ECONSTOR
Make Your Publications Visible.

A Service of

ZBW Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Erol, Isil; Unal, Umut; Coskun, Yener

Working Paper

ESG investing and the financial performance: A panel data analysis of developed REIT markets

MAGKS Joint Discussion Paper Series in Economics, No. 23-2021

Provided in Cooperation with:
Faculty of Business Administration and Economics, University of Marburg

Suggested Citation: Erol, Isil; Unal, Umut; Coskun, Yener (2021) : ESG investing and the financial performance: A panel data analysis of developed REIT markets, MAGKS Joint Discussion Paper Series in Economics, No. 23-2021, Philipps-University Marburg, School of Business and Economics, Marburg

This Version is available at:
http://hdl.handle.net/10419/234877

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

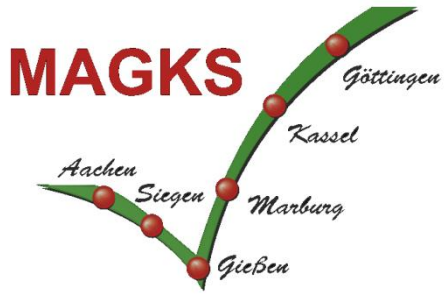
Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft



Joint Discussion Paper Series in Economics

by the Universities of

Aachen · Gießen · Göttingen
Kassel · Marburg · Siegen

ISSN 1867-3678

No. 23-2021

Isil Erol, Umut Unal and Yener Coskun

ESG Investing and the Financial Performance: A Panel Data Analysis of Developed REIT Markets

This paper can be downloaded from
http://www.uni-marburg.de/fb02/makro/forschung/magkspapers

Coordination: Bernd Hayo • Philipps-University Marburg
School of Business and Economics • Universitätsstraße 24, D-35032 Marburg
Tel: +49-6421-2823091, Fax: +49-6421-2823088, e-mail: hayo@wiwi.uni-marburg.de

ESG Investing and the Financial Performance: A Panel Data Analysis of Developed REIT Markets

Short title: ESG investing in REITs

Isil Erol[1]
Associate Professor of Real Estate Finance and Investment
Henley Business School, Department of Real Estate & Planning
University of Reading
Whiteknights, Reading RG6 6UD United Kingdom
Tel: +44-(0)7464-089150
E-mail: i.erol@henley.reading.ac.uk
ORCID: orcid.org/0000-0001-8125-9118

Umut Unal
Associate Professor of Economics
Visiting Researcher
School of Business and Economics, Philipps-Universität Marburg
Universitätsstr. 24, D-35037, Marburg, Germany
Tel.: +49-(0)6421-2823719
Email: umut.uenal@wiwi.uni-marburg.de

Yener Coskun
Associate Professor of Finance
Senior regulator at Capital Market Board of Turkey Ankara
Visiting lecturer at TED University Ankara
Email: ycoskun@spk.gov.tr
Orchid ID: https://orcid.org/0000-0002-3351-998X

[1] Corresponding author. University of Reading, Henley Business School, Department of Real Estate & Planning, Whiteknights Campus PO Box 217, Reading Berkshire RG6 6AH, UK. Tel: +447464089150

ESG Investing and the Financial Performance: A Panel Data Analysis of Developed REIT Markets

Abstract

Environmental, social, and governance (ESG) investing in the corporate real estate industry has notably increased since the mid-2000s. Utilizing PVAR-Granger causality model and a fixed-effects panel data model with a rich dataset comprising 234 ESG-rated REITs across five developed economies from 2003 to 2019, this study investigates both the causal relationship and the sign of the association between corporate social and financial performance for the REIT industry. The results suggest that stock market investors pay attention to individual E/S/G metrics and price each component of ESG investing differently, with environmental (E-investing) and social (S-investing) practices being the significant social performance factors influencing the financial performance of REITs. This study is the first attempt to test the social impact hypothesis of the stakeholder theory of the corporation and the neoclassic trade-off argument to explore corporate social responsibility and the market valuation of REITs. We find strong support for the trade-off hypothesis in our full-sample analysis and argue that REITs' environmental policies and activities involve high financial costs that may drain off capital and other company resources and lead to decreasing market returns. We also find that investors have attached a higher value to REITs' social investing performance in the post-GFC period, from 2011 to 2019. A positive premium for S-investing supports the social impact hypothesis, indicating that companies that reduce or ignore socially responsible actions to lower their implicit costs incur higher explicit costs, giving rise to competitive disadvantage.

JEL Codes: G11; G15; G32; M14

Keywords: Corporate social performance, ESG investing, REITs, financial performance, panel data, fixed effects regression, PVAR Granger causality test, social impact hypothesis, trade-off hypothesis.

1. Introduction

The demand for investment products with strong environmental, social and governance credentials boomed in 2020 as the pandemic put the need for a sustainable world in the spotlight (McDougall, 2020). Investors are increasingly conscious of the total wealth maximisation for all stakeholders, not only shareholder value. REITs are often overlooked as a way to gain exposure to sustainable and/or socially responsible investments, in part because numerous open-ended funds specifically publicise themselves as sustainable. Nevertheless, environmental, social and governance (ESG) investing in the REIT industry has notably increased since the mid-2000s – i.e., the number of ESG-rated REITs increased from 43 in 2005 to 217 in 2018 in the developed countries, including the United States of America (USA), the United Kingdom (UK), Australia, Canada, and Japan. At the same time, the average environmental score of ESG-rated REITs in these countries has noticeably increased by 142.7%, from 13.1 to 31.8, whereas the average social and governance scores have increased by 21.8% and 12.7%, respectively (Thomson Reuters DataStream database). A considerable body of research has focused on the impact of corporate social performance on the financial performance of non-REIT listed companies and provided controversial results (Salzmann 2013). Existing meta-studies, in contrast, have suggested unambiguous evidence for a rather positive association between corporate social performance (CSP) and corporate financial performance (CFP) – e.g., Orlitzky and Benjamin (2001), Orlitzky et al. (2003), Van Beurden and Gossling (2008), and Eccles et al. (2014). Similarly, the relevant literature on REITs has mainly found a positive association between social and financial performance although some studies reported mixed empirical findings, with positive, negative, or neutral CSP-CFP relationships found[2]. This is possibly due to different databases, sample sizes, model specifications, and social performance criteria used in these studies. In spite of the increase in REITs' ESG investing and a growing body of research on the impact of socially responsible investment on their performance, the association, if any, between social and financial performance has not been fully established for REITs.

This study uses the Thomson Reuters Worldcope and DataStream databases to construct a rich dataset comprising 234 ESG-rated REITs in five developed REIT markets: the USA, the UK, Australia, Canada, and Japan between 2003 and 2019.[3] The study employs the PVAR-Granger causality model and a fixed-effects panel data model for cross-country analysis of the direction of causation and the sign of the relationship between ESG investing and the market-based financial performance of REIT, respectively. We find strong evidence that REIT investors pay attention to individual E/S/G metrics and price each component of ESG investing differently, with environmental (E-investing) and social (S-investing) practices are being the significant CSP factors influencing the financial performance of REITs. The CSP-CFP relationship for our sample is best explained by the social impact, and trade-off hypotheses as the PVAR

[2] Eichholtz et al., 2012; Sah et al., 2013; Hin Ho et al., 2013; Ooi and Dung, 2019; Cajias et al., 2014; Fuerst, 2015; Westermann et al., 2018; and Morri et al., 2020 reported a positive association, whereas Mariani et al., 2018; Coën et al., 2018; and Westermann et al., 2019 provided evidence for a negative CSP-CFP relationship for the REITs.

[3] We have selected five countries because the number of REITs reporting ESG scores publicly are very limited with a short history in other developed countries such as France (7), Spain (3), Belgium (8), Singapore (7), the Netherlands (3), Hong Kong (2), and Germany (2).

Granger causality analysis suggests a direction of causality from the social performance to the financial performance: First, the results highlight a significant negative association between E-investing and the financial performance of REITs, providing evidence for the trade-off hypothesis – i.e., the environmental policies and activities involve high financial costs that may drain off capital and other company resources and lead to decreasing market returns. Second, the results suggest a strong positive relationship between S-investing and the financial performance of REITs, which supports the social impact hypothesis of the stakeholder theory of the corporation. The positive premium for S-investing has become stronger in the post-GFC period, from 2011 to 2019.

Conflicting empirical findings on the CSP-CFP nexus inherently imply that the relationship between REITs' financial performance and their success or failure in ESG-investment may largely depend on length of time, sample size, single/cross-country setting, and social performance metrics used. Our paper contributes to the relevant literature in several ways. First, unlike the previous REIT research that has utilised a single-country setting (e.g., Newell and Lee, 2012 for the Australian REITs; Brounen and Marcato, 2018 and Eichholtz et al., 2012 for the US REITs) we employ a cross-country panel data analysis to explore the REITs' financial performance in relation to their ESG investing. Our sample period goes back to 2003, which is relatively longer than that of prior studies (Morri et al., 2020 and Fuerst, 2015), which also employed cross-country data but used only four- or five-year time span. None of these papers has explored the nexus in both aggregated (ESG total score) and disaggregated (individual E/S/G scores) frameworks to understand how well REITs have implemented their ESG investments in relation to their stock market performance. Hence, this study uses a cross-country sample to minimize possible sample selection bias through geographically well-diversified REITs sample with a 17-year time span to investigate both the causal relation and the sign of the association between CSP-CFP for the REIT industry. Second, we manually construct a new, rich dataset that includes market-based financial performance measures – i.e., excess return, the Sharpe ratio, and the beta factor. Our paper is one of the initial attempts to employ the systematic firm risk as a dependent variable to explore the association between REITs' ESG investing and their stock performance. Third, this is the first study to test the social impact hypothesis of the stakeholder theory of corporation and the neoclassic trade-off argument (investing in business versus socially responsible investing) to explore corporate social responsibility and the market valuation of REITs.

The following section provides a background discussion on the corporate social-financial relationship focusing on the REIT market. Section 3 reviews the empirical literature on the CSP-CFP relationship both with structured greenness criteria and ESG metrics in REITs. Section 4 covers the empirical specification, data analysis, and a discussion of the findings. Section 5 concludes the paper.

2. Background to CSP-CFP Nexus

Corporate resource-allocation decision-making has become increasingly complicated because companies are assessed not only on the financial outcome of their decisions but also on how they evaluate a broader set of societal expectations. CSP has been considered as economic

responsibility to investors and consumers, ethical responsibilities to society, legal responsibility to the government, and discretionary responsibility to the community (Carroll, 1979). As a multi-layered concept, CSP incorporates the interaction between social responsibility rules, social responsiveness, and the strategies implemented by corporations to address social issues (Wartick and Cochran, 1985).

2.1 The concept of CSP in REITs

The real estate industry has special responsibility for decarbonisation because of its 40 percent share of global carbon dioxide emissions (United Nations Environment Programme, 2019). However, it is difficult to argue that the industry has complete awareness and actions against climate change risk. Intangible benefits of decarbonising the built environment through REITs have a large benefit spectrum in the physical market depending on the property focus of the equity REITs from health care to lodging/resorts or industrial/office buildings. Potential benefits of ESG ratings are far beyond firm-level performance or public image considerations and offer a wide range of positive externalities concerning environmental and social responsibility and corporate governance quality.

First, REITs can contribute to decarbonisation by improving their operational efficiency for energy and water use and developing environmental management systems. Examples of environmental policies include seeking green building certifications for their properties, adopting biodiversity, land conservation, and eco-friendly building design techniques, issuing green bonds to fund sustainability projects, reducing emissions at buildings, and encouraging sustainable commuting (RICS, 2013; IEA, 2019). Second, REITs can improve their social performance by supporting and contributing to community organizations while ensuring their workforces are inclusive and diverse, providing a safe working environment for employees, and encouraging employees to volunteer in the community (NAREIT, 2019). Third, REITs have the opportunity to boost their ESG performance in terms of good governance policies and practices. ESG metrics developed by global data providers such as MSCI, S&P, and Morningstar generally suggest that better governance could be achieved by establishing a high-quality reporting-disclosure framework, minimizing potential conflicts of interest, avoiding fraud and bribery, supporting diversity and independence in the board, and developing equal and fair compensation policy for executives. While there is no single best corporate governance structure, ESG-minded investors tend to prefer democratic, transparent, equitable, and focused on long-term growth.

REITs may implement better social and governance policies, adopt ESG-investing, and increase dedicated ESG staff. However, regarding the environmental impact of ESG-investing, some REITs may be better positioned for decarbonisation depending on their property focus – e.g., residential REITs may develop green-lease agreements and green affordable housing schemes, whereas retail REITs may adopt greenhouse gas emission reduction perspective to their operations from site selection to maintenance (NAREIT, 2019).

2.2 Theory and Hypotheses

The ongoing debate on corporate social-financial performance relationship involves two different empirical issues: (1) The direction of causation: Does social performance affect the financial performance of corporations or the opposite, does financial performance affect social performance, or is there a bilateral relationship between the two? (2) The sign of the relationship: Are social and financial performance positively or negatively associated, or not associated at all? Following the typology of possible corporate social-financial performance relationships developed by Preston and O'Bannon (1997), this paper first examines the direction of causation between social and financial performance of REITs. Then, depending on the causal sequence, it investigates the sign of association between social and financial performance. A causal sequence from corporate social performance to financial performance yields the following two hypotheses regarding the sign of the relationship between CSP and CFP (Preston and O'Bannon, 1997).

Social Impact Hypothesis of the stakeholder theory of corporation predicts that social and financial performance tend to be positively associated over the long term (Freeman, 1984). The theory states that stakeholders have different interests in a corporation and have different impacts upon it and the corporation is responsible for meeting their interests. A firm that attempts to lower its implicit costs by socially irresponsible actions will, as a result, incur higher explicit costs, giving rise to competitive disadvantage. On the contrary, an open-minded employee relations policy may have a lower cost. However, it can result in substantial gains in morale and productivity, yielding a competitive advantage compared to less responsible firms (Waddock and Graves, 1997, p. 306). According to Cornell and Shapiro (1987), serving the implicit claims of major stakeholders (employees, customers) enhances a company's reputation in a way that positively impacts on its financial performance; conversely, disappointing these groups may have a negative financial impact. Furthermore, the failure to meet the expectations of various non-shareowner constituencies will generate market fears, which, in turn, will increase a company's risk premium and result in higher costs. Accordingly, our first hypothesis is:

> *A higher score of environmental, social, and governance performance leads to a higher financial performance for REITs – i.e., a higher excess return, a higher Sharpe ratio, and a lower beta – all other things being equal.*

Trade-off Hypothesis asserts that socially responsive activities – e.g., charity, environmental protection, community development – involve financial costs, which may steal capital and other resources from the firm and may result in declining stock prices relative to the market average – may put corporations at a relative disadvantage compared to less socially active firms (Friedman, 1970; Aupperle et al., 1985). This hypothesis reflects the classic statement of Friedman (1970) and other neoclassical economists' arguments that there are few readily measurable economic benefits to socially responsible behaviour while there are numerous costs (Waddock and Graves, 1997). According to Friedman (1970, reprinted in 2007, p.178): "there is one and only one social responsibility of business – to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, …" Managerial attention to interests other than those of investors is a breach of trust that inevitably

reduces the welfare of shareowners (Preston and O'Bannon, 1997). Hence, our second hypothesis to be tested:

> *A higher score of environmental, social, and governance performance leads to a lower financial performance for REITs – i.e., a lower excess return, a lower Sharpe ratio, and a higher beta – all other things being equal.*

If the causal relationship is from financial to social performance, the following hypotheses are developed to test the sign of the association between CSP and CFP.

Available Funds and Managerial Opportunism Hypotheses: The slack resource theory states that financially successful companies have slack (available) resources to invest in corporate social performance such as community and employee relations, and environmental projects and therefore attain a higher standard (Waddock and Grave, 1997). Firms' actions may depend upon the resources available, although they may wish to follow the normative rules of good corporate citizenship at all times. Profitability in a specific period may increase a firm's ability to fund discretionary projects, subsequently indicating a positive association between financial and social performance (McGuire et al., 1988). The managerial opportunism hypothesis, in contrast, states that pursuit of private managerial goals (e.g., compensation schemes linked to short-term profit and stock price behaviour), might lead to a negative relationship between financial and social performance. When financial performance is strong, managers may attempt to "cash in" by reducing social expenditure in order to take advantage of the opportunity to increase their short-term private gains. Conversely, when financial performance weakens, managers attempt to offset and even justify their disappointing results by engaging in social programs (Preston and O'Bannon, 1997). Hence, a lead-lag relationship, this time with financial performance leading social performance, would provide the following two hypotheses to test empirically.

> *A Higher financial performance for REITs leads to higher (lower) scores of environmental, social, and governance performance, all other things being equal.*

3. LITERATURE REVIEW

3.1. CSP-CFP Nexus in REITs

Albeit a large body of research has documented a positive relationship between different measures of sustainability and corporate financial performance, knowledge on the financial effects of corporate social investing through ESG criteria remains fragmented (Friede et al., 2015) and very limited for the REIT industry (Fuerst, 2015). Previous research on REITs has primarily focused on corporate governance (i.e., Ghosh and Sirmans 2003; Hartzell et al., 2006, Bianco et al. 2007; Bauer et al., 2010; Campbell et al., 2011) and reported its weak relationship with the corporate financial performance. Corporate governance has less impact on REIT's performance due to the strongly regulated business environment (Ghosh and Petrova, 2020; Bauer et al., 2010). The relevant literature focusing on the REIT's risk-return characteristics regarding socially responsible investments is also scarce. Several researchers suggest that higher CSP may lower volatility, market risk premium (Eichholtz et al., 2013; Westermann et

al., 2018 and 2019), and lead to additional diversification benefits (Newell et al., 2011). On the contrary, some empirical exercises suggest a lack of abnormal return related to portfolio greenness (Eichholtz et al., 2012; Ooi and Dung, 2019), and indicate no risk-adjusted return from corporate social responsibility practices (Westermann et al., 2019). Below we review prior REIT research on CSP-CFP nexus by classifying the studies into two groups, measuring corporate social performance through either structured greenness criteria or ESG scores/ratings.

3.2. CSP-CFP Empirical Nexus with Structured Greenness Criteria in REITs

Research on the linkage between REITs' social and financial performance has generally utilised some greenness criteria, generally driving from sustainable building certifications rather than multi-layered ESG scores/ratings. These country-level and generally small sample studies have provided mixed evidence. For example, Eichholtz et al. (2012) provided evidence that the greenness of US REIT portfolios is positively (negatively) related to operating performance (market betas), due to the fact that "green properties are less exposed to energy price fluctuations and occupancy risks" (Eichholtz et al., 2012: p. 1925). The authors did not document any significant relationship between the greenness of property portfolios and abnormal stock returns. Sah et al. (2013) use the SNL REIT database and Energy Star building program data and employ various panel data techniques for the 67 US REITs. The study found positive evidence of investing and maintaining a green portfolio between 2009 and 2010. Mariani et al. (2018) used the Fama-French five-factor model for the US REITs and concluded that the percentage of certified buildings in the European REITs portfolios negatively affects ROA, ROE and stocks' alphas while improving the stocks' beta. This is possibly due to the incremented costs of green certifications. Coën et al. (2018) compared the financial performance of green and non-green US/Canadian REITs from 2010 to 2016 and suggested that risk-adjusted performance measures of non-green REITs are often significantly higher, which is disappointing for greenness defenders. Hin Ho et al. (2013) investigated the relationship between greenness and operational and financial performance of 18 Singapore REITs between 2007 and 2011. The study provided evidence that green buildings have positive impacts on the REIT performance. Furthermore, Singapore REITs with more green assets recorded higher ROA and operating margin, but no positive abnormal return or alpha (Ooi and Dung, 2019).

3.3. CSP-CFP Empirical Nexus with ESG Scores in REITs

The studies investigating CSP-CFP empirical relationship employing ESG metrics are of the primary concern of our study; therefore, we summarise this line of research regarding the data sources, single or cross-country samples, time periods, variable selection and modelling strategies, as well as the empirical evidence provided.

First, previous studies have employed various data sources and country samples. For instance, Newell and Lee (2012) used corporate social responsibility ratings of Corporate Monitor – an independent ethical investor research group in Australia – for environmental, social, and governance rating factors for 16 Australian REITs. Examining the US REIT market, Cajias et al. (2014) employed MSCI ESG (formerly KLD) database for 341 publicly traded US real

estate companies, whereas Brounen and Marcato (2018) utilised GRESB, Thomson Reuters, and KLD (MSCI) datasets for the aggregate ESG scores and also KLD (MSCI) data for the E, S, and G sub-scores. Amongst the cross-country case studies, Morri et al. (2020) and Fuerst (2015) used Global Real Estate Sustainability Benchmark (GRESB) database in order to study 50 European REITs and around 400 international REITs in the North America, Asia and Europe, respectively. Second, existing literature has predominantly focused on single-country analysis, including Australia (Newell and Lee, 2012; Westermann et al., 2018 and 2019) and the USA (Cajias et al., 2014); Brounen and Marcato, 2018). Only two studies so far (Fuerst, 2015; Morri et al., 2020) have investigated the CSP-CFP relationship in a cross-country setting. Furthermore, aforementioned studies have generally utilised short-time periods, ranging from three to nine years in their analysis except for Brounen and Marcato's (2018) study which utilised 18-year sample period for the US REITs.

Third, regarding the variable selection, prior research has investigated the nexus by using operating performance indicators such as ROA and ROE (Morri et al., 2020), financial performance indicators, including the total return and excess or risk-adjusted return (Newell and Lee, 2012; Brounen and Marcato, 2018; Westermann et al., 2018 and 2019) or both indicators (Fuerst, 2015) as the dependent variable. Although some studies employed a risk factor as an independent variable (Newell and Lee, 2012; Cajias et al., 2014), to our knowledge, no prior study has employed a risk factor as the dependent variable in a long-term analysis. As an exception in the short-term analysis, Fuerst (2015) employed beta as the dependent variable with GRESB data and found negative relation between sustainability and risk exposure and volatility. Fourth, as the modelling approach existing studies have generally utilised panel regression analysis to explore the nexus. Given that only a single study (Cajias et al., 2014) performed the Granger causality test and employed panel regressions, we could argue that lack of causality analysis is an ongoing modelling challenge in this line of research. The scarcity of simultaneous analysis of aggregated and disaggregated ESG scores in relation to corporate financial performance is another research gap in the related literature. Brounen and Marcato (2018) highlighted this knowledge gap and incorporated total ESG score and disaggregated E/S/G scores by using different sub-periods from 2002 to 2016. The present study differs from Brounen and Marcato (2018) because we used a cross-country panel data analysis, having the systematic firm risk (or beta factor) as the dependent variable in an ESG score-based empirical specification. We also use a longer period for E/S/G disaggregated level analysis to minimize possible modelling problems arising from short-time span (see Bauer et al., 2010).

In summary, systematic comparative work on the CSP-CFP empirical nexus employing ESG ratings in a cross-country REITs market setting is still at an embryonic stage. Previous studies have mainly suggested a decline in risk and an increase of a firm's financial performance with the ESG or GRESB metrics. However, our understanding of the relationship between individual E/S/G metrics and corporate financial performance, namely, insights from disaggregated analysis of ESG factors are less apparent.

4. Data Analysis

The use of ratings or scores involving the environmental, social, and governance credentials (ESG scores henceforth) of listed companies to capture CSP has been widely accepted both by empirical research (Chang et al. 2014; Eccles et al. 2014) and by sectoral insight (Bassen and Senkl, 2011). This study uses a rich source of ESG research data provided by the Thomson Reuters Asset4 database. Our sample covers 234 ESG-rated REITs in five developed markets, where 163(69.7%) REITs reporting ESG scores publicly are from the USA, 22(9.4%), 20(8.5%), and 19(8.1%) REITs from Australia, the UK, and Canada, respectively. Lastly, 10 (4.3%) Japanese REITs are included in the sample.

The preliminary analysis of the ESG scores across the sample reveals that during the period 2003-2019, the UK REITs and the Australian REITs have recorded the highest ESG total scores of 54.5 and 45.5, on average, respectively. The US and the Canadian REITs have performed moderately well, reporting overall ESG scores of 38.7 and 34.9, separately. Japanese REITs have experienced the worst ESG performance, with an overall score of 21.9. Regarding the individual E/S/G scores, the UK REITs have by far the highest environmental score of 61.1, whereas the other country REITs have displayed notably lower E-scores, ranging from 13.0 (Canada) to 39.1 (Australia). Governance score is more equally distributed than environment score – e.g., Japanese REITs have the lowest G-score of 31.5, whereas Canadian REITs have the highest score of 48.9. The overall social pillar score across countries indicates the UK and the Australian REITs have experienced the best social performances as they reported 55.5 and 51.1 S-scores, respectively. Once again, Japanese REITs have recorded the lowest S-score, that is 16.9, on average. Notably, REITs in the UK and Australia have recorded superior ESG performance, particularly in environmental and social factors. Japanese REITs, in contrast, have been unsuccessful in their ESG-investing, especially in social responsibility and governance quality.

4.1 PVAR Granger Causality Test for the Direction of Causality between CSP and CFP

To test whether corporate social performance (ESG score) affects the corporate financial performance or financial performance affects social performance, or if there is a feedback loop between the two, the Granger causality test is used.[4] In this regard, such a causal relationship is represented:

$$Y_{it} = \alpha_0 + \sum_{l=1}^{m} \beta_l X_{i,t-l} + \sum_{l=1}^{m} \gamma_l Y_{i,t-l} + \mu_i + u_{it} \quad (1)$$

$$X_{it} = \alpha_0' + \sum_{l=1}^{m} \theta_l X_{i,t-l} + \sum_{l=1}^{m} \lambda_l Y_{i,t-l} + \mu_i + u_{it}' \quad (2)$$

where it is assumed that the disturbances u_{it} and u_{it}' are uncorrelated. Equation (1) indicates that variable *X* Granger-causes *Y* provided that β_l's are statistically different from zero as a group whereas γ_l's are not statistically different from zero as a group. Similarly, *Y* Granger-causes *X* given that β_l's are not statistically different from zero in Equation (1), while the set

[4] Before running the causality tests, we carry out panel data unit root tests so as to investigate the stationarity of the variables. Our series are stationary at levels, and the results are available upon request.

of the lagged *X* coefficients in Equation (2), λ_l's, are statistically different from zero. Feedback, or bilateral causality, is indicated when the sets of *X* and *Y* coefficients are statistically different from zero in both equations. The most important feature that distinguishes the panel VAR model from the VAR model in the time series is the individual effects (μ_i) in the model. We use the generalized method of moments methodology developed by Abrigo and Love (2016)[5] which removes fixed effects using forward orthogonal deviation or Helmert transformation.

Table 1: Granger Causality Test

Direction of causality	chi2	Lags	Direction of causality	chi2	Lags
ESG → Excess Return	8.81* (0.07)	4	E-score → Sharpe Ratio	13.79*** (0.01)	4
Excess Return → ESG	3.45 (0.49)		Sharpe Ratio→ E-score	1.81 (0.77)	
ESG → Sharpe Ratio	13.42*** (0.01)	4	S-score → Sharpe Ratio	19.95*** (0.00)	4
Sharpe Ratio → ESG	5.57 (0.23)		Sharpe Ratio → S-score	5.07 (0.28)	
ESG → Beta	11.16** (0.03)	4	G-score → Sharpe Ratio	8.89** (0.03)	4
Beta → ESG	7.58 (0.11)		Sharpe Ratio → G-score	4.38 (0.22)	
E-score → Excess Return	15.60*** (0.00)	4	E-score → Beta	8.96** (0.03)	3
Excess Return → E-score	1.49 (0.83)		Beta → E-score	0.94 (0.82)	
S-score → Excess Return	14.15*** (0.01)	4	S-score → Beta	13.88*** (0.01)	4
Excess Return → S-score	4.61 (0.33)		Beta → S-score	18.28*** (0.00)	
G-score → Excess Return	6.75 (0.15)	4	G-score → Beta	4.38** (0.04)	1
Excess Return → G-score	4.76 (0.31)		Beta → G-score	2.66* (0.10)	

Notes: Cluster-robust standard errors at the firm level are used to mitigate possible heterogeneity and autocorrelation concerns. Excess return and Sharpe ratio are also calculated based on the overnight indexed swap rates (alternative to 3-month LIBOR) as a proxy for risk-free rate of interest. Our results are insensitive to these alternative calculations, which are available upon request. As the Granger-causality test is sensitive to the chosen lag, we are interested in finding the correct lag length, i.e., correct order, using the order selection criteria. In this regard, CD: R2 criterion, which indicates the overall coefficient of determination for GMM models capturing the proportion of variation explained by the relevant panel VAR model, is used.

Overall results from Granger causality Wald tests with the suggested lags for each equation of the underlying panel VAR model are presented in Table 1. Our findings reveal that the direction of causality is from the social performance to the financial performance,[6] supporting the aforementioned social impact and trade-off hypotheses. Our evidence generally suggests a precise casual-unidirectional (both aggregated and disaggregated level) relationship between ESG scores and financial performance. To our knowledge, Cajias et al. (2014) is the only study investigating the Granger causality in the CSP-CFP relationship for the US real estate companies and detect Granger causality neither from Tobin's Q to ESG score nor from total

[5] Stata 16 is not able to run Granger-causality tests with the existing embedded commands for an unbalanced panel dataset. Therefore, throughout the analysis held in this section, we utilised from Abrigo and Love (2016) which contributed user-written codes to Stata for these advanced panel data techniques.

[6] For S-score-beta and G-score-beta pairs, we find a feedback loop, whereas for G-score-excess return pair no causal relationship is detected.

returns to ESG score and concluded that ESG scores are not or only weakly endogenous with returns in their dataset.

4.2 Model Variables and Empirical Specification

Using a panel dataset of 1,408 firm-year observations over the period 2003-2019[7], we examine the effect of ESG scores on three market-based measures of financial performance: (1) Excess return, (2) Risk-adjusted performance of a portfolio by its Sharpe ratio, and (3) Systematic firm risk or beta factor. REITs' excess returns over a risk-free rate are calculated by subtracting 3-month interbank offered rates from the end-of-year stock returns. We measure the risk-adjusted performance of a REIT portfolio by its Sharpe ratio – i.e., the ratio of the annual excess return over risk-free rate to the volatility of excess returns –, where REIT stock volatility is calculated by using the annualized standard deviation of weekly stock returns over the previous 12 months following previous studies (Auer and Schuhmacher, 2016; Bouslah et al. 2013). Beta factor, representing the firm's systematic risk, is obtained from the beta index of REIT companies, considering a timeframe of 60 months.[8] The model variables are listed in Table 2. We retrieved all financial data from the Thomson Reuters Worldscope and DataStream databases. We evaluate two risk-free rate proxies, namely 3-month LIBOR and Overnight Indexed Swap rate[9], taken from Bloomberg. Similar to previous studies (e.g., Sassen et al., 2016; Cheng et al., 2014; and Eccles et al., 2014), ESG scores are obtained from the Thomson Reuters Asset4 database that evaluates CSP based on three pillars of environmental, social, and corporate governance performance. Amongst the country-specific variables, M3 Index is derived from OECD Statistics, GDP and the inflation rate are obtained from World Economic Outlook, IMF.

Regarding the control variables at the company level, we use the following variables commonly adopted in the relevant literature (Westermann et al., 2018; Garcia et al., 2017; Sassen et al., 2016; Auer and Schuhmacher, 2016; Newell and Lee, 2012). *Firm size* measured as the natural log of market capitalisation in USA dollar accounts for size effect on REIT's financial performance. *Leverage* controlled the impact of REIT's capital structure on the firm's market risk and return and is calculated as total debt to total assets. We included REIT's stock market *liquidity* as a possible influencing factor on market return and risk, measured as the volume of shares traded divided by number of shares outstanding at the company's year-end. We used *price-to-book ratio* to capture different risk characteristics for growth and value companies, calculated as the ratio of stock price per share to book value per share. We also included the *company total risk* and *operating expenses* to consider REIT's market risk and operating performance as the signs of uncertainty. Total risk reflects the firm's stock volatility and is measured by using the annualized standard deviation of weekly stock returns over the previous 12 months. Operating cost measured as natural log of total operating expenses and used to

[7] Our initial sample comprised 1,667 firm-year observations. Missing return measures and control variables have reduced the final sample to an unbalanced panel of 1,408 firm-year observations. The sample period starts from 2003 as Thomson Reuters Asset4 database publishes ESG scores since 2002.

[8] Maury and Pajuste (2005), Sassen et al., (2016) and Garcia et al., (2017) also used the historical beta index obtained from DataStream database.

[9] We alternatively use Overnight Indexed Swap rate data to reflect the impact of counterparty credit risk into risk-free rate variable (see, Smith, 2013).

explore if REITs with lower operating costs would have better financial performance (Siew, 2015; Sah et al., 2013). Finally, we controlled for *dividend pay-out ratio* which could be interpreted as a signal for managers' perception of certainty of future earnings. Pay-out ratio is calculated as the ratio of dividends per share to price per share with a time lag of one year due to the fact that dividend cash flows are time-lagged (Sassen et al., 2016). For all other control variables, we employed current values. Country-specific variables are employed in order to control macroeconomic conditions. In this respect, we use average consumer price changes to control variations in general price levels of our sample countries. Additionally, we use M3 and GDP to control in variations in broad money supply or excess liquidity and size of the sample economies.

Table 2: Model variables

	Variables and acronyms	Indicator	Vector of variables
Dependent Variable	Excess Return [(R_i - r_f)]	Excess return	Financial Performance (CFP)
	Sharpe Ratio [(R_i -r_f) /volatility]	Risk-adjusted excess return	
	Beta	Systematic risk (historical local index)	
Independent Variables	Environment pillar score (E-score)	Corporate's impact on its natural living and non-living environment - e.g., air, land, and water.	Corporate Social Performance (CSP)
	Governance pillar score (G-score)	Corporate's management commitment and effectiveness in implementing good governance principles	
	Social pillar score (S-score)	Corporate's ability to build trust and credibility with its employees, investors/customers, and society	
	ESG total score	An equally weighted average of individual E/S/G scores	
Control Variables	Market capitalisation (in USD)	Size	Firm characteristics
	Turnover ratio	Liquidity	
	Total debt ratio	Leverage	
	Price-to-Book Value ratio	Future growth opportunities	
	Total risk	Firm Risk	
	Operating expenses	Operating performance	
	Dividend payment t-1	Future earnings certainty	
	GDP	Size of the economy	Country-specific factors
	M3 Index	Money supply	
	Inflation rate	Average consumer price changes	

This study employs linear regressions with panel data and estimates the following empirical model to investigate the sign of relationship between CSP (through ESG scores) and the financial performance of REITs.

$$Financial\ Performance_{it} = \alpha + \beta_1 CSP_{it} + X'_{it}\theta + \sum_{t=1}^{t-1} \delta_t Year_t + \varepsilon_{it}$$

$$\varepsilon_{it} = \mu_i + \vartheta_{it} \qquad i = 1, \dots, N; \qquad t = 1, \dots, T \tag{3}$$

where *i* represents each REIT company denoting the cross-section dimension and *t* represents the time-series dimension. Financial performance is the dependent variable and CSP is the variable of interest and measured either by equally weighted average of environmental, governance and social responsibility scores or individual E/S/G scores (see Table 2). X_{it} is the *K*-dimensional vector of firm-specific variables that changes over time without a constant term.

θ is a *Kx1* matrix, and ϑ_{it} represents the effects of the omitted variables that will change across the individual firms and time periods. μ_i is a 1×1 scalar intercept representing the unobserved effects, which are constant over time. The random error term is assumed to be distributed independently identically with mean zero and constant variance. Two different panel data methods, namely random effects or fixed effects methods can be used for estimating our model. While the former premises that there might not be an arbitrary correlation between μ_i and regressors, the latter allows for it (Wooldridge, 2019). More specifically, fixed-effects model assumes that the inclinations do not vary but that the intercepts are different for each firm. To decide for an unbiased and consistent results, Hausman (1978) test is applied. In all our specifications, the Hausman specification test is strongly rejected, implying that the random effects estimator would lead to inconsistent results. The fixed effects estimator is, therefore, the appropriate methodology for our data. Although the most common drawback of fixed-effects models is the impossibility of including time-constant explanatory variables (Sassen, 2016), this is not the case for our model as our explanatory variables are time-variant. Besides, we also use year fixed effects to control for changing macroeconomic conditions denoted by $Year_t$, mainly to capture the impact of the global financial crisis in 2008 and 2009, which may affect financial performance of firms. Finally, we adopt for cluster-robust standard errors at the firm level[10] to mitigate the concerns about cross-sectional and time-series dependence (Garcia et al., 2017).

Table 3: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	Observation
Excess Return $[R_i - r_f]$	0.03	0.30	-2.64	1.38	1,667
Sharpe Ratio $[(R_i - r_f)/\sigma_i]$	0.13	1.11	-6.96	3.50	1,667
ESG Total Score	0.4	0.19	0.02	0.91	1,667
Beta	0.85	0.59	-0.87	6.40	1,667
E-Score	0.26	0.30	0.00	0.98	1,667
S-Score	0.46	0.20	0.02	0.96	1,667
G-Score	0.48	0.22	0.00	0.95	1,667
Log (Market capitalisation)	15.00	1.09	12.06	18.44	1,666
Log (Turnover Ratio)	0.23	0.84	-4.27	2.83	1,667
Total Debt Ratio	0.46	0.15	0.00	1.38	1,667
Log (Price-to-Book Value Ratio)	0.57	0.67	-2.30	5.03	1,634
Total Risk	0.26	0.17	0.08	1.71	1,667
Log (Operating Expenses)	13.14	1.51	8.83	17.74	1,647
Log (GDP)	29.97	1.34	27.88	33.92	1,667
Inflation rate	0.02	0.01	-0.01	0.05	1,667
Log (M3 Index)	4.54	0.25	3.55	4.87	1,667

Table 3 presents basic descriptive statistics for model variables. Sampled REITs' annual excess return changes between -2.64% and 1.38%, whereas the Sharpe ratio is more volatile, ranging from -6.96% to 3.50%. The total ESG score displays a high variation across the sample as the lowest score is 0.02 and the highest score is 0.91 during the period under consideration. Total risk of REIT portfolios also has a greater spread as we have companies with a total risk value of 1.71, indicating a quite high risk; on the other hand, some others with a value less than 0.10, representing almost no risk. Indeed, we have similar variations in other company-specific

[10]Another alternative approach would be bootstrapping the standard errors. Our results were insensitive in computing the variance of all estimates with 200 replications.

variables, including beta, turnover ratio, total debt ratio, operating expenses, and price-to-book value ratio.

4.3 Regression Analysis: Sign of Relationship between CSP and CFP

Given that the direction of causality is found from CSP to CFP, our regression analysis results are interpreted within the social impact hypothesis based on the theory of stakeholders, and the trade-off hypothesis that reflects Friedman's (1970) and other neoclassical economists' view that socially responsible investments simply divert funds away from shareholders. The results of the sign of association between ESG total score, E/S/G individual scores and REIT financial performance, which are estimated by using Equation (3), for the full sample period are shown in Table 4a and 4b. ESG total score has a negative association with REIT's Sharpe ratio (with an estimated coefficient of -0.52 and -0.62) and excess return (with an estimated coefficient of -0.13 and -0.16), whereas it has no association with REIT beta during the overall study period (see Table 4a). Coefficient values for the Sharpe ratio are larger in magnitude than those for excess return measure. The estimated coefficients for company-level control variables indicate that REIT size (market cap), stock market liquidity (turnover ratio), price-to-book value ratio, and dividend pay-out ratio are all positively related to REIT excess return and the Sharpe ratio. REIT total risk and operating expenses are, in contrast, negatively associated with their financial performance as anticipated. Country-specific macroeconomic indicators do not have any statistically significant association with the financial performance (excess return and beta) of REITs.

Table 4a: The ESG total score and the financial performance of REITS from 2003 to 2019 – Panel data fixed effects regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Sharpe Ratio	Sharpe Ratio	Sharpe Ratio	Excess Return	Excess Return	Excess Return	Beta	Beta
ESG total score	-0.62**	-0.52**	-0.52*	-0.16**	-0.13**	-0.13*	-0.04	0.09
Log (Market capitalisation)	0.26**	0.43***	0.43**	0.08**	0.11***	0.11**	-0.21**	-0.23***
Log (Turnover ratio)	0.17***	0.17***	0.17**	0.06**	0.06**	0.06**	0.02	0.03
(Dividend per price) $_{t-1}$	2.67*	2.85*	2.84*	1.13**	1.22**	1.22**	0.88*	0.81*
Total debt ratio	-1.97***	-1.40**	-1.40**	-0.50***	-0.43**	-0.44**	0.17	0.10
Log (Price to book value ratio)	0.80***	0.70***	0.70***	0.21***	0.20***	0.20***	-0.13**	-0.13**
Total risk	-0.89*	-0.71	-0.71	-0.37**	-0.29*	-0.30*		
Log (Operating expenses)		-0.29**	-0.28**		-0.05	-0.04		
Excess return							0.20***	0.19***
Log (GDP)			0.35			0.41		-2.55
Log (M3 Index)			-0.12			-0.16		-0.12
Inflation rate			-0.71			-0.13		-4.95
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,408	1,391	1,391	1,408	1,391	1,391	1,408	1,408
R-squared	0.57	0.57	0.57	0.65	0.65	0.65	0.56	0.57
Hausman Test chi2	111.02	123.15	123.53	210.48	214.39	235.08	62.20	76.09
Hausman Test p value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Constant term is included but suppressed. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

Table 4b: The environmental, social, and governance individual scores and the financial performance of REITS from 2003 to 2019

Variables	(1) Sharpe Ratio	(2) Sharpe Ratio	(3) Sharpe Ratio	(4) Excess Return	(5) Excess Return	(6) Excess Return	(7) Beta	(8) Beta
E-score	-0.57***	-0.48**	-0.48**	-0.13**	-0.11**	-0.11**	0.29**	0.31**
S-score	0.23	0.23	0.23	0.04	0.04	0.04	-0.31*	-0.28*
G-score	-0.11	-0.12	-0.12	-0.03	-0.03	-0.02	-0.13	-0.06
Log (Market capitalisation)	0.28**	0.44***	0.43**	0.08***	0.11***	0.11**	-0.23***	-0.24***
Log (Turnover ratio)	0.17***	0.17***	0.16**	0.06**	0.06**	0.06**	0.03	0.03
(Dividend per price) $_{t-1}$	2.73*	2.91**	2.91*	1.14**	1.24**	1.23**	0.83*	0.76*
Total debt ratio	-1.88***	-1.37**	-1.38**	-0.48***	-0.43**	-0.43**	0.09	0.03
Log (Price-to-Book value ratio)	0.80***	0.71***	0.71***	0.21***	0.20***	0.20***	-0.13**	-0.13**
Total risk	-0.89*	-0.72	-0.72	-0.37**	-0.29*	-0.30*		
Log (Operating expenses)		-0.27**	-0.26**		-0.04	-0.04		
Sharpe ratio								
Excess return							0.21***	0.20***
Log (GDP)			0.08			0.35		-2.21
Log (M3 Index)			-0.06			-0.15		-0.17
Inflation rate			-1.14			-0.22		-4.69
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,408	1,391	1,391	1,408	1,391	1,391	1,408	1,408
R-squared	0.57	0.57	0.57	0.65	0.65	0.65	0.57	0.58
Hausman Test chi2	114.96	125.03	123.63	207.25	210.86	231.91	59.16	141.02
Hausman Test p value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Constant term is included but suppressed. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

To understand which ESG factors affect financial performance, we regressed our return and risk measures on the three pillar scores of E/S/G, instead of using the aggregated ESG score (see Table 4b). The individual E/S/G components consolidated in the overall ESG score might have different impacts on REIT risk and return (Bouslah et al., 2013). E/S/G measures provide insights into the costs and benefits of CSP beyond those that combined measures have demonstrated in previous research (Laan et al., 2008). This is partly because heterogeneity among corporate stakeholders might create a mismatch between the ESG components – e.g., employees and Greenpeace put different emphasis on the issues of labour conditions (S-score) and environmental pollution (E-score). Hence, we incorporate individual E/S/G scores into our analysis. Table 4b displays a strong negative relationship between E-score and return measures – i.e., a negative association with Sharpe ratio and excess return at 1% and 5% significance levels, respectively. In contrast, the estimated coefficients of S-score and G-score are insignificant with a positive and negative sign, correspondingly. Thus, the negative relationship between E-score and REIT return measures has a dominating impact on REIT's CSP (ESG total score) and CFP nexus. Once again, company- and country-specific control variables have similar estimated coefficient values with the same signs. It is important to note that a higher S-score is negatively associated with REIT beta, indicating that S-investing reduces firm's systematic risk; a higher E-score, in contrast, is associated with higher systematic risk. Furthermore, no relationship between corporate governance (G-score) and financial performance is found. This finding is in line with the previous research by Bauer et al., (2010), Bianco et al., (2007) and Hartzell et al., (2006) who also found no significant relationship between corporate governance and USA REIT performance.

Overall, we provide evidence that the environmental component of ESG investing is negatively associated with REITs' return and positively with the systematic risk. We also find that neither social nor governance component of ESG investing has a significant association with REIT market return measures, whereas the former has a weak negative relationship with beta. These estimates provide evidence for our second hypothesis that a higher score of ESG performance leads to a lower financial performance, which might be explained by the trade-off hypothesis. REITs' environmental policies and practices such as obtaining green building certifications for their properties, adopting biodiversity and eco-friendly building design techniques, reducing emissions at buildings, and developing green-lease agreements involve high financial costs that may drain off capital and other company resources and result in declining stock prices and market returns. As our study is one of the initial attempts to analyse REITs' CSP-CFP nexus by investigating the association between financial performance and (dis-)aggregated ESG scores, the only comparable evidence that uses disaggregated ESG scores is provided by Brounen and Marcato (2018). Studying a sample of 194 USA REITs, the authors also found that a higher E-score is associated with a significant negative excess return.

Table 5 presents regression analysis results for the same range of models presented in Table 4, involving the influence of ESG investing on REIT financial performance after the global financial crisis (GFC) effect, from 2011 to 2019. Considering that both the financial and other company-specific indicators still exhibited poor performance in 2010, we define our after-GFC subperiod from 2011 onwards. We find no statistically significant association between ESG total score and REIT excess return and the Sharpe ratio (Table 5a), although ESG total score is negatively related with REIT beta (model 7). An insignificant relationship between ESG total score and REIT return measures is due to the fact that the dominating negative association between E-score and REIT returns is now offset by the strong positive relationship between S-score and the REIT return measures (Table 5b). Moreover, S-score has a solid negative relationship with REIT beta with the estimated coefficients of -0.48 (model 7) and -0.43 (model 8) which is already reflected in the ESG total score-beta relationship in model 7 in Table 5a. In line with the full sample case, G-score has no significant association with REIT financial performance either through excess return or systematic risk measures. It appears that, in the post-GFC period, stock market investors have attached a higher value to REITs' S-investing because S-score exhibits a strong positive association with CFP through not only higher excess return and the Sharpe ratio but also a lower systematic risk. A positive premium for S-investments supports the social impact hypothesis that predicts that corporate social-financial performance tends to be positively associated. REITs can gain a higher S-score by supporting and contributing to community organizations, ensuring their workforces are inclusive and diverse, and providing a safe working environment for employees. A corporation that attempts to lower its implicit costs by reducing or ignoring socially responsible actions will, therefore, incur higher explicit costs, giving rise to competitive disadvantage. On the contrary, a broad-minded employee relations policy may have a lower cost, which possibly result not only in substantial gains in morale and productivity but also a competitive advantage compared to less responsible firms.

Table 5a: The ESG total score and the financial performance of REITS after the GFC, from 2011 to 2019.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Sharpe Ratio	Sharpe Ratio	Sharpe Ratio	Excess Return	Excess Return	Excess Return	Beta	Beta
ESG total score	-0.54	-0.55	-0.51	-0.09	-0.09	-0.09	-0.32**	-0.25
Log (Market capitalisation)	0.34*	0.52***	0.63***	0.07*	0.09**	0.12***	-0.07	-0.08
Log (Turnover ratio)	0.20**	0.22**	0.18**	0.06***	0.06***	0.06***	-0.03	-0.04
(Dividend per price) $_{t-1}$	5.10**	5.38**	5.58**	0.88**	0.92**	0.97**	-0.49	-0.41
Total debt ratio	-1.30**	-0.69	-0.88	-0.29**	-0.22	-0.25*	0.92***	0.94***
Log (Price to book value ratio)	1.17***	1.03***	1.05***	0.25***	0.24***	0.24***	-0.14**	-0.12**
Total risk	-1.69*	-1.53*	-0.96	-0.56***	-0.54***	-0.44**		
Log (Operating expenses)		-0.31**	-0.38**		-0.04	-0.05		
Excess return							0.24***	0.20***
Country specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,093	1,086	1,086	1,093	1,086	1,086	1,093	1,093
R-squared	0.41	0.42	0.44	0.47	0.47	0.49	0.58	0.62
Hausman Test chi2	119.87	123.88	146.48	135.99	144.22	161.51	138.37	132.15
Hausman Test p value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Constant term is included but suppressed. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

Table 5b: The E/S/G individual scores and the financial performance of REITS after the GFC, from 2011 to 2019.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Sharpe Ratio	Sharpe Ratio	Sharpe Ratio	Excess Return	Excess Return	Excess Return	Beta	Beta
E-score	-0.54**	-0.52**	-0.60***	-0.11**	-0.11**	-0.12***	0.14	0.07
S-score	0.57*	0.57*	0.57*	0.14**	0.14**	0.14**	-0.48**	-0.43**
G-score	-0.38	-0.40	-0.29	-0.07	-0.08	-0.06	-0.08	0.02
Log (Market capitalisation)	0.34*	0.51***	0.62***	0.07*	0.09**	0.11***	-0.08	-0.08
Log (Turnover ratio)	0.20**	0.22**	0.18*	0.06***	0.06***	0.06***	-0.03	-0.04
(Dividend per price) $_{t-1}$	5.37**	5.64**	5.78**	0.94**	0.98**	1.02**	-0.60	-0.55
Total debt ratio	-1.22**	-0.64	-0.81	-0.27**	-0.20	-0.24	0.87***	0.92***
Log (Price to book value ratio)	1.16***	1.03***	1.05***	0.25***	0.24***	0.24***	-0.15**	-0.13**
Total risk	-1.77*	-1.62*	-1.05	-0.58***	-0.56***	-0.46**		
Log (Operating expenses)		-0.30**	-0.36**		-0.04	-0.05		
Sharpe ratio								
Excess return							0.26***	0.22***
Country specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,093	1,086	1,086	1,093	1,086	1,086	1,093	1,093
R-squared	0.42	0.42	0.44	0.48	0.48	0.49	0.58	0.62
Hausman Test chi2	118.58	121.81	143.83	135.07	142.24	159.16	143.92	89.53
Hausman Test p value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Constant term is included but suppressed. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1

Our results suggests that the negative relationship between E-investing and REIT returns is persistent as the analysis involves both long-term (full sample, 2003-2019) and mid-term (post-GFC sub-sample 2011-2019) periods. This finding seems rather counter-intuitive because a higher environmental score intuitively positively related to cost-effectiveness and better financial performance (e.g., Derwall et al., 2005; Guenster et al., 2011; Eichholtz et al., 2012). Nevertheless, some studies (Eichholtz et al., 2012; Coën et al., 2018) reported insignificant results for portfolio greenness and financial performance of REITs, or even found a negative relationship between high costs of certification and firm value (Mariani et al., 2018) and

environmental regulation and firm value (e.g., Brounen and Marcato, 2018; Rassier and Earnhart, 2010). As discussed previously, the negative results provide evidence for the trade-off hypothesis – i.e., environmental activities involve high financial costs that may drain off capital and result in declining market returns. Empirical literature reveals some plausible explanations for this negative relation, as well. For instance, Guenster et al. (2011) claimed that eco-efficiency is value-relevant but is incorporated slowly into a company's stock price. In the same line of time-effect argument, several studies (e.g., Derwall et al., 2011; Brounen and Marcato, 2018; Brounen et al., 2021) argued that environmental awareness has needed longer to gain any positive performance impact. While costs have a clear footprint in the short-term profit and loss accounts, the benefits of ESG investment are intangible, difficult to quantify/measure, and materialise only in the longer term. Hence, it could be argued that high costs of certification and environmental regulation in support of trade-off hypothesis, and also time-effect argument may play a role in this negative relationship.

5. Conclusion

Now, more than ever, investors understand the value of integrating ESG metrics into their investment decisions to reduce risks and discover opportunities hence they influence corporates' resource-allocation decisions. Existing knowledge on the financial effects of corporate social investing through ESG criteria remains fragmented and scarce for the REIT industry. Using a rich dataset comprising 234 ESG-rated REITs across five developed economies from 2003 to 2019, this paper examines the relationship between ESG investing and the financial performance of REITs.

The study contains four main findings. First, REIT investors pay attention to individual E/S/G metrics and price each component of ESG investing differently. A focus on the singular elements of ESG investment provides valuable insights into the costs and benefits of corporate social performance beyond those that aggregate ESG score could measure. Second, we find strong support for the trade-off hypothesis in our full-sample analysis of 234 REITs in the 2003-2019 period. REITs' environmental activities such as owning green building certifications, adopting land conservation and eco-friendly building design techniques, and reducing emissions at buildings involve high financial costs that may drain off company resources and result in diminishing market returns. The environmental component of ESG investment (E-investing) is negatively associated with REITs' excess return and positively related to the systematic risk, whereas social (S-investing) and governance (G-investing) components have no significant association with the financial performance of REITs. Third, stock market investors have attached a higher value to REITs' social performance – e.g., supporting community organizations, having inclusive and diverse workforces, providing a safe working environment for employees – in the post-GFC period, from 2011 to 2019. More specifically, S-investing has generated significant financial impacts as the S-score has a strong positive association with excess return and the Sharpe ratio, and a negative association with the systematic firm risk. A positive premium for S-investing supports the social impact hypothesis; REITs that aim to lower their implicit costs by reducing or ignoring socially responsible actions will incur higher explicit costs, giving rise to competitive disadvantage. Fourth, the evidence is not strong for the governance component of ESG-investing, indicating

that governance practices have not improved the financial performance of REITs over the 17-year study period. Overall, our findings suggest that E/S/G investments have different implications for the financial performance of REITs. Whilst E-investing and financial performance relationship is best explained by the trade-off hypothesis, the relationship between S-investing and corporate financial performance is explained by the social impact hypothesis.

Empirical investigations on the CSP-CFP nexus employing ESG ratings in a cross-country REIT market framework, specifically in developing REIT markets, have not received sufficient attention to date. Future studies could explore cross-country comparisons over a more extended period of time adopting alternative estimation methods that may provide more informative evidence on the theoretical and the empirical framework.

Compliance with Ethical Standards

The authors have no conflicts of interest to declare that are relevant to the content of this article.

No funding was received to assist with the preparation of this manuscript.

References

Abrigo, M. R. and Love, I. (2016). Estimation of panel vector autoregression in Stata. The Stata Journal, 16(3): 778-804.

Auer, B.R. and Schuhmacher, F. (2016). Do socially (ir)responsible investments pay? New evidence from international ESG data, The Quarterly Review of Economics and Finance, 59: 51-62.

Aupperle, K. E., Carroll, A. B., & Hatfield, J. D. (1985). An empirical examination of the relationship between corporate social responsibility and profitability. Academy of management Journal, 28(2), 446-463.

Bassen A., Senkl, D. (2011). ESG—environmental, social, governance issues. Die Betriebswirtschaft 71:506–509.

Bauer, R., Eichholtz, P.M.A., Kok, N. (2010). Corporate governance and performance: the REIT effect. Real Estate Economics 36: 1–29.

Bianco, C., Ghosh, C., and Sirmans, C.F. (2007). The impact of corporate governance on the performance of REITs. The Journal of Portfolio Management, 33(5):175-191.

Bouslah K., Kryzanowski L. and M'Zali B. (2013). The impact of the dimensions of social performance on firm risk, Journal of Banking and Finance. 37:1258–1273.

Brounen, D., & Marcato, G. (2018). Sustainable Insights in Public Real Estate Performance: ESG Scores and Effects in REIT Markets. *Berkeley Lab.: Berkeley, CA, USA*.

Brounen, D., Marcato, G. and Op't Veld, H. (2021). Pricing ESG equity ratings and underlying data in listed real estate securities. Sustainability, 13(4): 2037.

Cajias, M., Fuerst, F., McAllister, P., and Nanda, A. (2014). Do responsible real estate companies outperform their peers? International Journal of Strategic Property Management, 18(1): 11-27.

Campbell, R.D., C. Ghosh, M. Petrova, and C.F. Sirmans. (2011). Corporate governance and performance in the market for corporate control: The case of REITs. Journal of Real Estate Finance and Economics, 42(4):451-480.

Carhart, M.M. (1997). On persistence in mutual fund performance. Journal of Finance, 52 (1): 57–82.

Carroll, A. (1999). Corporate social responsibility. Business & Society, 38(3): 268.

Chang K., Kim I., and Li, Y. (2014). The heterogeneous impact of corporate social responsibility activities that target different stakeholders. Journal of Business Ethics, 125 (2):211–234

Cheng B., Ioannou I., Serafeim, G. (2014). Corporate social responsibility and access to finance. Strategic Management Journal, 35 (2):1–23

Coën, A., Lecomte, P., and Abdelmoula, D. (2018). The financial performance of green REITs revisited. Journal of Real Estate Portfolio Management, 24(1): 95-105.

Cornell, B., & Shapiro, A. C. (1987). Corporate stakeholders and corporate finance. Financial Management, 5-14.

Derwall, J., Koedijk, K., & Ter Horst, J. (2011). A tale of values-driven and profit-seeking social investors. Journal of Banking & Finance, *35*(8), 2137-2147.

Derwall, J., Guenster, N., Bauer, R., Koedijk, K., 2005. The eco-efficiency premium puzzle. Financial Analyst Journal 61 (2), 51–63.

Eccles R.G., Ioannou I., Serafeim, G. (2014) The impact of corporate sustainability on organizational processes and performance. Management Science, 60 (11):2835–2857

Eichholtz, P., Kok, N., & Yonder, E. (2012). Portfolio greenness and the financial performance of REITs. Journal of International Money and Finance, 31(7): 1911-1929.

Eichholtz, P., Kok, N., & Quigley, J. M. (2013). The economics of green building. Review of Economics and Statistics, 95(1), 50-63.

Fama, E.F., French, K.R. (1993). Common risk factors in the returns on stocks and bonds. Journal of Financial Economics, 33 (1): 3–56.

Friede, G., Busch, T. and Bassen, A. (2015). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies' Journal of Sustainable Finance & Investment, 5(4): 210-233.

Friedman, M. (1970). The social responsibility of business is to increase its profits. New York Times Magazine, September 13: 32-33, 122, 124, 126.

Fuerst, F. (2015). The financial rewards of sustainability: A global performance study of real estate investment trusts. Available at SSRN 2619434.

Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Boston: Pitman.

Garcia, A. S., Mendes-Da-Silva, W., and Orsato, R. J. (2017). Sensitive industries produce better ESG performance: Evidence from emerging markets. Journal of Cleaner Production: 150: 135-147.

Ghosh, C. and Petrova, M. (2020). The effect of legal environment and regulatory structure on performance: cross-country evidence from REITs. The Journal of Real Estate Finance and Economics, 1-42.

Ghosh, C., Sirmans, C.F., 2003. Board independence, ownership structure and performance: evidence from real estate investment trusts. Journal of Real Estate Finance and Economics, 26 (2): 287–318.

Guenster, N., Bauer, R., Derwall, J., and Koedijk, K. (2011). The economic value of corporate eco-efficiency. European financial management, 17(4): 679-704.

Hartzell, J., Sun, L. and Titman, S. (2006). The effect of corporate governance on investment: evidence from REITs. Real Estate Economics, 34 (3): 343-76.

Hausman, J. A. (1978). Specification tests in econometrics. Econometrica: Journal of the Econometric Society, 1251-1271.

Ho, K. H., Rengarajan, S., & Lum, Y. H. (2013). "Green" buildings and Real Estate Investment Trust's (REIT) performance. *Journal of Property Investment & Finance*, 31(6(: 545-574.

IEA. (2019). The 2019 Global status report for buildings and construction. Technology Report.Available at: https://www.iea.org/reports/global-status-report-for-buildings-and-construction-2019 (accessed on 12 April 2021)

Ioannou I., and Serafeim, G. (2012) What drives corporate social performance? The role of nation-level institutions. Journal of International Business Studies, 43 (9):834–864.

Van der Laan, G., Van Ees, H., & Van Witteloostuijn, A. (2008). Corporate social and financial performance: An extended stakeholder theory, and empirical test with accounting measures. Journal of Business Ethics, *79*(3), 299-310.

Mariani, M., Amoruso, P., Caragnano, A., & Zito, M. (2018). Green real estate: does it create value? Financial and sustainability analysis on European green REITs. International Journal of Business Management, 13.

Maury, B., and Pajuste, A. (2005). Multiple large shareholders and firm value, Journal of Banking and Finance, 29 (7): 1813-1834.

McDougall, M. (2020) Investment trusts for responsible investing. Nov. 12, Investors' Chronicle. Available at: https://www.investorschronicle.co.uk/funds-etfs/2020/11/12/investment-trusts-for-responsible-investing/ (accessed on 15 April, 2021).

McGuire, J. B., Sundgren, A. and Schneeweis, T. (1988). Corporate social responsibility and firm financial performance. Academy of Management Journal, 31: 854-872.

Morri, G. Anconetani, R. and Benfari, L. (2020). Greenness and financial performance of European REITs. Journal of European Real Estate Research. Vol. ahead-of-print.

Nareit. (2019). Nareit guide to ESG reporting frameworks. Available at: https://www.reit.com/sites/default/files/media/PDFs/Research/Nareit_Guide_to%20ESG_Reporting_2_21_19.pdf (accessed on 8 April 2021).

Newell, G. and Lin Lee, C. (2012). Influence of the corporate social responsibility factors and financial factors on REIT performance in Australia. Journal of Property Investment & Finance, 30(4): 389-403.

Newell, G., Wen Peng, H., & Yam, S. (2011). Assessing the Linkages between Corporate Social Esponsibility and A-Reit Performance. Pacific Rim Property Research Journal, *17*(3), 370-387.

Ooi, J. T., & Dung, D. D. (2019). Finding superior returns in green portfolios: evidence from Singapore REITs. Journal of Sustainable Real Estate, *11*(1), 191-215.

Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate social and financial performance: A meta-analysis. Organization studies, 24(3), 403-441.

Orlitzky, M. and Benjamin, J. D. (2001). Corporate social performance and firm risk: A meta-analytic review. Business and Society, 40(4): 369-396.

Preston, L. E., & O'bannon, D. P. (1997). The corporate social-financial performance relationship: A typology and analysis. Business & Society, *36*(4), 419-429.

Rassier, D. G., & Earnhart, D. (2010). Does the porter hypothesis explain expected future financial performance? The effect of clean water regulation on chemical manufacturing firms. Environmental and Resource Economics, 45(3), 353-377.

RICS. (2013). Global sustainability and commercial property valuation. Professional Guidance. 2nd Ed. London, UK.

Sah, V., Miller, N., & Ghosh, B. (2013). Are green REITs valued more? Journal of Real Estate Portfolio Management, 19(2): 169-177.

Sassen, R., Hinze, A. K., & Hardeck, I. (2016). Impact of ESG factors on firm risk in Europe. Journal of Business Economics, 86(8), 867-904.

Siew, R.Y.J. (2015). Predicting the behaviour of Australian ESG REITs using Markov chain analysis. Journal of Financial Management of Property and Construction, 20(3): 252 - 267

Smith, D. J. (2013). Valuing Interest Rate Swaps UsingOvernight Indexed Swap (OIS) Discounting. The Journal of Derivatives, 20(4), 49-59.

United Nations Environment Programme (2019). 2019 Global status report for buildings and construction. Available at: https://wedocs.unep.org (accessed on 10 April 2021).

Van Beurden, P., & Gössling, T. (2008). The worth of values–a literature review on the relation between corporate social and financial performance. Journal of Business Ethics, 82(2), 407-424.

Wartick, S. L., and Cochran, P. L. (1985). The evolution of the corporate social performance model. Academy of Management Review, 10(4): 758-769.

Westermann, S., Niblock, S. J., & Kortt, M. A. (2019). Does it pay to be responsible? Evidence on corporate social responsibility and the investment performance of Australian REITs. Asia-Pacific Journal of Accounting & Economics, 1-18.

Westermann, S., Niblock, S., & Kortt, M. (2018). Corporate social responsibility and the performance of Australian REITs: A rolling regression approach. Journal of Asset Management, 19(4): 222-234.

Waddock, S.A. and Graves, S.B. (1997). The corporate social performance-financial performance link. Strategic Management Journal, 18 (4): 303-319.

Wooldridge, J. M. (2019). Introductory econometrics: A modern approach. Cengage learning.