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EUROPEAN PUBLIC REAL ESTATE ASSOCIATION

Measuring the ESG Impact on Listed Real Estate Performance

An Analysis of EPRA's sBPR Database

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EXECUTIVE SUMMARY

ESG has become a standard for modern investment management. In an era where the literature on factor investing has inspired institutional investors around the world to tilt their portfolios towards small growth firms with stock momentum, the empirical evidence on the return effects on the values of ESG performance is scarce. Yet, many investors consider ESG metrics when screening their investments.

By analyzing the adoption of EPRA's Sustainability Best Practices Recommendations (sBPR), we examine and discuss the application of transparent Environmental, Social and Governance (ESG) ratings and their interaction with public real estate performance across European markets. Due to the increasing concerns about the environment and society at large, the public fund market has made significant progress on improving transparency and enhancing the protection of investor value by sharing and reporting ESG best practices. We explore and review the EPRA sBPR database, which is highly useful for investors who are already screening listed real estate companies. Hence, in this project, we carefully study the diffusion process of this new ESG metric as a tool to enhance informational transparency regarding public real estate fund management and assess the effects of this transparency and ESG performance for the real estate stock returns.

Our results show that both ESG measures covariate across firms. In other words, firms that score high on ESG completeness, also tend to score higher than average on ESG performance. Perhaps, a case of reverse causality in which poorly performing firm shy away from reporting their ESG completely. Furthermore, we find that both ESG scores are higher for the larger firms in our sample, and among the sBPR gold award winners. The latter does not come as a surprise, because the sBPR awards are partially based on ESG completeness scores. The fact that ESG scores covary with firm size is important, as this means that we need to control for firm characteristics when properly examining the effects of ESG scores on listed real estate returns. We analyze this issue in a set of multivariate regressions on firm stock returns in which controls for firm size, leverage, ownership, and property portfolio size are added. In these regressions, we find a positive and significant effect for ESG completeness and ESG performance for the ESG aspects energy and greenhouse gasses. Apparently, stock investors already identify and appreciate the progress that European listed real estate firm make when it comes to their reduction in energy usage and greenhouse gas emissions. Moreover, ESG completeness also increases returns regarding energy certification, social impact and governance scores. The more firms report on these matters, the better these subsequent returns evolve. Whether the actual performance on the ESG measures is also leading up to stock outperformance is still too soon to tell, as our data limitations don't allow for any significant estimations on these at this point in time.

These results are important for investors and fund managers, as we show that ESG not only matters, but also that thanks to EPRA's sBPR, it is swiftly evolving into a transparent quality of listed real estate firms. The extent to which firms cooperate in initiatives like the sBPR database can help them to improve their return profile. Given the successful but short history of EPRA's sBPR database, our analysis is still limited. We are certain that more data will soon become available and help to identify and measure the merits of ESG efforts within the European public real estate market. We therefore encourage future research on the matter and on this new and unique database.

Content table

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1. Introduction

In 2015, the United Nations COP21 Paris conference resulted in 174 nations signing a climate treaty with the objective of limiting global warming to 2 degrees versus pre-industrial levels. Institutional investors are under increasing pressure from governments, regulators and other stakeholders to contribute to this goal. We believe the listed real estate sector could play a pivotal role in achieving these aspirations, as real estate accounts for well over 30 percent of all greenhouse gas emissions. Furthermore, pension funds and other investors are looking for investment opportunities through which they can make a positive contribution to the societal challenges of tomorrow. Large institutional investors have invested over 8 percent of their assets in real estate and are expected to increase their allocation in the coming years . Publicly listed real estate investment firms are often used as a convenient and liquid means to build up this real estate exposure, as their stock market listing offers investors clear advantages when it comes to trading and portfolio management. At the start of 2020, investors could choose between no less than 800 publicly listed real estate investment firms, varying widely in portfolio size, focus and investment strategies.

During their selection process, investors are considering and screening for specific features that align with both their financial aims and their purpose. A wide range of environmental, social and corporate governance (ESG) metrics has become available to investors. Metrics that can help them select investments that fit best with their corporate aspirations and ambitions. But an objective discussion and evaluation of the available ESG metrics in the listed real estate market is still missing. Moreover, thus far, very little is known and analyzed regarding the interlink between these ESG scores and the financial public real estate performance. Some investors fear the initial marginal costs of ESG investments, while others are weary about the long-term risk of unsustainable stranded real estate assets. During a lack of evidence, opinions will differ about the net effect of ESG in real estate performance. Given the importance of the ESG themes, it is high time that empirical evidence is added to these opinions.

Thus far, the academic literature on public real estate has only provided evidence on the hypothesized relationship between energy efficiency (as part of the broader ESG) and real estate asset performance. At the asset level, most of the available research focuses on the commercial private real estate sector, which arguably represents a more efficient market with more rational agents (see Eichholtz et al., 2010). Unfortunately, the finance literature on ESG / sustainability and real estate on a portfolio level is still very limited. Eichholtz, Kok and Yonder (2012) studied the U.S. Real Estate Investment Trust (REIT) market and documented a link between energy efficiency and sustainability of properties and the operating and stock performance of a sample of publicly listed REITs. Their evidence suggests a positive relation between the greenness of the portfolio – measured as the percentage of LEED and Energy Star certifications - and three measures of operating performance; return on assets, returns on equity, the ratio of funds from operations to total revenues. Green REITs performed better, both operationally and in their stock performance.

In this paper, we broaden the analysis by focusing on ESG instead of sustainability. We examine the unique database that underlies the newest ESG metric for European public real estate – EPRA's sBPR. Our results show both ESG completeness and ESG performance covary across firms. In other words, firms that score high on ESG completeness, also tend to score higher than average on ESG performance. Furthermore, we find that both ESG scores are higher for the larger firms in our sample, and among the sBPR gold award winners. Our return regressions offer evidence for a positive and significant return effects for ESG completeness and ESG performance, especially regarding the ESG aspects energy and greenhouse gasses. Moreover, ESG completeness also increases returns regarding energy certification, social impact and governance scores. The more firms report on these matters, the better these subsequent returns evolve.

We contribute to the literature, by converting detailed firm level ESG data into objective measures for ESG transparency and ESG performance, tailored to the public real estate market. We continue our analysis with a clear expose on EPRA's sBPR data, after we review the most relevant literature on ESG and ESG measurement. We then introduce and present the ESG metrics that we construct using the sBPR data, and we discuss the variation in these ESG scores within the European listed real estate market. The effects of these ESG scores on public real estate performance are studied by means of multivariate regressions, and the most important results and their implications are summarized in our conclusions.

2. Literature review

2.1. ESG

Environmental, social and governance (ESG) refer to the three central factors in measuring the sustainability and ethical impact in a company. Including these non-financial considerations into financial asset decision dates back to the 1950s and 1960s when US pension funds managed by Trades Unions recognized this opportunity to affect a wider social environment using their capital assets (Roberts, 1958). This started with small initiatives focused on specific social needs, like affordable housing, but soon extended to broader ethical issues like the repugnance of apartheid in South-Africa. Today, a wide range of ESG aims and goals has been identified, and various means and manners have emerged to incorporate these issues into the investment process.

In the finance literature, these ESG metrics have been put to the test, to assess the interlink between ESG ratings and corporate financial performance. This interlink is complex, as ESG criteria can reduce the investment universe and thereby reduce the available diversification benefits, and enhance the risk of ESG frontrunners. Moreover, ESG screening also introduces additional costs into the investment selection process. These information and screening costs are easy observable in the short-term, while the benefits of ESG practices are often intangible, difficult to quantify, and materialize in the long term similarly to R&D investments (Lev et al. 2005). Derwall et al. (2011) evaluated the stock performance of US firms for the period 1992-2008, using KLD as ESG metric to distinguish leaders and laggards. Their results show that low-scoring ESG firms (sin stocks) outperform in the short run, these profit-generating opportunities do not persist in the longer run. Enforcing high ESG standards may weaken returns initially, in the long run this return difference vanished, as high ranking ESG firms catch up.

2.2. ESG IN REAL ESTATE

Overall the empirical evidence on integral ESG scores is very limited within the real estate literature. Instead, E, S and G have been mostly analyzed separately using different metrics and markets. Especially sustainability has been studied, internationally. Eichholtz, Kok and Yonder (2012) studied the U.S. Real Estate Investment Trust (REIT) market and documented an empirical link between energy efficiency and sustainability of properties and the operating and stock performance of a sample of publicly listed REITs. Their evidence suggests a positive relation between the greenness of the portfolio – measured as the percentage of LEED and Energy Star certifications - and three measures of operating performance; return on assets, returns on equity, the ratio of funds from operations to total revenues. Green REITs performed better, both operationally and in their stock performance. Fuerst (2015) studied the performance effects that coincided with the GRESB ratings for REIT in North America, Asia and Europe for the period 2011-2014. Although data coverage was still very weak during this early period,

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Fuerst (2015) reported that high sustainability scores resulted in enhanced operational performance and lower stock market risks. Mariani et al. (2018) focused on the European listed real estate markets, using LEED and certifications as metrics for REIT sustainability. Contrary to the earlier work, Mariani et al (2018) document that the percentage of certified building in the European REITs portfolios has a negative impact on ROA, ROE and stocks' alphas while also improving the stocks' beta. According to the authors, this is mainly due to the incremented costs related to the refurbishments and adjustments processes needed to obtain the BREEAM and LEED certification.

Regarding the social aspects of ESG, the literature is thin. Ferrell et al. (2016) applied MSCI's Intangible Value Assessment (IVA) database to identify the voluntarily initiated aspects of corporate social responsibility (CSR) for a sample 1,500 companies worldwide during the period 1999 – 2011. Using an instrumental variable approach, they document that CSR ratings are higher for companies with fewer agency problems and that certain aspects of CSR (e.g., labor and social protection) are associated with increased executive pay-for-performance sensitivity and the maximization of shareholder value. For real estate investment, and US REITs specifically, Fuerst et al (2011) offer evidence for a positive relationship between CSR ratings and Tobin's Q. Using the KLD data during a 2003-2010 sample of US REITs they document that this spread in firm valuation is mainly due to a negative effect for low scoring CSR REITs, positive scores had no compelling effects on REIT returns.

Regarding the governance aspects of REITs, Cannon and Vogt (1995) were among the firsts to empirically analyze the performance effects of two competing governance structures in the market – the "self-administered" versus the "advisor" REITs. The first outperformed, also after correcting for their greater market risk. The authors also found traces of ownership structure within the return variations, indicating that shareholder structure and involvement can have materials effects in this market. Bauer et al (2010) have built on this work and have used the Corporate Governance Quotient Index (CGQ) - a metric developed by Institutional Shareholder Services (ISS) that rates publicly traded companies in terms of the quality of their corporate governance - and firm performance. They uncover a significant and positive relationship but only for US REITs with low dividend payout ratios. Anglin et al (2013) studied the relationship between corporate governance and REITs' earnings management. Their findings indicate that, despite the unique legal and reporting structure, REITs engage in certain forms of earnings management, and that the ability for REITs to manipulate earnings is reduced when corporate governance is more effective. In other words, also within the strongly regulated REIT regime, setting high corporate governance standards can create value for investors.

In all cases, studies have been focused on aspects of ESG, and have been limited by their choice of metrics. In this study, we hope to profit from the emergence of EPRA's sBPR scores that have become available recently.

2.3.   ESG MEASUREMENT AND METRICS

The ecosystem of organizations that provide ESG data is vast and products offered range from a wide variety of overall rating scores (sometimes including sub-dimensions), ratings on specific issue areas, overall rankings of companies based on specific scores, as well as tools providing evaluation of companies' ESG performances. According to the Global Initiative for Sustainability Ratings, over 100 organizations are collecting data, analyzing, and rating or ranking company ESG performance today (GISR, 2018).

Even though there has been substantial consolidation of rating agencies over the course of the last 30 years, the diversity of these data vendors remains impressive. Some of these organizations are for

profit, others are non-profit, and some have a subject matter focus, such as climate (e.g., the former Carbon Disclosure Project, CDP) or human rights (e.g., Corporate Human Rights Benchmark), while others focus on the entire range of issues covered under ESG. Increasingly, data vendors also diversify their service offering, moving away from only selling data and research to investors, to offering consulting services and including multiple technology and management solutions in their portfolio, such as application programming interfaces (APIs) that feed ESG data directly onto corporate servers or advise on ESG integration into wider investment strategies and engagement. Additionally, data vendors increasingly face pressures to grow and internationalize the universe of companies they cover, as data users seek ever larger quantities of data to benchmark their analyses. A trend which supports consolidation and benefits larger data vendors.

Depending on the topic and geographical focus, data vendors collect the ESG information needed for rating periodically (usually annually) and in a variety of ways. They use surveys to companies, analyses of company documents (e.g., sustainability reports), interviews with company personnel and other stakeholders (such as trade unions, NGOs, etc.), and, increasingly, natural language processing and artificial intelligence technologies to scrape the web of unstructured data (e.g., TruValue Labs). Some also collect surveys to individuals to capture perceptions of companies along various dimensions (e.g., Corporate Human Rights Benchmark, Ethisphere, JUST Capital, and Reputation Institute). Data will be used in different ways to create a specific range of indicators, representing qualitative and quantitative data dimensions, frameworks, and conventions which data vendors design. Each vendor has their own trade-marked methodology to sell data with a specific value proposition. However, since transparency about indicators and methodologies used is low, the distinct contribution of diverse methodologies is not always obvious.

3. The EPRA sBPR Database

In this project, we make good use of the EPRA sBPR database. In Table 1, we give an overview of the different aspects of E, S, and G and how these are weighted across different metrics, including EPRA's sBPR. This directly yields an interesting first finding, as the weights that these metrics use differ significantly. For instance, the Thomson Reuters measure assigns equal weights to the three categories of E, S and G scores, while GRESB overweights the environmental impact as this accounts for 57 percent of the overall score. Instead, KLD assigns more importance to Governance with a score weight of 58 percent. This shows that when having to choose between the aggregate ESG score of Thomson Reuters, GRESB and MSCI KLD, one needs to be weary of the underlying variations, since these can result in very different outcomes using the same set of raw data.

This issue is very different in EPRA's sBPR database. EPRA's sBPR has been designed to raise the standards and consistency of sustainability reporting for listed real estate companies across Europe. First published in 2011, the third edition of the sBPR was published in September 2017 to align with established reporting initiatives in the real estate sector, and to establish common metrics to support companies with their reporting on wider social and governance issues as set out in Directive 2014/95/EU of the European Parliament and of the Council on the disclosure of non-financial and diversity information . The sBPR complement the existing and well established EPRA Financial BPR. Each year, a panel of sustainability reporting experts scores each eligible company's public disclosure against several areas of the EPRA sBPR Guidelines, including 28 different performance measures, consisting of environmental, social and governance items, and 10 overarching recommendations which

underpin good quality disclosure and should be applied when reporting EPRA's sBPR Performance Measures.

Table 1: ESG metric weighting schemes

	GRESB	Thomson Reuters	KLD MSCI	EPRA sBPR
E (Environmental)	57%	34%	17%	70%
Energy score	✓	✓	✓	✓
GHG score	✓	✓	✓	✓
Waste score	✓	✓	✓	✓
Water score	✓	✓	✓	✓
Technical building assessment	✓		✓	
Monitoring management system	✓	✓		
Building certifications	✓			✓
Raw material sourcing		✓	✓	
Biodiversity and land use		✓	✓	
Environmental policy				
Environmental supply chain incidents				
S (Social)	18%	36%	25%	20%
Sustainability community engagement	✓			
Community engagement impact	✓	✓		✓
Tenants engagement and satisfaction	✓			
Employee's training and satisfaction	✓	✓	✓	✓
Product liability		✓	✓	
Controversial sourcing			✓	
Social opportunities			✓	
Policy on freedom of association		✓		
Policy on elimination of discrimination		✓		
Customer responsibility		✓		
Diversity				✓
G (Governance)	25%	30%	58%	10%
Management / Corporate governance	✓	✓	✓	✓
Policy and disclosure	✓	✓	✓	✓
Sustainability risk assessment	✓			
Tax transparency			✓	
Anti-competitive practice			✓	
Signatory of UN global compact				

EPRA has compiled a methodological framework that carefully assesses ESG transparency and yields an ESG disclosure score . Companies wishing to comply with EPRA's sBPR standard must disclose their sustainability data against the 28 EPRA's sBPR Performance Measures (16 on Environmental, 9 on Social, and 3 on Governance) and a set of 10 guiding principles, i.e. the Overarching Recommendations which are the principles to apply to the disclosure of each performance metrics. Their disclosure must be made public in either their annual reports or corporate social responsibility report, or if preferred

using a standalone documentation. The subsequent review of these sBPR data items occurs in a structured process, starting with a detailed primary review of annual reports, which is initiated by sustainability reporting experts at the end of the second quarter of the year, using a scorecard based directly on the EPRA sBPR. The total points are evenly distributed over the Performance Measures and the Overarching Recommendations (50%-50% weighting scheme). Within these two categories, different weighting schemes are applied, i.e. 70-20-10 weighting for the E, S and G impact categories within the Performance measures while a [2.5%,10%] range for the Overarching Recommendations. The score over the Performance Measures and the Overarching Recommendations is then aggregated into one ESG score at firm level. A second review by a different member of the team is then carried out to ensure data consistency. Any discrepancies between the primary and secondary review scores are double checked and addressed.

The increasing number of reporting companies and the progressing harmonization of them within the standard, allowed EPRA to start a data collection exercise that became the sBPR database., launched in September 2019 and which includes sBPR data of EPRA members reporting sBPR data since 2011 .Using the raw data on the sBPR data items collected for each company and included in the sBPR database, we define two measures of ESG compliance:

- The sBPR ESG completeness score, which represents the percentage of data items for which data is available. Even if this measure does not directly relate to the effectiveness of compliance, it indicates the ability of the company to provide data on ESG compliance. Therefore, it also represents a proxy for the emphasis each company gives to these themes, also collating appropriate data.

- The sBPR ESG performance score, which reflects the average percentage change in the data items. In particular, we firstly identify the following key items: Energy efficiency (incl. energy intensity, proportion of renewables), greenhouse gas emissions (scope 1-3), water management, total waste by disposal route, energy performance certification (incl. BREAM, BRAVE and LEED), social impact score (incl. health & safety, diversity, employee turnover, and community engagement), and corporate governance impact score. We then count the number of items for which improvements (i.e.. reduced energy intensity, increased proportion of renewable, etc.) have been achieved from year to the next. The percentage of improved data items forms our performance score.

For these public real estate firms, we collect firm characteristics (e.g. firm size, age, asset portfolio) from the Thomson Reuters and WRDS databases. For our analysis on real estate performance, we also collect time series on public real estate returns (both price and dividend) to assess any structural variations across our sBPR scores.

The sBPR database covers 64 different European listed companies, and we obtain data for the period 2011 to 2018. The sBPR panel is unbalanced both for companies – that entered and left the sample at different stages –, as well as for data items – with extension to S and G in 2017. Therefore, we limit our empirical analysis to the 2017 and 2018 data, when the panel is both consistent and balanced.

In Table 2, we present relevant summary statistics on the sampled firms, which show that their 2018 year-end average market value equalled €3.18 bln, an average leverage ratio of 40 percent, and an annualized total return of just over 12 percent. Apart from a difference in size - the sampled firms are larger than the ones in the EPRA universe - these Table 2 statistics are well aligned with the market at large. Around 60 percent of our sampled firms has a property portfolio that is invested in one single property type. We classified these firms as property type focused, and we incorporate this focus in our

subsequent ESG analysis. Also regarding the regional spread of the property portfolio, we gathered information, and discovered that 70 percent of the firms in our sample is regionally focused, investing in one (national) home market. Apart from these mean values, Table 2, also shows some disparities within this sample. Average total returns have ranged between almost -43 percent and +44 percent. One may wonder whether the ESG performance of firms has had any influence on their position within this range. Therefore, we start our descriptive analysis with a simple visualization of the ESG-Return relation.

Table 2: Sum stats (year-end 2018)

	Mean	Standard deviation	Min	Max
Market Value (mln. euros)	3.178,48	1.041.52	84.65	23.121,58
Total assets (mln. euros)	5.322,86	1.615,40	217,01	64.500,30
Debt/assets	0.40	0.06	0.00	1.03
Total return (annualized)	12.03%	20.09%	-42.71%	44.27%
Fraction closely held shares	0.24	0.06	0.00	0.99
Fraction property type focused firms	0.60	0.49	0.00	1.00
Fraction regionally focused firms	0.70	0.46	0.00	1.00

Market value (or market capitalization) is calculated by multiplying the number of its outstanding shares by the current share price, and is denominated here in million euros. *Total asset* refers to the total amount of assets owned by the companies in our sample, stated in million euros. *Debt/asset* is the debt to total assets ratio, and indicated a company's financial leverage. It tells you the percentage of a company's total assets that were financed by creditors. In other words, it is the total amount of a company's liabilities divided by the total amount of the company's assets. *Total return* refers to the average annualized total stock return of the firms in our sample, stated as percentage. *Fraction closely held shares* represent the percentage of outstanding shares held by insiders, which includes: corporate offices and directors, pension/benefit plans, individuals who hold 5% or more of the outstanding shares. For each firm in our sample, we also examined their property portfolio composition. We classified firms as property type focused, whenever at least 80 percent of their portfolio is invested in one property type. We classified firms as regionally focused, whenever at least 80 percent of their portfolio is invested in one and the same (national) home market.

Figure 1 plots the pair of the 2018 ESG completeness scores and the annualized total return for each firm in the sample. We use different color to indicate the sBPR Award that was handed out to each firm in 2018; green for gold, yellow for silver, and red for bronze. Let us start with the observation that award colors cluster in line with ESG scores, the bronze awards are found at the left of the chart where ESG completeness scores are lowest, while the golden awards dominate the right half of the scatter plot. On the vertical axis we have the total returns of each firm, and the fitted trend line reveals a slightly downward sloping trend. In other words, higher ESG completeness score are not associated with superior returns. The negative relation that is shown instead ought to be handled with caution as the explanatory power of the trend line falls short of 5 percent, indicating that other omitted determinants are relevant and should be considered in the modelling part of the study.

Figure 1: Scatter plotting total returns versus ESG completeness scores
(green = sBPR gold award winners, yellow = sBPR silver award winners, red = sBPR bronze award winners)
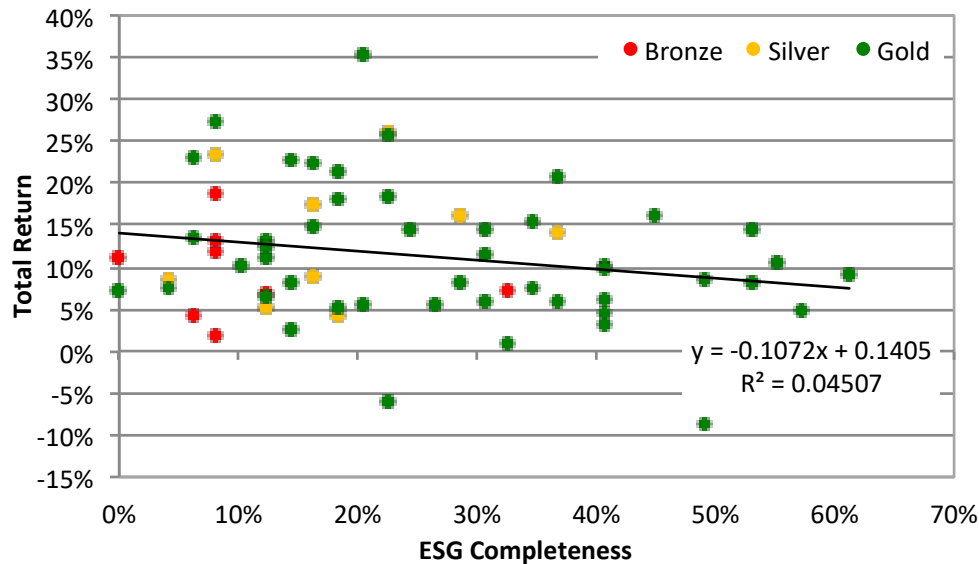

Figure 2: Scatter plotting size (market value) versus ESG completeness scores
(green = sBPR gold award winners, yellow = sBPR silver award winners, red = sBPR bronze award winners)
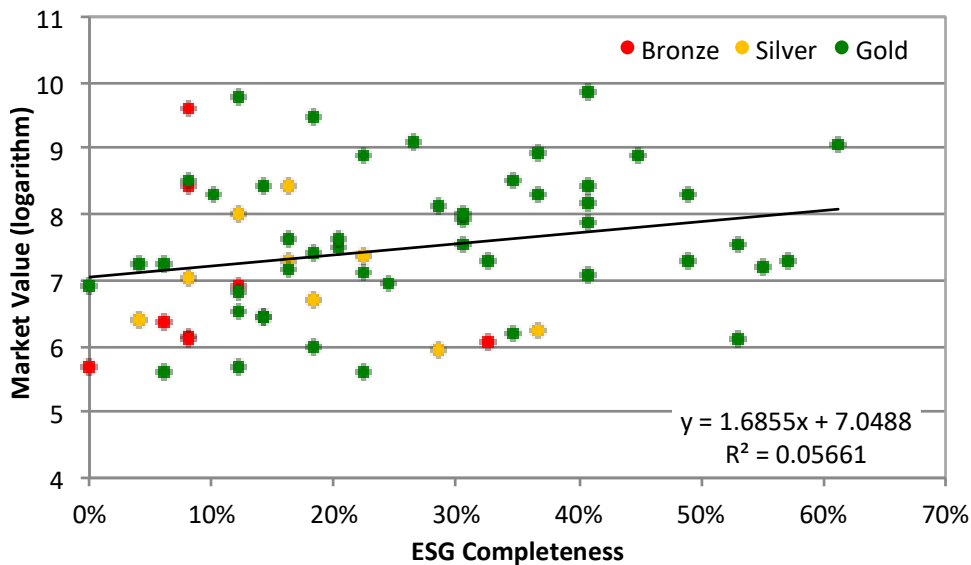

Figure 2 plots the pair of the 2018 ESG performance scores and the size (logarithm of market value to rescale the dimension to a more homogeneous measure) of each firm in the sample. Again, we continue to use a different color to indicate the 2018 sBPR Award. Awards cluster in line with ESG scores, the bronze awards (with some exceptions), tend to be of smaller sized firms, while silver awards show a slightly bigger dimension. Gold awards show a wide spread of sizes, even if the biggest companies in our sample tend to receive the highest award. Overall, the fitted trend line shows a slightly upward sloping trend, revealing a positive association between ESG score and company size. In other words, the

bigger the company size, the higher the ESG completeness score tends to be. In this case too, the slightly positive relation ought to be handled with caution as the explanatory power of the trend line is just above 5 percent, indicating that other omitted determinants are relevant.

Table 3: Sum stats of award categories (year-end 2018)

	MV (mean)	D/A (mean)	TR	Closely held
Gold	4.355,05	0.39	8.44%	0.22
Silver	3.360,79	0.37	12.09%	0.21
Bronze	2.150,71	0.44	13.42%	0.25

MV refers to the mean market value, *D/A* to the mean debt to asset ratio, *TR* to the average annualized total stock return, and *Closely held* to the fraction of closely held shares.
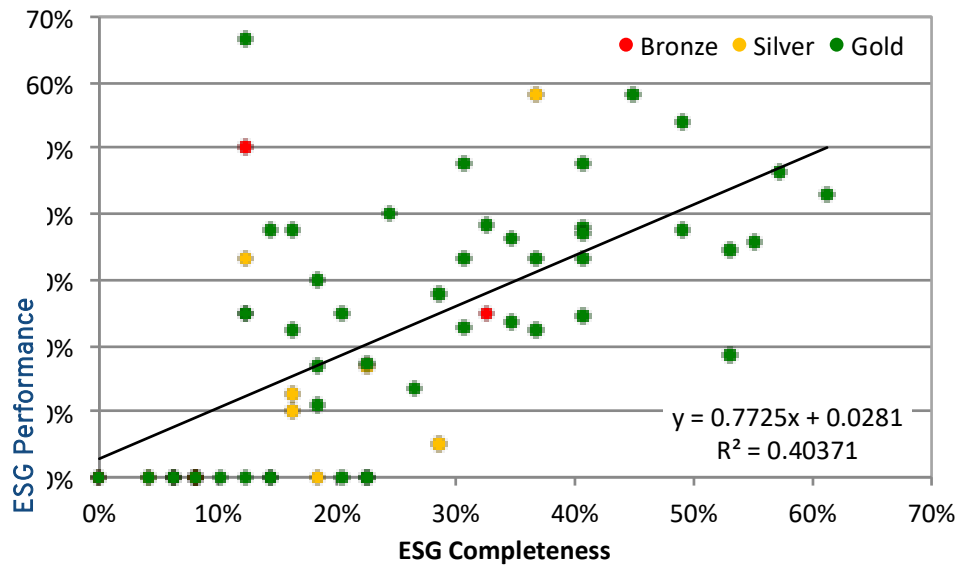
Therefore, we continue our descriptive analysis in table 3 with a clustered overview of the key summary statistics across the three sBPR award categories. Although the debt-to-asset ratios and the fraction of closely held shares show little consistence, we do find evidence that market values covariate with sBPR awards – gold award winners are twice as large as bronze awards. Given, that the available finance literature has shown that firm size and other characteristics matter for return dynamics, we need to correct for these variations in a regression analysis of stock performance.

Table 4: sBPR scores per award category (year-end 2018)

	ESG Completeness (% filled in of total)	ESG Performance (% improvers)
Gold	0.513	0.280
Silver	0.421	0.192
Bronze	0.331	0.169

Before, we present the estimation of our regression models, however, we also compare our sBPR scores of completeness versus performance. The first counts the number of completed data cells across all 51 sBPR ESG items, while performance measures refers to the number of items recording an ESG improvement. In Table 4, we show that these scores align very well with each other and with the sBPR 2018 awards. Gold award winners score highest on both accounts, while bronze awards have been granted to the lowest ends of both metrics. Figure 3 also shows the scatter plot of the two ESG scores, which reveals a positive relationship explaining more than 40 per cent of its variation. This finding suggests that a more complete questionnaire is normally associated to companies that are improving their ESG scores. Furthermore, this outcome reinforces our conjecture to measure ESG compliance via the completeness of the EPRA questionnaire as companies more aware and engaged in ESG activities also tend to monitor their position through data collection (and analysis).

Figure 3: Scatter plotting ESG performance versus ESG completeness scores
(green = sBPR gold award winners, yellow = sBPR silver award winners, red = sBPR bronze award winners)

4. Our Return Analysis

Our pricing analysis starts with examining firm specific returns using multivariate OLS regressions. These regressions are estimate on total returns for firm i (returni) for the year 2018 period. We explain the cross-sectional variations in these returns using different combinations of factors as follows. In equation (1) we estimate the pricing using the firm's characteristics that vary over time (Xijt) – e.g. age, size, portfolio composition, etc. – – and the ones that are allow for property-type (i.e. core, other and diversified) and portfolio location (national vs international) fixed effects (Zi). – e.g. property sector, investment style, etc.

$$return_i = \alpha + \sum_{j=1}^{m} \beta_j * X_{ji} + \sum_{k=1}^{p} \delta_k * Z_{ki} + \varepsilon_i \qquad (1)$$

In equation (2) we then add the sBPR score information to model specifications as follows:

$$return_i = \alpha + \sum_{j=1}^{m} \beta_j * X_{ji} + \sum_{k=1}^{p} \delta_k * Z_{ki} + \sum_{h=1}^{q} \lambda_h * scores_{hi} + \varepsilon_i \qquad (2)$$

In table 5, we present the results of these multivariate regressions for the sBPR Completeness scores. The regressions have been executed and reported for key items within the sBPR framework, starting with 'energy', and 'greenhouse gasses', all the way to 'social impact', and 'corporate governance'. Before, we discuss the results on the sBPR completeness scores, it is worth noting that control variables yield coefficients that are in line with expectations. Stock returns of the sampled listed real estate firms are higher for smaller (log total assets) companies, with lower debt ratio (LTV), and larger real estate portfolios (log sqm). This confirms the common notion that investors prefer and appreciate investment firms in commercial real estate (higher square meters) with low leverage and a potential for growth. The fraction of closely held shares by inside investors appears to have no pervasive effect on stock returns.

Table 5: Stock return regressions, including sBPR ESG completeness scores

	Energy	GHG	Water	Waste	Certificate	Social	Governance
Log(tot assets)	-0.022*	-0.022*	-0.018'	-0.016	-0.017'	-0.014	-0.014
	0.058	*0.058*	*0.115*	*0.184*	*0.123*	*0.176*	*0.21*
LTV	-0.18**	-0.153**	-0.146*	-0.135*	-0.118'	-0.147**	-0.124'
	0.023	*0.046*	*0.062*	*0.084*	*0.117*	*0.045*	*0.1*
Closely held shares	0.006	-0.01	-0.01	-0.002	0.009	-0.022	-0.018
	0.874	*0.784*	*0.808*	*0.954*	*0.82*	*0.554*	*0.637*
Log(sqm)	0.027**	0.028**	0.026**	0.024**	0.026**	0.02**	0.022**
	0.011	*0.01*	*0.017*	*0.035*	*0.014*	*0.047*	*0.034*
Completeness score	0.073*	0.07*	0.028	-0.004	0.083*	0.113**	0.054*
	0.056	*0.098*	*0.326*	*0.93*	*0.074*	*0.012*	*0.081*
Constant	0.065	0.055	0.041	0.049	0.009	0.065	0.023
	0.592	*0.652*	*0.743*	*0.702*	*0.939*	*0.582*	*0.853*
Property-type F.E.	Y	Y	Y	Y	Y	Y	Y
Portfolio location F.E.	Y	Y	Y	Y	Y	Y	Y
Adjusted R-squared	0.10	0.09	0.06	0.04	0.09	0.15	0.09
F-stat	2.35*	2.12*	1.7'	1.48	2.23*	3.02**	2.2*
DoF	51	51	51	51	51	51	51
Observations	60	60	60	60	60	60	60

In this table, we present our coefficient estimation for model (2) in which the variation in 2018 stock returns is explained by the ESG completeness scores, while controlling for the four most important company characteristics; firm size, leverage, ownership, and property portfolio size. These controls are estimated by *Log(total assets)*, which refers to the natural log of a firm's total assets, *LTV* which is the loan to value ratio, *Closely held shares* which is the fraction of shares held by insiders, and log(sqm) which is the natural log of the total square meterage of the property portfolio. The completeness score is estimated with several measures (energy usage, greenhouse gasses, water management, waste management, energy certification, social score and the governance score) and it should lead to higher performance (coefficients are expected to be positive). Coefficient estimates marked with (*) (**) (***) are statistical significantly different from zero on a 90%, 95% and 99% confidence interval. Below each coefficient, we also state the corresponding robust standard error. We have also estimated models assuming clustered errors by property type and individual REIT and results remain consistent.

Regarding the sBPR Completeness score, we find positive and significant coefficients, indicating that firms more aware and active in sustainability issues (hence reporting more sBPR data) are associated with higher returns. This positive result is strongest for the data on social impact performance, but also statistically significant for other measures: energy usage, greenhouse gasses, energy performance certification and corporate governance. For the data categories water and waste management results lack statistical significance. Therefore, we conclude that investors currently care most about the realized momentum regarding social impact, energy efficiency, and corporate governance.

Table 6: Stock return regressions, including sBPR ESG performance scores

	Energy (-)	GHG (-)	Water (-)	Waste (-)	Certificate (+)	Social (+)	Governance (+)
Log(tot assets)	-0.007	-0.001	-0.02'	-0.016	-0.017	-0.021'	-0.018
	0.537	*0.917*	*0.105*	*0.208*	*0.153*	*0.126*	*0.167*
LTV	-0.147*	-0.153**	-0.157**	-0.178**	-0.157*	-0.162*	-0.151'
	0.051	*0.030*	*0.049*	*0.042*	*0.057*	*0.090*	*0.112*
Closely held shares	-0.006	-0.047	0.011	0.001	0.014	-0.02	-0.006
	0.879	*0.197*	*0.778*	*0.978*	*0.728*	*0.648*	*0.884*
Log(sqm)	0.02*	0.014	0.025**	0.021*	0.027**	0.028**	0.028**
	0.055	*0.164*	*0.022*	*0.077*	*0.014*	*0.016*	*0.019*
Performance score	-0.138***	-0.18***	0.012	0.003	-0.035	0.068	0.039
	0.003	*0.001*	*0.808*	*0.945*	*0.366*	*0.570*	*0.839*
Constant	0.013	0.035	0.09	0.108	0.041	0.069	0.034
	0.915	*0.753*	*0.482*	*0.402*	*0.752*	*0.625*	*0.801*
Property-type F.E.	Y	Y	Y	Y	Y	Y	Y
Portfolio location F.E.	Y	Y	Y	Y	Y	Y	Y
Adjusted R-squared	0.21	0.31	0.05	0.04	0.08	0.06	0.05
F-stat	4.09***	6.1***	1.57	1.44	1.87'	1.66	1.56
DoF	49	49	46	39	45	43	43
Observations	58	58	55	48	54	52	52

In this table, we present our coefficient estimation for model (2) in which the variation in 2018 stock returns is explained by the ESG performance scores, while controlling for the four most important company characteristics; firm size, leverage, ownership, and property portfolio size. These controls are estimated by *Log(total assets)*, which refers to the natural log of a firm's total assets, *LTV* which is the loan to value ratio, *Closely held shares* which is the fraction of shares held by insiders, and log(sqm) which is the natural log of the total square meterage of the property portfolio. The performance score is estimated regarding different improvement measures: energy usage, greenhouse gasses, water management, waste management, energy certification, social score and the governance score. To indicate the expected sign for the ESG performance coefficient, we state (-) for hypothesized negative effects (e.g. higher use of energy or gasses should reduce performance), and (+) for hypothesized positive effects (e.g. better social and governance scores should relate to higher performance). Coefficient estimates marked with (*) (**) (***) are statistical significantly different from zero on a 90%, 95% and 99% confidence interval. Below each coefficient, we also state the corresponding robust standard error. We have also estimated models assuming clustered errors by property type and individual REIT and results remain consistent.

The same set of models are also estimated with the sBPR Performance scores replacing Completeness scores. In Table 6, we present our results, that confirm the main predictions of control variables but also tell a slightly different story as far as the sustainable measure is concerned. Contrary to sBPR Completeness, which is a monotonically increasing variable that is expected to have a positive effect on stock returns, sBPR Performance requires more nuances. In the performance score, we count the number of reported data items for which an increase over the years has been reported. But, while an increase in one data item should be interpreted as a positive accomplishment (as for example the percentage of energy performance certification (column 5) within the property portfolio), the same increase in energy usage (column 1) or greenhouse gas emissions (column 2) reflects an ESG deterioration. Therefore, we include an expected coefficient sign at the top of each column in Table 6 to

assist in the proper interpretation of results. Particularly, we find significant results for energy usage and greenhouse gas emissions. In both cases, the coefficients are negative as expected, because a reduction should be interpreted as a positive ESG change, which will be rewarded by higher stock returns. As far as other ESG performance measures are concerned, they do not seem to affect stock returns and coefficients lack statistical significance to allow for a proper economic interpretation. The fact that results are strong and compelling for energy use and greenhouse gas emissions might indicate that investors currently care most about these ESG performance measures, which are also more prominent in the climate change debates. At the same time, we should note that the lack of significance among the other performance measures may well be due to the lack of data. We are estimating these effects on a small sample, which limits our degrees of freedom. It may well be that also other ESG elements will become more material for real estate stock performance in the near future, when more observations become available. Finally, even if other omitted factors in our modeling exercise may lead to a higher goodness of fit, the low R-squared is generally in line with results in the mainstream finance literature on asset pricing. They particularly reveal the attention investors give to the actual measurement of energy usage and gas emissions, where 20 to 30 percent of the variability in returns is explained with our models using Performance scores.

This combination of regression results tells us that sBPR transparency pays off. Overall, investors reward sBPR data completeness with a return premium, which can be justified as a reward for data transparency that helps them to better select listed real estate firms within their own ESG framework. As sBPR performance – measured as the percentage of data items that shows increasements over time – is only recognized and awarded when it relates to energy usage and greenhouse gas emissions, this can be part of a learning curve in the market, in which more investors need to recognize sBPR data opportunities, also for ranking and selecting listed real estate firms based on other ESG aspects.

5.Conclusions and Implications

ESG has become a standard for modern investment management. In an era where the literature on factor investing has inspired institutional investors around the world to tilt their portfolios towards small growth firms with stock momentum, the empirical evidence on the return effects of ESG performance is scarce. Yet, many investors consider ESG metrics when screening their investments.

In this paper, we add to this empirical literature by analyzing EPRA's sBPR database for the listed European real estate market. A database that covers a wide variety of ESG aspects, and allows us to disentangle the return effects of each. In our analysis, we construct two ESG measures based on the sBPR data: ESG completeness – a measure of ESG transparency in which we report the fraction of filed data field -, and ESG performance – the fraction of ESG data fields that shows an improvement of the years. Both are computed for a sample of 64 European listed real estate firms.

Our results show that both ESG measures covariate across firms. In other words, firms that score high on ESG completeness, also tend to score higher than average on ESG performance. Perhaps, a case of reverse causality in which poorly performing firm shy away from reporting their ESG completely. Furthermore, we find that both ESG scores are higher for the larger firms in our sample, and among the sBPR gold award winners. The latter does not come as a surprise, because the sBPR awards are partially based on ESG completeness scores. The fact that ESG scores covary with firm size is important, as this means that we need to control for firm characteristics when properly examining the effects of ESG scores on listed real estate returns. We analyze this issue in a set of multivariate regressions on firm

stock returns in which controls for firm size, leverage, ownership, and property portfolio size are added. In these regressions, we find a positive and significant effect for ESG completeness and ESG performance for the ESG aspects energy and greenhouse gasses. Apparently, stock investors already identify and appreciate the progress that European listed real estate firm make when it comes to their reduction in energy usage and greenhouse gas emissions. Moreover, ESG completeness also increases returns regarding energy certification, social impact and governance scores. The more firms report on these matters, the better these subsequent returns evolve. Whether the actual performance on the ESG measures is also leading up to stock outperformance is still too soon to tell, as our data limitations don't allow for any significant estimations on these at this point in time.

Our results are important for investors and fund managers, as we show that ESG not only matters, but also that thanks to EPRA's sBPR, it is swiftly evolving into a transparent quality of listed real estate firms. The extent to which firms cooperate in initiatives like the sBPR database can help them to improve their return profile. Given the successful but short history of EPRA's sBPR database, our analysis is still limited. We are certain that more data will soon become available and help to identify and measure the merits of ESG efforts within the European public real estate market. We therefore encourage future research on the matter and on this new and unique database.

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Appendix

APPENDIX A: ABBREVIATION LIST

BPR	Best Practices Recommendations (Financial)
BREEAM	Building Research Establishment Environmental Assessment Method
CDP	Carbon Disclosure Project
CGQ	Corporate Governance Quote
COP21	Conference of the Parties, UN Climate Conference held in 2015 in Paris
CSR	Corporate Social Responsibility
EPRA	European Public Real Estate Association
EPC	Energy Performance Certificate
ESG	Environmental, Social and Governance
IVA	Intangible Value Assessment
LEED	Leadership in Energy and Environmental Design
REITs	Real Estate Investment Trusts
ROA	Return on Assets
ROE	Return on Equity
sBPR	Sustainability Best Practices Recommendations

Appendix

APPENDIX B: EPRA SUSTAINABILITY PERFORMANCE MEASURES, CODES, AND UNITS OF MEASUREMENT

ENVIRONMENTAL SUSTAINABILITY PERFORMANCE MEASURES

Code	Performance measure	Unit of measure
Elec-Abs	Total electricity consumption	annual kWh
Elec-LfL	Like-for-like total electricity consumption	annual kWh
DH&C-Abs	Total district heating & cooling consumption	annual kWh
DH&C-LfL	Like-for-like total district heating & cooling consumption	annual kWh
Fuels-Abs	Total fuel consumption	annual kWh
Fuels-LfL	Like-for-like total fuel consumption	annual kWh
Energy-Int	Building energy intensity	kWh/appropriate denominator
GHG-Dir-Abs	Total direct greenhouse gas (GHG) emissions	annual metric tonnes CO2e
GHG-Indir-Abs	Total indirect greenhouse gas (GHG) emissions	annual metric tonnes CO2e
GHG-Int	Greenhouse gas (GHG) emissions intensity from building energy consumption	tonnes CO2e/appropriate denominator
Water-Abs	Total water consumption	annual cubic metres (m3)
Water-LfL	Like-for-like total water consumption	annual cubic metres (m2)
Water-Int	Building water intensity	m2/appropriate denominator
Waste-Abs	Total weight of waste by disposal route	annual metric tonnes and proportion by disposal route
Waste-LfL	Like-for-like total weight of waste by disposal route	annual metric tonnes and proportion by disposal route
Cert-Tot	Type and number of sustainably certified assets	Total number by certification/

SOCIAL PERFORMANCE MEASURES

Code	Performance measure	Unit of measure
Diversity-Emp	Employee gender diversity	Percentage of employees
Diversity-Pay	Gender pay ratio	Ratio
Emp-Training	Employee training and development	Average hours
Emp-Dev	Employee performance appraisals	Percentage of employees
Emp-Turnover	New hires and turnover	Total number and rate
H&S-Emp	Employee health and safety	Injury rate, absentee rate and number of work related fatalities
H&S-Asset	Asset health and safety assessments	Percentage of assets
H&S-Comp	Asset health and safety compliance	Number of incidents
Comty-Eng	Community engagement, impact assessments and development programs	Percentage of assets

GOVERNANCE PERFORMANCE MEASURES

Code	Performance measure	Unit of measure
Gov-Board	Composition of the highest governance body	Total number
Gov-Selec	Process for nominating and selecting the highest governance body	Narrative on process
Gov-Col	Process for managing conflicts of interest	Narrative on process