, proving that market transparency and openness to engage in an investor dialogue are meaningful tools for achieving sustainability goals.

## **2.4 ESG and REIT Financial Performance**

The previous section discussed the ESG concept specifically in the context of real estate and REITs and described the actions that REITs take to perform well on ESG. This part of the research discusses whether those additional efforts merely satisfy the compliance requirements and create better publicity for REITs or have a meaningful impact on their financial performance.

### ***2.4.1 Theoretical Framework: ESG and Firm Performance***

Before diving deep into the discussion of previous empirical findings relating ESG and REIT financial performance, it is important to understand the possible existing links from the theoretical viewpoint. Exploring those links allows to explain the mechanisms through which ESG performance may influence value creation on a deeper level than the simple correlation, as well as provides a conceptual framework to interpret empirical findings in a broader academic context. Multiple theoretical frameworks offer insights into how ESG practices can impact firm performance. The most commonly applied among them include Stakeholder Theory, Signaling Theory, and the Resource-Based View (RBV), each of which provides its unique reasoning on why ESG can serve as a value-creating investment strategy.

**2.4.1.1 Stakeholder Theory.** Stakeholder theory, which was proposed by Freeman (1984), argues that firms create long-term value by addressing the needs and expectations of a broad set of stakeholders, including investors, employees, customers, suppliers, and the community around. While looking at it from ESG performance perspective, this implies that firms that prioritize sustainability, employee well-being, take care of communities, and design a proactive governance strategy are more likely to develop trust-based relationships, reduce reputational risks, and maintain a good social status (Freeman et al., 2007). In the context of real estate, such stakeholder involvement may result in a more stable, long-lasting relationship with tenants, easier regulatory cooperation, and greater leasing demand, which would eventually contribute to a better financial performance. For example, research by Eccles et al. (2014) found that companies labeled as “high sustainability” that have strong stakeholder-focused ESG practices significantly outperformed their peers in terms of both stock market and accounting measures over the long term.

**2.4.1.2 Signaling theory.** Signaling theory was proposed by Spence (1973), and it states that firms use observable actions and characteristics in order to convey information about hidden qualities to external parties. ESG performance, in this framework, can be viewed as a signal of managerial quality, forward-looking strategy, and lower operational risk. Investors can interpret extensive ESG practices as signs of proactive governance and long-term planning, which reduces potential risks and results in better access to capital for a firm. This is confirmed by a study of El Ghoul et al. (2011), who found that U.S. companies that invest in the improvement of responsible employee relations, environmental practices, and product strategies generally benefit from lower cost of equity capital. Similarly, Dhaliwal et al. (2011) demonstrated that voluntary disclosure of non-financial information such as CSR and ESG efforts is associated with lower analyst forecast error and stock price volatility, which suggests that the market views CSR and ESG transparency as a valuable signal.

**2.4.1.3 Resource-Based View (RBV).** The Resource-Based View (Barney, 1991) states that companies gain a competitive advantage through valuable, unique, and difficult to imitate internal characteristics. ESG characteristics, such as energy-efficient infrastructure, an enhanced relationship with the community, and transparent, goal-driven governance, fit the criteria of RBV. Indeed, in the context of real estate and REITs, those features tend to create a competitive advantage by reducing operating costs and enhancing reputational image. Fuerst & McAllister (2011) found that ESG-focused properties in the US enjoy rental and sale premiums as well as lower operating expenses, proving sustainability to be a valuable resource in the context of RBV.

#### ***2.4.2 Empirical evidence on ESG–REIT performance***

While the previous section suggests that, based on theoretical arguments, ESG practices should have a positive effect on long-term value creation in real estate, empirical evidence is not so straightforward. A growing number of academic studies have examined how ESG factors influence the performance of Real Estate Investment Trusts and the properties they hold. Those studies take various advanced approaches and utilize different methodologies, allowing scholars to assess how sustainability efforts translate into superior returns, lower costs of capital, better tenant relationships, or enhanced risk management. The results of those studies are mixed, and the evidence remains somewhat inconclusive: some scholars report clear financial benefits from ESG adoption, others claim effects to be neutral, and a number highlight potential additional costs or short-run underperformance. The following subsections review this evidence in depth.

**2.4.2.1 Positive evidence: ESG as a source of value creation.** Several studies provide strong evidence that ESG adoption has positive effects on companies' financial and operating performance. Henisz et al. (2019) analyzed the results of more than 2000 academic studies that focused on the impact of ESG on equity returns and found that an overwhelming

63% of those studies reported positive effects of ESG on equity returns, while only a small share of 8% discovered a negative correlation. Based on their review of existing research, the authors concluded that, “ESG links to cash flow in five important ways: (1) facilitating top-line growth, (2) reducing costs, (3) minimizing regulatory and legal interventions, (4) increasing employee productivity, and (5) optimizing investment and capital expenditures” (Henisz et al., 2019, p. 2). Those links, as stated by authors, allow companies with strong ESG profiles to achieve greater equity returns, both from a tilt and momentum perspective, as well as to reduce the downside risk, which is evidenced by lower loan and credit default swap spreads and enhanced credit ratings.

As for the effects of ESG performance specifically for real estate and REITs, numerous studies provide similar evidence and highlight specific links in which a focus on sustainability leads to improved financial results. Eichholtz et al. (2012), for instance, demonstrate a positive relationship between the proportion of environmentally certified properties owned by the US REITs and their return on assets, return on equity, and operating income to revenue ratio. Morri et al. (2020) echo these results by providing identical conclusions about the correlation of portfolio greenness and ROA, ROE, and operating performance of European REITs. Kats (2003) states that investing in green buildings has a substantial economic benefit due to their lower operating cost and higher appeal to tenants. Eichholtz et al. (2012) also emphasize that greener REITs display lower market betas, suggesting a significantly lower level of investment risk. Altogether, these findings highlight a key connection that links ESG to company value: certified buildings tend to attract higher-quality tenants, achieve better occupancy, and yield higher revenues from rent and sales. This is confirmed by another research of Eichholtz et al. (2009), which shows that buildings that have green certification tend to rent for around 7% more and sell for as much as 16% more compared to non-green certified buildings. Moreover, complementary evidence from Fuerst

and McAllister (2011) states that green buildings earn rental premia of 3–5% and sales price premia of nearly 20%, suggesting that sustainability efforts are capitalized directly into real estate values.

Beyond the direct impact on property values and returns, ESG practices also appear to affect other aspects of REITs' operations and performance. Feng and Wu (2021) examined a global sample of REITs and found that those with higher ESG disclosure enjoy a lower cost of debt, higher credit ratings, and greater reliance on unsecured borrowing. This effect is especially noticeable during periods of market stress, such as the COVID-19 pandemic, when lenders placed additional emphasis on transparency and resilience. Chiang et al. (2019) revealed that REITs that are more engaged in ESG initiatives present a lower book-to-market ratio, which indicates opportunities for potential higher growth. Active participation in industry ESG benchmarking initiatives, such as GRESB, has also been associated with enhanced performance: REITs that participate in GRESB tend to outperform their non-participating peers based on financial metrics (Devine et al., 2023). These outcomes suggest that ESG transparency helps REITs to gain better access to the capital markets, creates potential for growth, and allows for greater financial flexibility within the company.

It is also worth noting that aside from the effects of the overall ESG score and the specific benefits of enhancing E factor through green properties, a substantial number of researchers also highlight the positive impact of S factor on REITs' performance. The Social dimension of ESG is concerned with tenant well-being and satisfaction and is closely linked to occupancy stability and hence to cash-flow predictability. Hu et al. (2024) prove that higher tenant satisfaction significantly reduces the probability of non-renewal, thereby increasing income stability for properties that prioritize the social aspect. Fan et al. (2024) claim that REITs with higher Social scores tend to achieve better returns and market valuations. According to the authors, this is because socially responsible REITs are viewed as

having substantially lower fundamental risk among investors. Erol et al. (2023) provide the identical results in their study, explaining that stock market investors attach a higher value to REITs' social investment and are willing to pay a premium on it due to a perceived better risk mitigation. Altogether, those findings suggest that social initiatives such as a healthier environment or greater community engagement serve as a powerful mechanism that allows REITs to achieve better cash flow predictability, lower perceived risk, and eventually convert into other tangible performance benefits.

**2.4.2.2 Neutral and mixed findings: the role of measurement and context.** Despite the prevailing results that signify a positive relation between ESG and REIT performance, some studies report mixed or neutral findings. For example, Lee and Chow (2025) found that ESG investment only benefits REITs' operational performance when it increases from low to medium, but a switch from medium to high degree of ESG investment has a harmful effect on the firm. Furthermore, the research of Halbritter and Dorfleitner (2015) shows that there is no significant difference in returns when comparing companies with high and low ESG ratings. The study explains that even though several ESG variables appear significant based on a regression analysis, in practice, their effect is minimal, and investors should not expect to receive different returns while trading high and low ESG portfolios. According to the authors, the main reason for neutral results and preventing investors from exploiting ESG benefits is the inconsistency in rating methodologies, as well as market and time frame conditions. Moreover, the impact of each of the individual ESG factors also tends to be mixed. For example, Fan et al. (2024) investigate U.S. REITs and find that the effects of ESG vary considerably across pillars: better environmental performance is associated with lower subsequent equity returns, while improved social performance is related positively with profits and other firm fundamentals. Governance, on the other hand, demonstrates weaker or

context-dependent results. Collectively, these findings suggest that ESG might be significant in many instances, but its effects lack consistency and are neither universal nor guaranteed.

**2.4.2.3 Negative evidence: costs and underperformance.** A smaller but nonetheless important body of work finds that ESG adoption can, in fact, negatively impact REIT performance. Neo et al. (2025) analyze 413 REITs worldwide between 2018 and 2022 and find that ESG-rated REITs underperformed non-rated peers by up to 2.4% per month in price returns and 1.7% in total returns. The authors partially explain this gap by referencing higher compliance costs and the possibility that ESG characteristics are already priced into assets, leading to lower excess returns. Even more drastically, after analysing 2019-2021 GRESB ESG performance data, Chacon et al. (2023) conclude that better ESG scores are related to lower firm value and lower operating cash flows. Furthermore, they also claim that REITs with stronger ESG performance exhibit a higher degree of company risk. According to the authors, such results suggest that, “REIT management may overinvest in ESG activities at the expense of shareholder value” (Chacon et al., 2023, p.1). In addition to these findings, a substantial amount of research underlines that it is specifically the E factor that often causes the negative effect. Strong environmental performance often requires significant expenditures to reach energy-efficiency upgrades or carbon reduction targets, which subsequently drains REIT capital and leads to decreasing market returns (Erol et al., 2023; Fan et al., 2024). To conclude, these negative results suggest that ESG may impose short-run costs, especially in the case of environmental investments where costs are upfront but financial benefits show only in the long term. Moreover, based on the aforementioned findings, one can also conclude that investors may price in the sustainability factor for REITs, hence reducing the possibility for excess returns.

Taken together, the empirical evidence suggests that ESG factors influence REIT performance in multiple ways, including property-level cash flows, financing costs, tenant

relationships, and investor perceptions. The prevailing majority of existing evidence claims that enhanced ESG practices benefit REIT financial performance. However, the relationship is not consistently positive as effects vary based on individual ESG pillar, market context, and time horizon, with some studies claiming neutral or even negative financial outcomes, especially in the short run. Hence, the complexity and inconsistency of results creates a need for further empirical research.

## **2.5 Hypotheses Development**

Based on the literature reviewed, this research develops hypotheses regarding the relationship between ESG performance and REIT returns. Given that ESG is multidimensional, both the aggregate ESG score and the individual environmental, social, and governance pillars are examined.

### **Overall ESG Scores**

Prior studies suggest that firms with higher ESG scores may benefit from lower risk premiums, reduced financing costs, and enhanced tenant demand. However, mixed evidence remains on whether these benefits consistently lead to higher stock returns. Nevertheless, given the overwhelming majority of positive results, this study takes a stance of claiming that enhanced ESG performance does, in fact, increase returns.

***H1: Higher overall ESG scores are positively associated with REIT returns.***

### **Environmental Dimension**

Green-certified buildings are associated with lower operating expenses, higher occupancy, and price premia (Eichholtz et al., 2010; Fuerst & McAllister, 2011). These findings suggest that environmental efforts may contribute to higher returns.

***H2: Stronger environmental performance is positively associated with REIT returns.***

### **Social Dimension**

Social factors such as tenant satisfaction and community engagement are highlighted in previous research and said to be related to a better company valuation, increased returns, and lower fundamental risk (Fan et al., 2024; Erol et al., 2023). Therefore, this research echoes the same view.

***H3: Stronger social performance is positively associated with REIT returns.***

### **Governance Dimension**

In a REIT context, the effectiveness of the Governance factor received limited attention from researchers. However, in a practical business setting, sustainable governance practices such as transparent board structures, consistent communication with shareholders, and an ethical work culture are crucial for a company's long-term success. Hence, this study hypothesizes that the governance pillar also has a positive effect on REIT performance.

***H4: Stronger governance performance is positively associated with REIT returns.***

## **2.6 Summary and Next Steps**

This chapter has reviewed the theoretical and empirical foundations of real estate investment, the concept of REITs as investment vehicles, and the growing importance of Environmental, Social, and Governance (ESG) considerations in capital markets. The discussion established that REITs are not only financial intermediaries but also a driving force for improving sustainability in real estate.

The literature indicates that ESG has the potential to influence REIT performance through several channels. From a theoretical perspective, stakeholder theory suggests that stronger ESG practices can build trust and lower reputational and regulatory risks. Signaling theory implies that ESG activities may indicate to the market about companies' efforts, quality, and commitment, attracting long-term investors. Resource-based theory highlights that ESG attributes such as green building certifications or tenant engagement are valuable, rare, and hard-to-imitate resources that may provide a competitive advantage.

From an empirical perspective, studies provide mixed evidence. A significant number of studies suggest that ESG practices can enhance financial performance by reducing operating costs, improving tenant retention, lowering financing costs, and risk in downturns (e.g., Eichholtz et al., 2010; Devine et al., 2023; Eichholtz et al., 2009). Others find neutral or insignificant results, and a smaller amount of research even identifies negative effects, particularly when ESG initiatives increase the expenditure at the loss of shareholder value (Neo et al., 2025; Chacon et al., 2023).

Overall, the evidence underscores both the importance and the inconclusiveness of ESG's financial relevance for REITs. While ESG is without any doubt a significant factor that investors take into account nowadays, its usefulness in terms of improving financial performance remains contested. Therefore, this creates a need for further empirical testing, particularly with respect to REITs, which are both asset-heavy and highly exposed to sustainability-related risks and opportunities. The next sections lay out the methodology that this study employs for empirical testing and discuss the testing results, as well as provide an overview of the limitations of the study and give recommendations regarding further research on the topic.

## Chapter 3. Methodology

### 3.1 Research Design

This study investigates the relationship between Environmental, Social, and Governance (ESG) performance and the financial performance of Real Estate Investment Trusts (REITs). The main goal of the research is to determine whether REITs with higher ESG scores achieve superior stock returns compared to their peers, and whether the individual pillars of ESG (E, S, and G) have differential effects on REIT returns.

This study utilizes panel data on REITs for the analysis, and hence its research design can be characterized as quantitative, panel regression that captures both cross-sectional and historical variations across REITs. Panel regressions are widely employed in ESG–finance research because they control for unobserved heterogeneity across firms and allow for the identification of historical dynamics (Wooldridge, 2010). As part of the panel data analysis, fixed effects (FE) and random effects (RE) models are applied, with Hausman tests used to determine the more appropriate estimator.

Based on the limitations related to data availability, the study also chooses to implement a dual sample approach. First, regressions are conducted with a bigger sample of 371 REITs — all 386 ESG-rated REITs available on Bloomberg, less the 15 that were deemed ineligible for analysis due to missing data on returns and leverage. However, a limitation of a bigger sample is that the majority of those REITs only have 4 years of ESG rating history (2021-2024). Given that ESG improvements might have a delayed impact on REIT's financials, this creates the need for a robustness check in the form of lagged regressions, and 4 historical data points per REIT are not sufficient for running such an analysis and making reliable conclusions. Hence, a robustness check of 1-year lagged regression is performed with a smaller sample of 152 REITs, for which 10 years worth of ESG data is available (2015-2024). Such an approach addresses the trade-off between the

breadth and the depth of the study, allowing for the achievement of greater external validity by analyzing wider cross-sectional samples while also accounting for the possible time-dynamics of ESG effects.

### **3.2 Data Sources**

This study uses secondary data, and the main source for its obtainment is the Bloomberg Terminal, from which all financial and ESG indicators were extracted. Bloomberg's ESG database aggregates sustainability information from company reports, third-party providers, and direct disclosure, which ensures consistency and comparability across firms. Financial variables such as REIT total annualized returns, market capitalization, and leverage ratios were also retrieved from Bloomberg. Finally, market indicators extracted from the platform include the S&P 500 total annual returns as an approximation for market performance and the 3-month U.S. Treasury Bill yield as an approximation of the risk-free rate. These variables are standard in asset pricing literature (Fama & French, 1993) and allow estimation of systematic risk and excess returns.

### **3.3 Sample Selection**

In total, there are 1326 REITs available on the Bloomberg Terminal. However, the majority of them are ESG-rated. Hence, the selected sample consists of 371 REITs with available Bloomberg ESG scores listed across multiple global markets. For 152 of these REITs, ESG data is consistently available for 10 years (2015–2024). For the remaining firms, ESG coverage is only available for the last 4 years (2021-2024), reflecting Bloomberg's expansion of ESG coverage over time.

In order to balance between the coverage that the study makes and the depth of its historical analysis, the samples are used in the following way:

- The full sample (371 REITs, 4 years of data) is used for the baseline regression analysis.
- The subsample filtered based on the availability of historical data (152 REITs, 10 years of data) is used for lagged regressions and robustness checks.

### 3.4 Variable Construction

#### 3.4.1 Dependent Variable: REIT Performance

The dependent variable is the annual total return for each REIT, obtained from Bloomberg's Total Return Index (TR), which incorporates both price appreciation and dividends. Excess returns are calculated as:

$$R_{i,t}^{excess} = R_{i,t} - R_{f,t}$$

where  $R_{\{i,t\}}$  is the REIT's annual return and  $R_{\{f,t\}}$  is the annualized 3-month Treasury Bill rate.

#### 3.4.2 Independent Variables: ESG Scores

This study utilizes 4 independent variables: overall ESG score for the combined effect regression, as well as individual E, S, and G scores to explore the financial impact of each pillar separately. All four of those variables are evaluated in Bloomberg on a scale from 0 to 10, with 10 being the best. Both same-year and lagged ESG variables are used to capture potential delayed effects of ESG efforts on REIT performance.

#### 3.4.3 Control Variables

To mitigate omitted variable bias and ensure that the relationship between ESG performance and REIT returns is not driven by any other firm or market characteristics, several control variables are included in the regressions. The choice of controls is based on the review of existing empirical research on the topic and includes the following variables:

- Market capitalization (log): firm size is an important factor that has a direct impact on the financial performance of a company. Larger REITs generally benefit from

economies of scale and have easier access to capital (Embong et al., 2012). Hence, this benefits their ability to invest in sustainability initiatives, which may in turn affect their returns.

- Leverage ratio (Debt/Equity): leverage shows the financial structure of the company and its risk exposure. Highly leveraged REITs face greater constraints when financing sustainability projects and may also be more exposed to volatility in returns (Li, 2012).
- Market return (S&P 500 Total Return Index): allows to control for systematic market risk. REIT returns are partly driven by broader equity market movements so including market returns in the model helps to account for that factor.
- Risk-free rate (3-month U.S. Treasury Bill). The risk-free rate is used in calculating excess returns and also serves as a macroeconomic control, which reflects the global interest rate developments.

By including these control variables, the analysis isolates the effect of ESG performance on REIT returns, reducing the risk of biased results.

### 3.5 Empirical Model

#### 3.5.1 Baseline Model

The model uses panel regression to assess whether ESG performance is associated with REIT excess returns. The dependent variable is the excess return of REIT  $i$  in year  $t$ :

$$R_{i,t}^{excess} = R_{i,t} - R_{f,t}$$

The baseline regression is defined as following:

$$R_{i,t}^{excess} = \alpha + \beta_1 ESG_{i,t} + \beta_2 Size_{i,t} + \beta_3 Leverage_{i,t} + \beta_4 MktRet_t + \epsilon_{i,t}$$

where:

- $ESG_{i,t}$  = ESG score of REIT at time  $t$  (overall score),
- $Size_{i,t}$  = natural log of market capitalization,
- $Leverage_{i,t}$  = leverage ratio (debt-to-equity),

- $MktRet_t$  = market return in year  $t$ ,
- $\epsilon_{i,t}$  = error term.

In addition to the overall ESG score, regressions are also estimated for the individual effects of Environmental, Social, and Governance sub-scores. Combined regression is run for the three factors after verifying the absence of multicollinearity:

$$R_{i,t}^{excess} = \alpha + \beta_1 E_{i,t} + \beta_2 S_{i,t} + \beta_3 G_{i,t} + \beta_4 Size_{i,t} + \beta_5 Leverage_{i,t} + \beta_6 MktRet_t + \epsilon_{i,t}$$

This allows to identify whether specific ESG factors have a stronger impact on financial performance than the overall score.

### 3.5.2 Lagged Model

The relationship between ESG and financial performance may not show up instantly, as sustainability investments often require time before they have a measurable impact on financial results. To capture potential delayed effects, lagged regressions are estimated using the subsample of REITs with complete 10-year ESG historical scores:

$$R_{i,t}^{excess} = \alpha + \beta_1 ESG_{i,t-1} + \beta_2 Size_{i,t} + \beta_3 Leverage_{i,t} + \beta_4 MktRet_t + \epsilon_{i,t}$$

Similarly to baseline case, lagged regressions are run for the individual E, S, and G components:

$$R_{i,t}^{excess} = \alpha + \beta_1 E_{i,t-1} + \beta_2 S_{i,t-1} + \beta_3 G_{i,t-1} + \beta_4 Size_{i,t} + \beta_5 Leverage_{i,t} + \beta_6 MktRet_t + \epsilon_{i,t}$$

### 3.6 Robustness Checks

This study implements several robustness checks to ensure reliability of findings. First of all, it uses alternative ESG measures, analyzing both the effects of the overall ESG scores and the individual E, S, and G sub-scores, which provides a more in-depth insights into the effects of sustainable practices on REIT financial performance. Secondly, the study employs two samples in order to get a more reliable view of both cross-sectional and historical ESG dynamics. Finally, it uses lagged models to assess the possible delayed ESG effects on REIT returns.

### **3.7 Software and Implementation**

Bloomberg data is imported in Excel format, cleaned, and transformed into panel layout with REIT identifiers and years as indices to make it appropriately structured for further analysis. All analyses are conducted in Python (Anaconda distribution). In the course of the analysis pandas and numpy libraries are used for data management, statsmodels for baseline regression analysis, linearmodels for panel data estimation (FE, RE, Hausman test), and matplotlib for visualization. The results of the analysis are then summarized and discussed in the next section of this research.

## Chapter 4. Analysis

This chapter presents the results of the empirical analysis conducted in Python and provides a detailed overview of the findings. The analysis is based on two datasets: the full sample (referred to as the “big sample”) and a restricted 10-year sample designed for a robustness check via the lagged regression.

The chapter begins with descriptive statistics and diagnostic checks, including summary charts, a correlation matrix, and a multicollinearity assessment. Afterwards, panel regression models that examine the relationship between excess returns and ESG performance are presented. Both the overall ESG score and its individual factors (environmental, social, and governance) are analyzed. For each regression, both fixed-effects and random-effects models are conducted, followed by a Hausman test that helps to determine the preferred model. In addition, robustness analyses are carried out using the 10-year subsample with lagged ESG variables (152 REITs observed over 2015–2024) to evaluate the consistency of the results. The results are interpreted with reference to the underlying hypotheses about the relationship between ESG factors and the financial performance of the real estate investment trusts.

### 4.1 Descriptive Statistics — Big Sample

The big sample comprises 1,492 firm-year observations of Real Estate Investment Trusts (REITs) across multiple countries and over a four-year period. This dataset provides a comprehensive foundation for examining the relationship between environmental, social, and governance (ESG) performance of REITs and their stock returns.

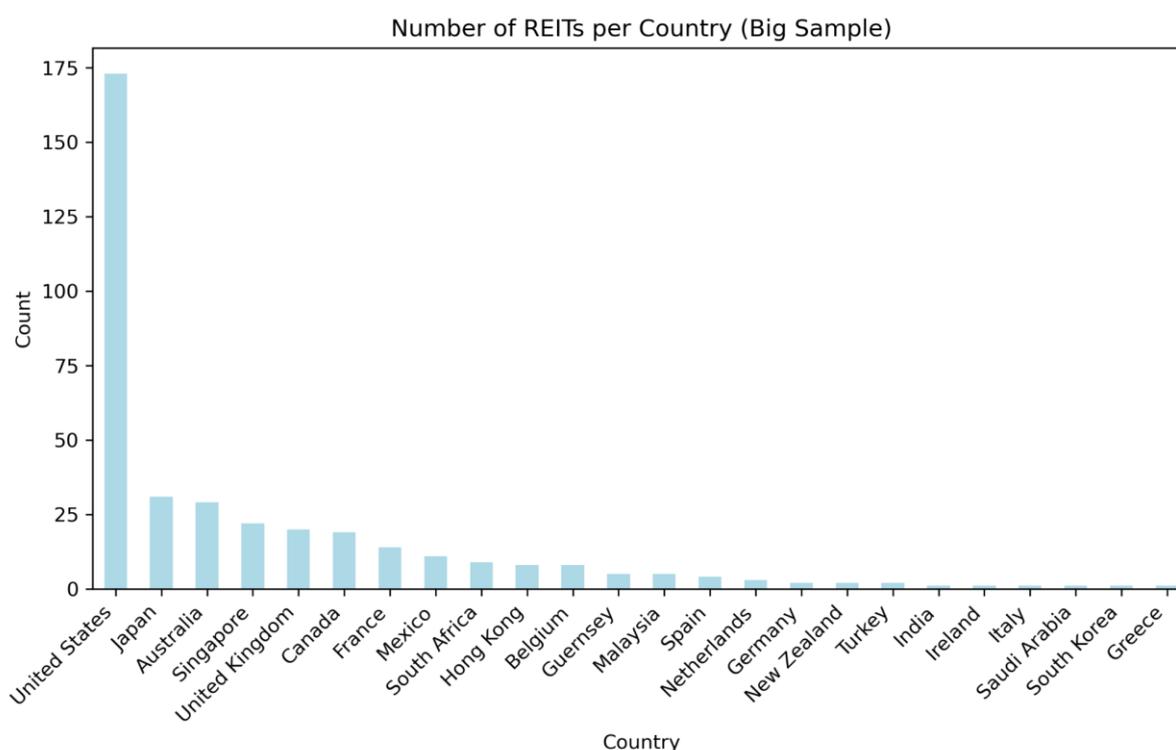
#### 4.1.1 Country Distribution of REITs — Big Sample

The big sample includes REITs from a total of 24 countries across the world. As can be seen from Figure 1, the United States has the biggest representation in the dataset, with 173 REITs coming from the country, which reflects the size and maturity of the U.S. REIT

market. Other significant countries include Japan (31), Australia (29), Singapore (22), and the United Kingdom (20), while the remaining countries have a comparatively smaller representation. Such a distribution both highlights the importance of developed markets in shaping the overall results of the study and reveals the relatively limited presence of REITs in emerging markets.

**Figure 1**

*REITs Distribution by Country — Big Sample*



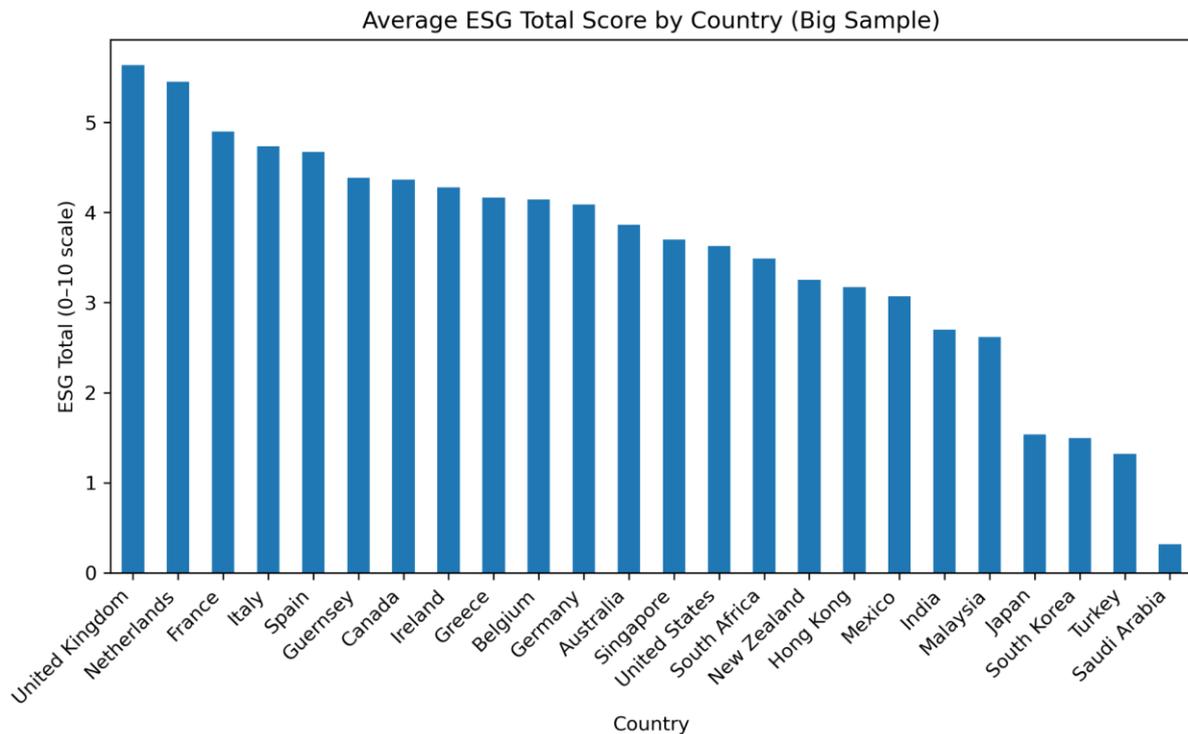
*Data Source: Bloomberg Terminal*

Despite being the number one country in terms of REIT quantity, the US loses its leadership to the European counterparts based on the average ESG scores of REITs by country. Figure 2 demonstrates that on the overall ESG scale of 0-10, countries such as the United Kingdom, the Netherlands, France, and Italy display the highest average ESG ratings. These results suggest a stronger focus on sustainability within those markets. In contrast, countries such as Saudi Arabia, Turkey, and South Korea have the lowest average ESG

scores, which indicates a lesser degree of adoption of ESG practices among their REITs. The overall variation of ratings across countries reflects different regulatory environments, investor pressures, and cultural attitudes toward sustainability in various regions.

## Figure 2

*Average ESG Total Score by Country — Big Sample*



*Data Source: Bloomberg Terminal*

### **4.1.2 Summary Statistics and Diagnostic Checks — Big Sample**

Table 1 reports the summary statistics for the main financial and ESG variables. The average excess return for the sample is 0.018. It has a standard deviation of 0.322, which indicates substantial variation in REIT performance. The mean ESG total score is 3.65, with the governance pillar individual score (mean 5.93) being significantly higher than the environmental (mean 2.31) and social (mean 4.35) scores, suggesting that REITs are generally more focused on their governance practices rather than on environmental and social performance.

The average market capitalization is approximately USD 5.2 billion, although it varies considerably across the sample, ranging from USD 18 million to USD 133 billion. Leverage averages 2.12, with a maximum of nearly 196, reflecting differences in financing structures of the analyzed REITs. The market return (Mkt\_Return) variable has an average of 0.158, while the risk-free rate (RF) is close to zero, which is consistent with the low-interest-rate environment that took place during most of the sample period.

**Table 1**

*Descriptive Statistics — Big Sample*

	Return	ESG_Total	E_Score	S_Score	G_Score	MarketCap	Leverage	Mkt_Return	RF	ExcessReturn	LogMarketCap
<b>count</b>	1,492.0000	1,492.0000	1,492.0000	1,492.0000	1,492.0000	1,492.0000	1,484.0000	1,492.0000	1,492.0000	1,492.0000	1,492.0000
<b>mean</b>	0.0486	3.6497	2.3110	4.3475	5.9309	5,193.1895	2.1210	0.1576	0.0309	0.0177	7.5235
<b>std</b>	0.3176	1.5603	1.7275	2.6086	2.0905	11,847.1003	11.9883	0.1960	0.0217	0.3220	1.4105
<b>min</b>	-0.9333	0.2400	0.0000	0.0000	0.6767	18.4875	0.0000	-0.1813	0.0004	-0.9843	2.9171
<b>25%</b>	-0.1229	2.2000	0.8348	1.5300	5.0775	773.0931	0.5563	0.1475	0.0153	-0.1604	6.6504
<b>50%</b>	0.0245	3.7100	2.2000	4.2300	6.4700	1,806.5867	0.8010	0.2623	0.0356	-0.0106	7.4992
<b>75%</b>	0.1984	4.9200	3.5743	6.7500	7.4600	4,504.6725	1.1947	0.2724	0.0512	0.1645	8.4129
<b>max</b>	4.8790	7.2900	8.8519	10.0000	9.1005	133,208.5064	195.7849	0.2868	0.0518	4.8272	11.7997

Table 2 presents the correlation matrix of the main variables. As can be seen, the ESG Total score is strongly correlated with its underlying pillars, particularly with the Environmental (0.85), Social (0.78), and Governance (0.59) factors, which is expected as the total score aggregates the individual ones. As for the control variables, firm size (LogMarketCap) shows moderate positive correlations with the ESG Total score (0.44) and the Environmental factor (0.42). This result suggests that larger firms tend to achieve higher ESG ratings, particularly when it comes to environmental performance. In contrast, leverage shows slightly negative correlations with most of the ESG variables. Excess Return has low correlations with the ESG factors, which indicates a limited direct relation at this stage. However, it is more strongly correlated with market return (0.39), which is expected.

**Table 2**

*Correlation Matrix — Big Sample*

	ExcessReturn	ESG_Total	E_Score	S_Score	G_Score	LogMarketCap	Leverage	Mkt_Return
ExcessReturn	1.0000	-0.0239	-0.0489	0.0111	0.0160	0.1762	-0.0933	0.3886
ESG_Total	-0.0239	1.0000	0.8476	0.7760	0.5916	0.4380	-0.1029	0.0134
E_Score	-0.0489	0.8476	1.0000	0.5752	0.1366	0.4221	-0.1204	0.0061
S_Score	0.0111	0.7760	0.5752	1.0000	0.3591	0.3992	-0.1146	0.0254
G_Score	0.0160	0.5916	0.1366	0.3591	1.0000	0.1762	0.0127	0.0062
LogMarketCap	0.1762	0.4380	0.4221	0.3992	0.1762	1.0000	-0.1285	0.0294
Leverage	-0.0933	-0.1029	-0.1204	-0.1146	0.0127	-0.1285	1.0000	0.0106
Mkt_Return	0.3886	0.0134	0.0061	0.0254	0.0062	0.0294	0.0106	1.0000

Overall, the correlations suggest no immediate concern of collinearity. However, to further confirm these results, the variance inflation factor (VIF) test is conducted, and its results prove the absence of multicollinearity between variables (see Appendix A: VIF Test Results).

#### 4.2 Impact of Total ESG Scores on REIT Returns — Big Sample

The first regression analysis analyzes the relationship between overall ESG scores and excess REIT returns. Both fixed effects (FE) and random effects (RE) models are estimated, and a Hausman test is applied to determine the appropriate approach. Based on the results of the Hausman test, the null hypothesis is rejected ( $p$ -value = 0.000), which indicates that the FE model is more suitable for the purpose. Therefore, the FE results are discussed below, while the RE results can be found in Appendix B for further reference.

As can be seen from Table 3, the fixed effects model displays an R-squared of 0.4161. This result suggests that approximately 42% of the variation in REIT excess returns within entities can be explained by the independent variables of the model. Such a relatively high result suggests that, altogether, ESG scores, firm size, leverage, and market returns account for a substantial portion of within-firm return dynamics.

The FE model shows a statistically significant negative relation between the overall ESG scores and REIT excess returns. The coefficient for ESG\_Total is  $-0.1105$  ( $p < 0.01$ ), which suggests that a one-point increase in the ESG score (on a 0–10 scale) is associated with

a decrease of approximately 0.11 or 11% in excess returns. This finding is robust and highly significant as it contradicts the positive relationship expected initially.

**Table 3**

*Impact of Total ESG Scores on REIT Returns — Fixed Effects Model*

PanelOLS Estimation Summary						
Dep. Variable:	ExcessReturn	R-squared:	0.4161			
Estimator:	PanelOLS	R-squared (Between):	-511.69			
No. Observations:	1484	R-squared (Within):	0.4161			
Date:	Sun, Sep 07 2025	R-squared (Overall):	-107.61			
Time:	19:25:44	Log-likelihood	148.78			
Cov. Estimator:	Clustered					
		F-statistic:	197.61			
Entities:	371	P-value	0.0000			
Avg Obs:	4.0000	Distribution:	F(4,1109)			
Min Obs:	4.0000					
Max Obs:	4.0000	F-statistic (robust):	168.17			
		P-value	0.0000			
Time periods:	4	Distribution:	F(4,1109)			
Avg Obs:	371.00					
Min Obs:	371.00					
Max Obs:	371.00					
Parameter Estimates						
	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
ESG_Total	-0.1105	0.0222	-4.9827	0.0000	-0.1540	-0.0670
LogMarketCap	0.4839	0.0454	10.654	0.0000	0.3948	0.5731
Leverage	-0.0010	0.0005	-1.9964	0.0461	-0.0019	-1.668e-05
Mkt_Return	0.5460	0.0329	16.605	0.0000	0.4815	0.6105
F-test for Poolability: 2.2097						
P-value: 0.0000						
Distribution: F(370,1109)						

The control variables behave as anticipated. Firm size, represented by LogMarketCap, demonstrates a strong, positive, significant effect (coefficient = 0.4839,  $p < 0.01$ ). This suggests that larger REITs are generally associated with higher excess returns. Similarly, market returns (Mkt\_Return) also exhibit a highly significant positive impact (coefficient = 0.5460,  $p < 0.01$ ), which is an expected behavior for the variable. Leverage, on the other hand, is negatively related to the excess returns, but its effect is only mildly significant.

Overall, the results provide strong evidence that higher ESG scores are associated with lower, and not higher, REIT excess returns during the sample period. Therefore, Hypothesis 1, which states that higher overall ESG scores are positively associated with REIT returns, is rejected.

#### **4.3 Impact of Individual E, S, and G Scores on REIT Returns — Big Sample**

To further investigate the role of sustainability in real estate, the effects of the individual environmental (E), social (S), and governance (G) scores on REIT returns are examined. Both fixed effects (FE) and random effects (RE) regressions are estimated, and the Hausman test is conducted to determine the more appropriate model. The Hausman test reveals that the FE model is preferred ( $p = 0.000$ ). Hence, the results of the FE model are discussed below, while RE estimates are available in Appendix C.

As demonstrated in Table 4, the fixed effects regression has an R-squared value of 0.417, suggesting that the model explains approximately 41.7% of the variation in REIT excess returns. This indicates a reasonably strong explanatory power in comparison to typical panel data regression models in financial research.

As can be seen in the table, the coefficient of the environmental pillar is negative and statistically significant (coefficient = -0.0395,  $p = 0.012$ ), implying that higher environmental scores are associated with lower REIT excess returns. This contradicts the initial expectation that stronger environmental performance is positively associated with REIT returns. As a result of these findings, Hypothesis 2 is rejected.

Similarly, the social pillar also shows a significant negative relation with the excess returns (coefficient = -0.0318,  $p < 0.001$ ). This suggests that efforts related to the improvement of the social aspect of ESG, while most likely are beneficial for stakeholders, do not provide immediate financial benefits for REITs. Therefore, Hypothesis 3, which

claims that stronger social performance is positively associated with REIT returns, is also rejected.

Finally, the Governance pillar is also negatively associated with excess returns, but its effect is weaker and not statistically significant (coefficient = -0.0396,  $p = 0.095$ ). Even though the coefficient is negative as for the other two pillars, the fact that it's insignificant suggests that the governance factor has a limited effect on REIT returns. Therefore, Hypothesis 4 is also rejected.

**Table 4**

*Impact of E, S, and G Scores on REIT Returns — Fixed Effects Model*

PanelOLS Estimation Summary						
=====						
Dep. Variable:	ExcessReturn	R-squared:				0.4168
Estimator:	PanelOLS	R-squared (Between):				-498.40
No. Observations:	1484	R-squared (Within):				0.4168
Date:	Mon, Sep 08 2025	R-squared (Overall):				-104.80
Time:	07:05:17	Log-likelihood				149.55
Cov. Estimator:	Clustered					
		F-statistic:				131.83
Entities:	371	P-value				0.0000
Avg Obs:	4.0000	Distribution:				F(6,1107)
Min Obs:	4.0000					
Max Obs:	4.0000	F-statistic (robust):				112.11
		P-value				0.0000
Time periods:	4	Distribution:				F(6,1107)
Avg Obs:	371.00					
Min Obs:	371.00					
Max Obs:	371.00					
Parameter Estimates						
=====						
	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
-----						
E_Score	-0.0395	0.0157	-2.5129	0.0121	-0.0703	-0.0087
S_Score	-0.0318	0.0095	-3.3522	0.0008	-0.0504	-0.0132
G_Score	-0.0396	0.0237	-1.6685	0.0955	-0.0862	0.0070
LogMarketCap	0.4860	0.0456	10.651	0.0000	0.3965	0.5755
Leverage	-0.0009	0.0005	-1.9024	0.0574	-0.0019	2.932e-05
Mkt_Return	0.5493	0.0330	16.662	0.0000	0.4846	0.6140
=====						

F-test for Poolability: 2.1710

P-value: 0.0000

Distribution: F(370,1107)

The results of the control variables, on the other hand, align with prior expectations. Firm size once again shows a positive and highly significant relationship with returns (coefficient = 0.486,  $p < 0.001$ ). Leverage exhibits a weak negative effect (coefficient = -0.0009,  $p = 0.057$ ), which is rather insignificant, while the market return (coefficient = 0.549,  $p < 0.001$ ) strongly and positively relates to REIT excess returns.

Overall, the results indicate that higher scores in individual environmental, social, and governance pillars are not associated with higher REIT returns. In fact, the environmental and social dimensions are significantly negatively related to excess returns, while the governance factor is rather insignificant. These findings provide strong evidence to reject H2, H3, and H4, and suggest that better ESG pillar performance doesn't drive REIT financial performance.

#### **4.4 Descriptive Statistics — 10 Year Subsample**

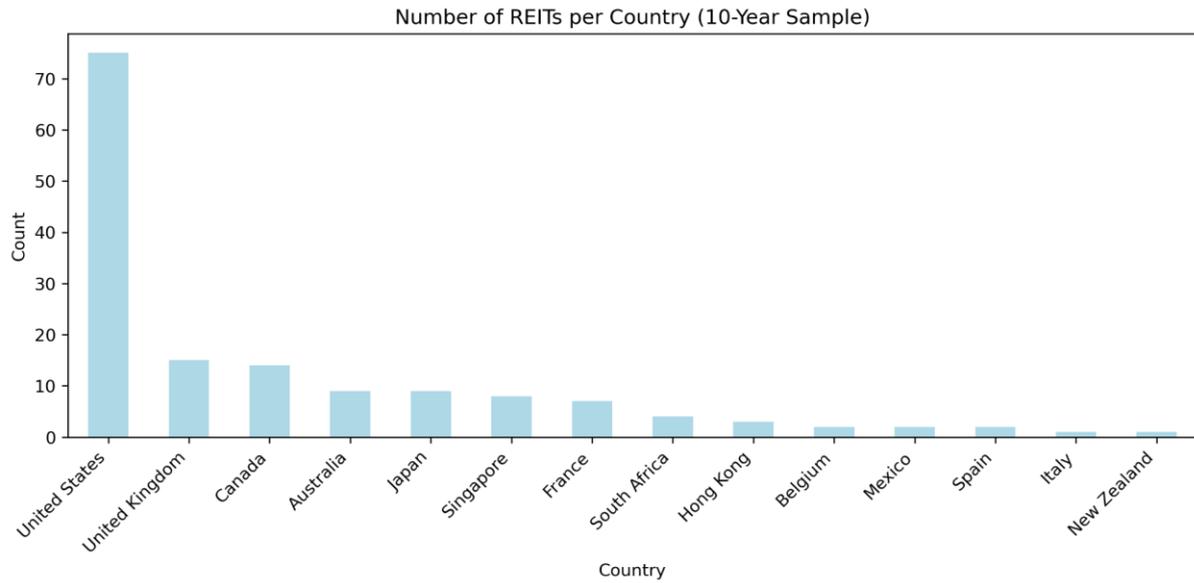
To ensure robustness of the results, a restricted subsample of 152 REITs with ESG data available for the period 2015–2024 is analyzed separately. This subsample is particularly designed to conduct the lagged regression models, with ESG scores at  $t-1$ , as ESG performance may have a delayed effect on REIT returns.

##### ***4.4.1 Country Distribution of REITs — 10 Year Subsample***

Similarly to the big sample, the United States dominates the restricted subsample, accounting for nearly half of the REITs (Figure 3). However, compared to the big sample, the relative representation of other countries increases with the United Kingdom, Canada, Australia, and Japan. Smaller but notable contributions also come from Singapore, France, South Africa, and Hong Kong, while the remaining countries, including Belgium, Mexico, Spain, Italy, and New Zealand, are represented only by a few firms, which suggests lesser development of the REIT market in those regions.

#### **Figure 3**

*REITs Distribution by Country — 10 Year Subsample*

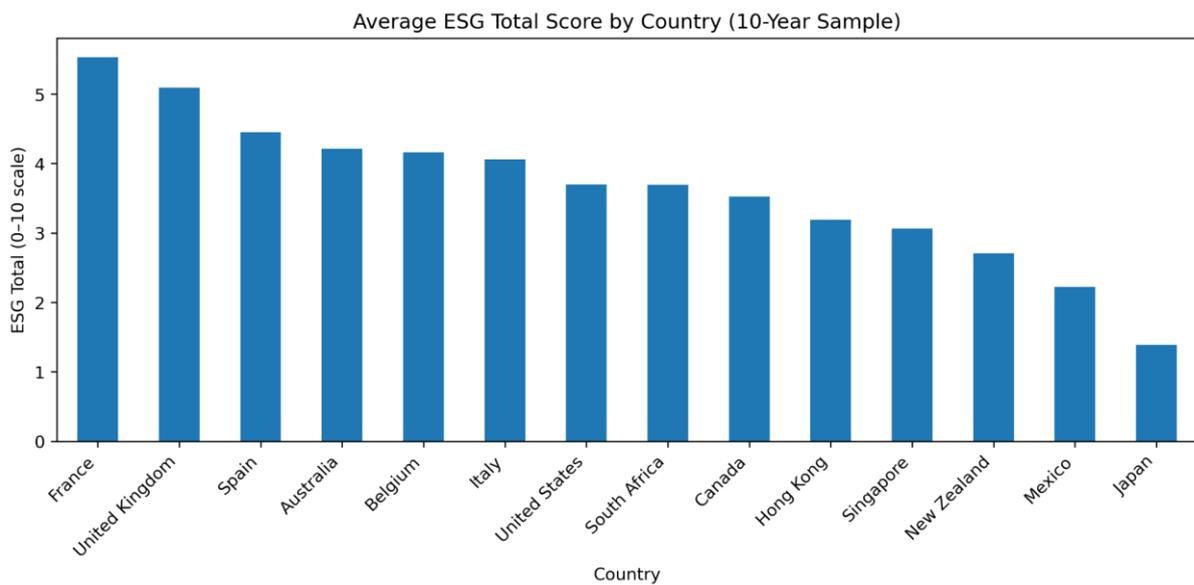


*Data Source: Bloomberg Terminal*

Figure 4 shows the average total ESG scores by country for the 10-year subsample. Consistently with the big sample, European countries such as France, the United Kingdom, and Spain lead with the highest average scores, while the US and Asian markets demonstrate weaker ESG performance.

**Figure 4**

*Average ESG Total Score by Country — 10 Year Subsample*



*Data Source: Bloomberg Terminal*

#### **4.4.2 Summary Statistics and Diagnostic Checks — 10 Year Sample**

Descriptive statistics for the key variables are reported in Table 5. The mean excess return in the subsample is 0.044, higher than the mean of 0.018 in the big sample, with a similar level of volatility. The average lagged ESG total score (ESG\_Total\_L1) is 3.63, practically in line with the big sample mean of 3.65. The Environmental pillar remains the weakest (mean 2.15), while Social (mean 4.08) and Governance (mean 6.24) show better results, which is consistent with the broader sample. Firm size is slightly larger in the 10-year sample (mean 8.41 vs. 7.52), while leverage ratios appear lower (mean 1.10 vs. 2.12), reflecting differences in the set of firms included.

**Table 5**

*Descriptive Statistics — 10 Year Subsample*

	count	mean	std	min	25%	50%	75%	max	median
<b>ExcessReturn</b>	1368	0.0438	0.2835	-0.9081	-0.1213	0.0295	0.1922	4.8272	0.0295
<b>ESG_Total_L1</b>	1368	3.6322	1.5216	0.1600	2.2700	3.6800	4.8600	7.2900	3.6800
<b>E_Score_L1</b>	1368	2.1532	1.6679	0.0000	0.6875	1.9600	3.3950	6.8200	1.9600
<b>S_Score_L1</b>	1368	4.0766	2.7633	0.0000	1.5000	4.2300	6.6300	9.7000	4.2300
<b>G_Score_L1</b>	1368	6.2422	1.8236	0.4600	5.8500	6.7400	7.3900	8.9100	6.7400
<b>LogMarketCap</b>	1368	8.4059	1.0358	4.2458	7.7433	8.3789	9.0000	11.7997	8.3789
<b>Leverage</b>	1368	1.0999	1.8177	0.0000	0.5439	0.7908	1.0584	37.9435	0.7908
<b>Mkt_Return</b>	1368	0.1560	0.1588	-0.1813	0.1195	0.2079	0.2676	0.3147	0.2079

Table 6 presents the correlation matrix for the 10-year sample. ESG\_Total\_L1 shows strong positive correlations with its components, especially with Environmental (0.889) and Social (0.790) factors, which is consistent with the big sample. ExcessReturn once again has weak negative correlations with both the total ESG score and with the individual pillars, suggesting that there is no simple positive linear relationship. The correlation between

ExcessReturn and Mkt\_Return is 0.401, very close to the big sample's 0.389, which once again highlights the role of market-wide factors in driving REIT returns.

**Table 6**

*Correlation Matrix — 10 Year Subsample*

	ExcessReturn	ESG_Total_L1	E_Score_L1	S_Score_L1	G_Score_L1	LogMarketCap	Leverage	Mkt_Return
ExcessReturn	1.0000	-0.1379	-0.1558	-0.0908	-0.0291	0.1495	0.0522	0.4009
ESG_Total_L1	-0.1379	1.0000	0.8891	0.7900	0.5569	0.1662	0.0042	0.0423
E_Score_L1	-0.1558	0.8891	1.0000	0.6417	0.1679	0.1375	-0.0270	0.0452
S_Score_L1	-0.0908	0.7900	0.6417	1.0000	0.3037	0.2002	0.0027	0.0263
G_Score_L1	-0.0291	0.5569	0.1679	0.3037	1.0000	0.0582	0.0515	0.0134
LogMarketCap	0.1495	0.1662	0.1375	0.2002	0.0582	1.0000	0.1171	0.0601
Leverage	0.0522	0.0042	-0.0270	0.0027	0.0515	0.1171	1.0000	0.0213
Mkt_Return	0.4009	0.0423	0.0452	0.0263	0.0134	0.0601	0.0213	1.0000

#### 4.5 Impact of Lagged Total ESG Scores on REIT Returns — 10 Year Sample

The first regression conducted for the subsample explores the effect of the lagged total ESG score on REIT returns. Same as with the baseline models approach, both Random Effects (RE) and Fixed Effects (FE) models are estimated for the lagged regression. The Hausman test rejects the null hypothesis ( $p < 0.001$ ), suggesting that the FE model is more suitable for the purpose. Therefore, as with the baseline analysis, the discussion below focuses on the FE model, while RE results are available in Appendix D.

The FE regression has an R-squared (within) of 0.2412, suggesting that approximately 24% of the variation in excess returns can be explained by the analyzed variables (Table 7). Despite being lower than the 42% of the baseline model, it still remains a moderate explanatory power in the context of financial research.

The lagged total ESG score (ESG\_Total\_L1) is significantly and negatively correlated with next year returns (coefficient =  $-0.0517$ ,  $p < 0.001$ ). This implies that a one-point increase in ESG performance in the previous year (on a scale from 1-10) is associated with approximately a 5.2% decrease in REIT excess returns in the subsequent year. This result mimics the findings of the baseline regressions, further strengthening the rejection of

Hypothesis 1. However, it is worth noting that the lagged effect is much less drastic compared to the baseline model, where a one-point increase in ESG score was linked to an approximately 11% decrease in returns in the same year.

**Table 7**

*Impact of Lagged Total ESG Scores on REIT Returns — Fixed Effects Model*

PanelOLS Estimation Summary			
Dep. Variable:	ExcessReturn	R-squared:	0.2412
Estimator:	PanelOLS	R-squared (Between):	-158.01
No. Observations:	1368	R-squared (Within):	0.2412
Date:	Mon, Sep 08 2025	R-squared (Overall):	-13.746
Time:	22:17:09	Log-likelihood	19.860
Cov. Estimator:	Clustered		
		F-statistic:	96.304
Entities:	152	P-value	0.0000
Avg Obs:	9.0000	Distribution:	F(4,1212)
Min Obs:	9.0000		
Max Obs:	9.0000	F-statistic (robust):	149.20
		P-value	0.0000
Time periods:	9	Distribution:	F(4,1212)
Avg Obs:	152.00		
Min Obs:	152.00		
Max Obs:	152.00		

Parameter Estimates						
	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
ESG_Total_L1	-0.0517	0.0080	-6.4649	0.0000	-0.0673	-0.0360
LogMarketCap	0.1416	0.0198	7.1592	0.0000	0.1028	0.1804
Leverage	0.0017	0.0035	0.4812	0.6304	-0.0052	0.0085
Mkt_Return	0.6808	0.0381	17.878	0.0000	0.6061	0.7555

F-test for Poolability: 0.9381

P-value: 0.6871

Distribution: F(151,1212)

Control variables behave consistently with expectations and baseline results. Market capitalization once again has a strong positive relation to returns (coefficient = 0.1416,  $p < 0.001$ ). Similarly, market return continues to be a highly significant and positively related factor in driving company returns (coefficient = 0.6880,  $p < 0.001$ ). Leverage, on the other hand, is statistically insignificant in the subsample, indicating that capital structure plays a lesser role when considering lagged ESG effects.

## 4.6 Impact of Lagged Individual E, S, and G Scores on REIT Returns — 10 Year

### Sample

Similarly to the baseline model, the second regression for the 10-year subsample is conducted to explore the lagged effect of each of the three individual E, S, and G pillars. Both Random Effects (RE) and Fixed Effects (FE) models are estimated, and the Hausman test is performed to determine the best approach. Same as in previous cases, the Hausman test supports the use of the Fixed Effects model. Hence, the interpretation of the FE model is stated below, while RE results are provided in Appendix E.

The overall explanatory power of the FE model is moderate, with an R-squared of approximately 0.25 (Table 8). This suggests that around one-quarter of the variation in REIT excess returns is explained by the lagged individual ESG factors and control variables, which is in line with the first model applied for the subsample.

The lagged environmental score (E\_Score\_L1) has a negative statistically significant relation with REIT excess returns (coefficient = -0.029,  $p < 0.01$ ). This implies that an increase of one unit in the environmental score corresponds to a reduction of around 2.9 percentage points in excess returns, *ceteris paribus*. This result is in line with the baseline model, although its effect size is slightly smaller (-3.95% in baseline vs. -2.89% in lagged), which further reinforces the rejection of H2.

The lagged social score (S\_Score\_L1) does not exhibit a statistically significant relationship with excess returns (coefficient = -0.0007,  $p = 0.883$ ). This finding contradicts the baseline model, where the social pillar demonstrated a significant negative correlation. Similarly, the lagged governance score (G\_Score\_L1) also behaves differently from the G score in baseline regression. While having no statistical significance in baseline same-year scenario, the lagged Governance score proves to have negative significant association with next year excess returns.

**Table 8***Impact of Lagged E, S, and G Scores on REIT Returns — Fixed Effects Model*

PanelOLS Estimation Summary			
Dep. Variable:	ExcessReturn	R-squared:	0.2452
Estimator:	PanelOLS	R-squared (Between):	-88.438
No. Observations:	1368	R-squared (Within):	0.2452
Date:	Mon, Sep 08 2025	R-squared (Overall):	-7.5932
Time:	22:18:18	Log-likelihood	23.512
Cov. Estimator:	Clustered		
		F-statistic:	65.520
Entities:	152	P-value	0.0000
Avg Obs:	9.0000	Distribution:	F(6,1210)
Min Obs:	9.0000		
Max Obs:	9.0000	F-statistic (robust):	105.00
		P-value	0.0000
Time periods:	9	Distribution:	F(6,1210)
Avg Obs:	152.00		
Min Obs:	152.00		
Max Obs:	152.00		

Parameter Estimates						
	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
E_Score_L1	-0.0289	0.0067	-4.3469	0.0000	-0.0420	-0.0159
S_Score_L1	-0.0007	0.0046	-0.1473	0.8830	-0.0097	0.0083
G_Score_L1	-0.0606	0.0165	-3.6682	0.0003	-0.0931	-0.0282
LogMarketCap	0.1392	0.0203	6.8593	0.0000	0.0994	0.1790
Leverage	7.884e-05	0.0037	0.0214	0.9829	-0.0071	0.0073
Mkt_Return	0.6846	0.0380	18.031	0.0000	0.6101	0.7590

F-test for Poolability: 0.9230

P-value: 0.7315

Distribution: F(151,1210)

The lagged analysis further confirms the baseline finding that neither the total ESG score nor the pillar scores do not contribute positively to REIT excess returns. In fact, the overall ESG scores and environmental scores exhibit persistent negative effects, social scores influence returns only in the same-year time span, and governance scores have a delayed effect. Notably, the extent of the negative coefficients is slightly smaller in the lagged models compared to the baseline ones, indicating that the negative financial effects of ESG improvements may be strongest in the short term.

## **Chapter 5. Discussion of Findings**

### **5.1 Introduction**

This section of the study interprets the main empirical findings reported in Chapter 4. Overall, the analysis contradicted the initial expectations hypothesized based on the previous empirical research and revealed a consistent negative relationship between ESG performance and excess REIT returns. Those effects were persistent in both the full sample and the 10-year subsample used for additional lagged analysis. Hence, this chapter aims to explain the potential mechanisms behind such outcomes from the economic and financial perspective, as well as places the findings in the broader perspective linking them to previous studies with similar results.

### **5.2 Overall ESG Score and Returns**

The results demonstrate that a one-point increase in the overall ESG score is associated with an approximately 11% decrease in REIT excess returns in the baseline scenario and around 5.2% decrease in the lagged effect model. While contradicting the major chunk of previous empirical research, which found that better ESG performance has a positive impact on real estate returns, such findings are not a complete novelty. For instance, Neo et al. (2025) find significant negative relationships between ESG ratings and ex-post REIT stock returns across developed markets, and Kitulazzi et al. (2025) prove that better aggregate ESG scores have a significant negative effect on real estate firm values. The rationale behind such results is complex and can be attributed to a combination of several factors.

First and foremost, the most widely-cited reasoning that explains the negative relationship between ESG ratings and REIT returns revealed by this study are additional costs generated by increased ESG efforts. Strong ESG performance often involves heavy capital expenditures, higher regulatory compliance costs, and pricy energy efficiency investments.

Such costs may reduce short-term profitability and hence take a toll on stock returns. In fact, this explanation is supported by the finding of Neo et al. (2025), who state that ESG-rated REITs experience much higher ESG compliance costs related to the compensations of the Board and Senior Management. This is further confirmed by Chacon et al. (2023) who suggest that REITs that chase better ESG performance tend to overinflate their sustainability spendings at the expense of the shareholders.

Secondly the negative relation can be explained by the maturation of ESG trend and market adjustment. Back in the years, at the earlier stages of ESG development, firms that were investing in it were seen as innovators and therefore enjoyed the abnormal positive returns. However, over time ESG performance became more mainstream and the benefits from it might have gradually declined. The research of Al Azizah and Haron (2025) confirms this by stating that the ESG had a positive impact on companies' financial performance before the pandemic, but in recent years, its effect has diminished significantly.

Moreover, investor expectations as it relates to ESG have also shifted. Now ESG initiatives are seen as something that's expected from the firm rather than as a proactive initiative. ESG Global Study from Harvard Law School indicates that more and more investors every year describe their position towards ESG as "acceptance" or "compliance" rather than treating it as a cornerstone for their investment strategies (Ground, 2022). Hence, researchers argue that now ESG performance is already priced into the valuation of companies and may no longer be rewarded the same way as it was in the past (Alves et al., 2025). Furthermore, broader market trends even show the emergence of negative sentiment towards ESG among the investors as it is often associated with greenwashing, underperformance, and regulations uncertainty due to fast-changing politics (Temple-West & Schmitt, 2024).

Finally, another reason that explains the negative relationship between ESG scores and REIT excess returns is the marginal benefit of sustainable investments. The initial ESG improvements tend to increase the financial performance of companies, while further investments have a negative effect on it. This is proven in the study of Naseer et al. (2025), who state that ESG performance has a positive impact at lower quantiles but a negative impact at higher ones. The justification is further echoed by Lee and Chow (2025) who argue that an increase from low to medium ESG investment benefits the companies, but a switch from medium to high degree of investment has a harmful effect on the firms. Those findings demonstrate that the positive effect of ESG performance is marginal, and superior ESG ratings may, in fact, diminish excess returns of REITs.

### **5.3 Pillar Effects: Environmental, Social, Governance**

The Environmental variable shows a negative correlation with excess returns both in baseline and in lagged regressions. This suggests that the environmental pillar imposes especially high costs or constraints. The real estate sector is capital-intensive when it comes to the Environmental factor, as it consumes a lot of energy, produces emissions, and has high building standards. As a result, environmental improvements may be more expensive and take longer to pay off, therefore affecting the subsequent returns. These findings are consistent with Fan et al. (2024), who also reported that among the three pillars, environmental performance has a consistent negative impact on REIT returns.

The Social pillar is statistically significant and negative in the baseline model, but it loses its significance with a lag. This suggests that social initiative may have a negative influence on returns in the short term, for example, through increased costs, but its effect is short-lived and not carried into subsequent periods. This finding contradicts the existing literature on the subject, as the prevailing majority of empirical studies state that increased Social performance benefits companies' financial results.

Similarly to the Social, Governance pillar also shows divergent results. It is statistically insignificant in the baseline model and has a significantly negative effect in the lagged one. This suggests that governance improvements, in this sample, are not rewarded, or perhaps have costs (e.g. additional oversight, efforts to reach more transparency, improved internal control) that are not observable initially but appear over time. Literature shows mixed results when it comes to the Governance factor: many studies find it less strongly associated with returns in real estate, possibly because governance quality is already high or its improvements are less visible to the market (Erol et al., 2023; Fan et al., 2024).

#### **5.4 Lagged vs Contemporaneous Effects**

It is worth highlighting that when comparing the contemporaneous baseline model and the lagged one, the magnitude of the coefficients for ESG variables falls quite drastically in the latter. To be precise, the coefficient for the total ESG score falls from about -11% to -5.2% in the lagged regression. Similarly, the coefficient for the individual E-score decreased from -4% to -2.9%. This trend suggests that for the two aforementioned variables, the negative impact may be strongest in the short term, most likely due to upfront costs, and then it diminishes over time. Alternatively, it can also indicate partial market adjustment where markets gradually price in ESG performance so that the lagged effect becomes less pronounced.

On the other hand, the lag in effect shows the possibility that ESG improvements require time to generate either benefits or costs, or that risk/reward trade-offs evolve over time. Some prior literature supports this notion by stating that the ESG–return relationship can change over time. For example, Brounen and Marcato (2019) find that ESG impact is negative in earlier years and then it becomes positive in the years to follow. Same conclusions are reached by Naseer et al. (2025) who claim that, “while ESG investments initially exert negative impacts on stock returns - reflecting substantial upfront costs and

operational disruptions - these negative effects diminish over time, transitioning into significant long-term benefits through improved firm resilience and enhanced market valuation” (p.1). Altogether, these prior empirical findings provide a broader picture for the results of this study and suggest that the effects of ESG investments tend to change over the years and may require substantial time to demonstrate their full impact.

## Chapter 6. Conclusion and Implications

### 6.1 Conclusion

This study investigated the relationship between Environmental, Social, and Governance (ESG) performance and Real Estate Investment Trust (REIT) returns using panel data that covers 371 REITs globally (2021–2024). The analysis considered both overall ESG scores and the scores of the individual E, S, and G pillars in fixed effects and random effects regression models, with a Hausman test conducted to select the more appropriate approach. The results of the baseline models were supplemented with robustness checks through lagged regressions that used a subsample of 152 REITs with a 10-year-long span of ESG data available (2015-2024).

Despite the initial hypotheses that posited that better ESG performance is positively related to REIT returns, the results consistently proved the opposite. Higher ESG scores were found to be negatively associated with excess returns. The effect is most pronounced in the baseline, contemporaneous models, and becomes less severe over time, as proven by the lagged regressions.

When analyzed on the individual pillar basis, the Environmental dimension also showed consistent negative associations with financial performance in both models. The Social factor, on the other hand, had a negative impact only in the baseline case but displayed no statistical significance in the lagged model. Similarly, Governance also demonstrated divergent results with being statistically insignificant in the baseline regression but showing a strong negative association with the excess returns in the lagged scenario. While these findings contradict a major portion of existing literature that argues that enhanced ESG performance improves financial results, they align with more recent emerging studies that often reveal ESG's diminishing return premia due to it becoming mainstream.

Overall, this study concludes that ESG factors do not function as a driver of superior REIT performance in contemporary markets. The results are attributed to a combination of causes, including the mature stage of the trend for ESG, investors' tendency to adjust their expectations and price in the sustainability factors, and the costs of ESG enhancements potentially outweighing financial benefits. Nevertheless, based on the diminishing coefficients in the lagged model, the study also highlights that the effects of ESG investment tend to change over the years and may simply require longer time spans to demonstrate the beneficial impact.

## **6.2 Theoretical Contribution**

This study makes a significant contribution to the existing empirical research in the field of ESG and real estate due to several reasons. Firstly, as mentioned before, previous findings on the topic remain highly controversial and inconsistent. A relatively small share of studies report negative effects of ESG on real estate returns. Hence, this study facilitates the formation of the opposing view to the prevailing belief about ESG's beneficial impact on companies' financial performance. Secondly, while many ESG studies focus on corporations in general, this research specifically analyzes REITs, which represent a unique asset class but receive significantly less attention in academic settings. Moreover, unlike many existing works cited in the literature review section that focus on earlier periods, this paper analyzes ESG data through 2024. It enables the study to reflect on the most recent, mature stage of ESG integration, when sustainability efforts are no longer viewed as innovative but rather treated as given to meet compliance standards. Finally, another way in which this research makes a valuable contribution to existing literature is by disintegrating the total ESG score and analyzing the effects of the individual pillars. Although it's not the first paper to take such an approach, only a small proportion of researchers focused on the pillars separately, leaving their individual effects in need of further exploration, which this study fulfilled.

### **6.3 Practical Implications**

The findings of this research provide several valuable insights for practitioners. It suggests to investors that higher ESG ratings should not be assumed to drive superior financial performance in REITs. Instead, ESG may serve more as a risk management or reputational tool but portfolio strategies centered on ESG's ability to increase REIT returns are unlikely to succeed. For REIT managers, the results highlight that while ESG initiatives may enhance transparency and provide reputational benefits, they should be executed with caution, keeping in mind a cost-benefit perspective. Managers need to balance sustainability efforts with financial efficiency. Finally, for policymakers, such results may signal the need for further regulations, as a lack of clear financial rewards may discourage voluntary ESG improvements among REITs despite their substantial environmental footprint.

### **6.4 Limitations**

As with any empirical study, multiple limitations must be acknowledged. The first and most substantial limitation of this study is related to the incompleteness of the dataset used for analysis. While a total of 386 ESG-rated REITs are available on Bloomberg, majority of them are missing earlier years ESG scores or other vital information necessary for the analysis. Hence, the main analysis is limited to a 4-year-long period only (2021-2024), while the subsample for the robustness analysis has data for a 10-year period but contains 152 REITs only. As a result of limited data availability, another limitation of the study is analyzing 1-year lagged effects only. As mentioned before, the full scope of ESG effects tends to materialize over longer periods of time. Hence, having a 2 or 3-year lagged analysis would be beneficial for gaining deeper understanding of ESG effects time dynamics. Additionally, using ESG scores from one provider only (Bloomberg) is another limitation of the study. It constrains the findings to one methodology while other ESG providers may rate REITs differently, potentially influencing the results. Finally, the study also has a limitation

of potentially omitting significant control variables. Only a limited set of control variables (market cap, leverage, market returns, risk-free rate) were included while other important variables that can potentially impact REIT performance, such as property type or macroeconomic factors were missing.

### **6.5 Recommendations for Further Research**

Future work can address the aforementioned limitations and build on the findings in several ways. Firstly, it is suggested to use an alternative ESG metrics provider. Taking the data from GRESB or MSCI would serve as a check for consistency of results and could provide different perspectives on ESG performance. Additionally, it is recommended to conduct additional analysis with a 2-5 year lag to clarify whether the initial negative impact of ESG on returns provides benefits in the long-term perspective. Finally, given the mixed results on returns, future research could also explore ESG's effect on other performance metrics such as volatility, cost of capital, operational efficiency, or tenant retention as alternative channels of value creation.

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## Appendix A

### Variance Inflation Factor Test for Multicollinearity

	<b>variable</b>	<b>VIF</b>
<b>0</b>	const	30.7305
<b>1</b>	ESG_Total	1.2401
<b>2</b>	LogMarketCap	1.2485
<b>3</b>	Leverage	1.0198
<b>4</b>	Mkt_Return	1.0011

	<b>variable</b>	<b>VIF</b>
<b>0</b>	const	36.0098
<b>1</b>	E_Score	1.6191
<b>2</b>	S_Score	1.7611
<b>3</b>	G_Score	1.1685
<b>4</b>	LogMarketCap	1.2883
<b>5</b>	Leverage	1.0275
<b>6</b>	Mkt_Return	1.0016

## Appendix B

### Impact of Total ESG Scores on REIT Returns — Random Effects Model

#### RandomEffects Estimation Summary

```

=====
Dep. Variable:      ExcessReturn      R-squared:          0.1695
Estimator:         RandomEffects      R-squared (Between): -0.0049
No. Observations:      1484      R-squared (Within):  0.2067
Date:              Sun, Sep 07 2025    R-squared (Overall):  0.1621
Time:              19:25:44           Log-likelihood        -256.25
Cov. Estimator:      Unadjusted

                               F-statistic:          75.501
Entities:            371              P-value              0.0000
Avg Obs:             4.0000          Distribution:         F(4,1480)
Min Obs:             4.0000
Max Obs:             4.0000          F-statistic (robust): 75.501
                               P-value              0.0000
Time periods:       4                Distribution:         F(4,1480)
Avg Obs:            371.00
Min Obs:            371.00
Max Obs:            371.00

```

#### Parameter Estimates

```

=====
                Parameter  Std. Err.    T-stat    P-value    Lower CI    Upper CI
-----
ESG_Total      -0.0310     0.0059     -5.2326   0.0000    -0.0426    -0.0194
LogMarketCap   0.0074     0.0032     2.3329   0.0198     0.0012     0.0136
Leverage       -0.0031     0.0007     -4.5022   0.0000    -0.0044    -0.0017
Mkt_Return     0.5989     0.0380    15.758   0.0000     0.5243     0.6734
=====

```

## Appendix C

### Impact of E, S, and G Scores on REIT Returns — Fixed Effects Model

#### RandomEffects Estimation Summary

```

=====
Dep. Variable:      ExcessReturn      R-squared:          0.1711
Estimator:         RandomEffects      R-squared (Between): 0.0050
No. Observations:  1484          R-squared (Within):  0.2073
Date:              Mon, Sep 08 2025    R-squared (Overall): 0.1646
Time:              07:05:17          Log-likelihood       -257.31
Cov. Estimator:    Unadjusted

F-statistic:          50.865
Entities:            371          P-value             0.0000
Avg Obs:            4.0000      Distribution:        F(6,1478)
Min Obs:            4.0000
Max Obs:            4.0000      F-statistic (robust): 50.865
P-value             0.0000
Time periods:       4          Distribution:        F(6,1478)
Avg Obs:            371.00
Min Obs:            371.00
Max Obs:            371.00

```

#### Parameter Estimates

```

=====
              Parameter  Std. Err.   T-stat   P-value   Lower CI   Upper CI
-----
E_Score      -0.0243    0.0060    -4.0538  0.0001   -0.0361   -0.0126
S_Score       0.0014    0.0041     0.3406  0.7334   -0.0067    0.0095
G_Score      -0.0127    0.0040    -3.1762  0.0015   -0.0206   -0.0049
LogMarketCap  0.0090    0.0036     2.4933  0.0128    0.0019    0.0161
Leverage     -0.0030    0.0007    -4.3662  0.0000   -0.0044   -0.0017
Mkt_Return    0.5978    0.0381    15.697   0.0000    0.5231    0.6726
=====

```

## Appendix D

### Impact of Lagged Total ESG Scores on REIT Returns — Random Effects Model

#### RandomEffects Estimation Summary

```

=====
Dep. Variable:      ExcessReturn      R-squared:          0.2114
Estimator:         RandomEffects      R-squared (Between): 0.2732
No. Observations:      1368      R-squared (Within): 0.2054
Date:              Mon, Sep 08 2025      R-squared (Overall): 0.2114
Time:              22:17:10      Log-likelihood      -69.804
Cov. Estimator:      Unadjusted

                               F-statistic:          91.388
Entities:              152      P-value              0.0000
Avg Obs:              9.0000      Distribution:        F(4,1364)
Min Obs:              9.0000
Max Obs:              9.0000      F-statistic (robust): 91.388
                               P-value              0.0000
Time periods:         9      Distribution:        F(4,1364)
Avg Obs:              152.00
Min Obs:              152.00
Max Obs:              152.00

```

#### Parameter Estimates

```

=====
              Parameter  Std. Err.    T-stat    P-value    Lower CI    Upper CI
-----
ESG_Total_L1    -0.0366     0.0046    -8.0203    0.0000    -0.0456    -0.0277
LogMarketCap     0.0079     0.0023     3.4419    0.0006     0.0034     0.0124
Leverage         0.0050     0.0038     1.3018    0.1932    -0.0025     0.0125
Mkt_Return       0.6991     0.0435    16.080     0.0000     0.6138     0.7844
=====

```

## Appendix E

### Impact of Lagged E, S, and G Scores on REIT Returns — Fixed Effects Model

#### RandomEffects Estimation Summary

```

=====
Dep. Variable:      ExcessReturn      R-squared:          0.2149
Estimator:         RandomEffects      R-squared (Between): 0.3067
No. Observations:      1368      R-squared (Within): 0.2060
Date:              Mon, Sep 08 2025      R-squared (Overall): 0.2149
Time:              22:18:18      Log-likelihood      -66.710
Cov. Estimator:      Unadjusted

Entities:          152      F-statistic:        62.141
Avg Obs:          9.0000      P-value             0.0000
Min Obs:          9.0000      Distribution:        F(6,1362)
Max Obs:          9.0000      F-statistic (robust): 62.141
Time periods:      9      P-value             0.0000
Avg Obs:          152.00      Distribution:        F(6,1362)
Min Obs:          152.00
Max Obs:          152.00

```

#### Parameter Estimates

```

=====
Parameter   Std. Err.   T-stat   P-value   Lower CI   Upper CI
-----
E_Score_L1  -0.0332    0.0054  -6.1664   0.0000    -0.0438    -0.0227
S_Score_L1   0.0016    0.0034   0.4642   0.6426    -0.0050     0.0082
G_Score_L1  -0.0096    0.0037  -2.5856   0.0098    -0.0168    -0.0023
LogMarketCap 0.0070    0.0029   2.3737   0.0177     0.0012     0.0127
Leverage     0.0046    0.0038   1.2003   0.2302    -0.0029     0.0121
Mkt_Return   0.7016    0.0434  16.155   0.0000     0.6164     0.7868
=====

```