Sustainable Insights in Private Equity Performance

Evidence from the European Non-listed Real Estate Fund Market

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Abstract

Over the past decades, the European institutional non-listed real estate fund market has matured into an investment category that consists of almost 340 funds, representing well over 200 billion euro of gross asset value. In this paper, we use the Global Real Estate Sustainability Benchmark (GRESB) as a means to enhance our understanding of performance of these non-listed funds. By combining the data of GRESB and INREV, we learn three valuable lessons within a market in which information is still scarce. First, we can learn about fund agility and strength by observing the diffusion of GRESB participation, as early adopters differed greatly from the late adopters both on firm characteristics and performance. Second, the GRESB total score helps us to better understand the cross-sectional variation in non-listed fund performance. GRESB score and INREV returns move together. And third, we need to allow for lagged relationships to grasp the full and positive impact of GRESB scores on fund performance, as GRESB information is released with delays.

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1. Introduction

Large institutional investors around the globe have invested over 8 percent of their assets in real estate and are expected to increase their allocation in the coming years.[1] Publicly listed Real Estate Investment Trust (REIT) markets are often used as a convenient and liquid means to build up real estate exposure. REITs have become available in almost all major investment markets, and their stock market listing offers investors clear advantages when it comes to trading and portfolio management. The flipsides of this coin – the public listing – are also well documented. Listed real estate tends to correlate with general equities, especially in the short run, which also increases the volatility of this investment category.

- Insert exhibit 1: Market development of European listed and non-listed markets -

But besides the classic tradeoff between publicly listed real estate convenience and private real estate stability, investors have a third investment alternative –non-listed real estate funds. Brounen et al. (2007) described the surge and structure of this market from a European perspective. A lot has happened and

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[1] See Mercer's 2017 European Asset Allocation Survey for more details on asset portfolio breakdown. Their 2017 edition reported an increase in real estate allocation, which was highest for the largest investors.

changed since then. INREV[2] data in Exhibit 1 show that the number of non-listed real estate funds has grown substantially. By the year-end of 2016, the European non-listed real estate fund market consisted of 339 funds with a total gross asset value of around 214 billion euro, a fair match to the European listed real estate market. But in the past ten years, the non-listed market has changed more than these numbers can tell.

In this paper, we examine and discuss the evolution of European non-listed real estate funds, by analyzing the adoption and effects of GRESB[3], the Global Real Estate Sustainability Benchmark. In an era of financial crises and increasing concerns about sustainability, the non-listed fund market has made significant progress regarding improving transparency and the enhancement and protection of investor value through sustainability best practices. In all matters, transparency is key, as in the absence of a public listing, non-listed funds face more challenges in disseminating corporate information on cost and performance data. Hence, in this paper, we carefully study the diffusion process of GRESB as a new means of enhancing informational transparency regarding non-listed real estate fund management. GRESB can offer us new and rare insights in the early adopter profiles of non-listed firms that are keen to expose their corporate sustainability efforts. What can we learn from early and late GRESB adoption, and what do the GRESB scores tell us about the performance of non-listed real estate funds?

Even though the non-listed real estate fund market has been growing strongly over the past decades, scientific documentation of this industry is scarce. After Brounen et al. (2007), Tomperi (2010) was one of

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[2] INREV is the European Association for Investors in Non-Listed Real Estate Vehicles. Europe's leading platform for sharing knowledge on the non-listed real estate industry, aiming to improve transparency, professionalism and best practices across the sector, making the asset class more accessible and attractive to investors.

[3] GRESB, the Global Real Estate Sustainability Benchmark, is an investor-driven organization started to transform the way the industry assesses the environmental, social and governance (ESG) performance of real assets globally. More than 250 members, of which about 60 are pension funds and their fiduciaries, use the GRESB data on more than 1,000 private equity real estate funds and REITs in their investment management and engagement process, with a clear goal to optimize the risk/return profile of their investments.

the first to empirically analyze non-listed real estate fund returns using a U.S. database of opportunistic funds. His results showed that fund size is positively correlated to realized performance. A size effect, which was later confirmed by Andonov et al (2013), but then analyzing the non-listed real estate portfolios of pension funds. Part of the explanation of this size effect was the fact that smaller (pension) funds faced higher costs. Fuerst and Matysiak were the firsts to empirically analyze the European non-listed fund returns using INREV data. They analyzed the first seven years of INREV fund returns and found that lagged GDP growth, stock market returns and government bond rates are significant and positive predictors of annual fund performance. Fisher and Hartzell (2013) analyzed the performance differences between public REITs and private real estate funds using a similar database as Tomperi. They found that non-listed real estate funds underperformed alternative real estate indices, like the listed market. Again, the data was centered around U.S. value-add and opportunistic funds, and moreover, most funds were launched during the pre-crisis era. Results, therefore, are somewhat skewed to negative returns. Delfim and Hoesli (2016) studied the risk factors of non-listed European real estate funds, and identified that fund size, -style and – structure are most important. The most recent contribution to the empirical literature on private real estate fund performance is by Pagliari (2017). He critically evaluated and decomposed the realized performances of non-listed real estate funds across the three major strategies; core, value-added and opportunistic, using the NCREIF-Townsend fund returns. His results show that variation across the risk adjusted net returns of value-add and opportunistic funds feel short of the low risk core funds in the market; the U.S. market that is, again. By combining two unique European data initiatives, INREV and GRESB, our paper contributes by analyzing the European performance of non-listed real estate funds in the period after the financial crisis, and by assessing the performance effects of their corresponding corporate sustainability scores.

Our analysis of the INREV return index shows that European non-listed real estate funds have delivered a modest but stable total return over the past 16 years. Compared to their stock listed counterparts, non-listed funds yielded a 1.3 percent lower return (5.8 percent a year, on average), but at almost half the risk (standard deviation) of public real estate stocks. We can learn from the GRESB adoption process, as innovations like these set funds apart. The early GRESB adopters tend to be larger in size, which turns out to be rewarded by investors. Therefore, it is important to capture the signals of early adoption, as strong performers tend to respond first. Finally, we find that sustainability has gradually developed into an important distinctive factor within the non-listed market. The results of a combined GRESB/INREV dataset show that total returns of high ranked GRESB funds yield higher returns, a difference of around three percent a year between the highest and lowest GRESB deciles within the non-listed fund market. A result, that remains even after correcting for all the variation in firm characteristics. In fact, in case information on fund size and leverage is absent, our results indicate that the GRESB total score can serve as a broader fund quality indicator, as in those cases the score also capture that premia for size and leverage. Finally, we observe that the strongest link between GRESB scores and INREV returns are found, once lagged relationship are considered. GRESB scores are released midyear, which helps to explain why return effects increase after lagging scores.

This paper continues as follows. We continue with a brief discussion of the literature on sustainability and the GRESB indicators. We then analyze the adoption process of GRESB within the European non-listed real estate fund market, and link GRESB scores to INREV returns. An analysis, which we then extend with multi variate regressions that pool and detail results over time, and across different model specifications which help us to identify the key factors that drive non-listed real estate returns. We conclude the paper with a summary of the most important findings and implications.

2. Energy Efficiency and Sustainability

Given that real estate is responsible for over 30 percent of total energy consumption, and for 40% of total carbon dioxide emissions, it is no surprise that the industry has been targeted with a plethora of rules and regulations that enhance energy efficiency. Energy efficiency is also part of the broader aims of sustainable real estate, which paves the way for long term success for real estate investors and consumers.

2.1. Energy rating policy

As part of this sustainable real estate agenda, policymakers and investors have been pushing for more transparency regarding the sustainability ratings of real estate and real estate investments. For instance, the European Union has implemented the Energy Performance of Buildings Directive (EPBD) in January 2003, with the explicit goal of promoting energy performance improvements in buildings in the European Union. The Directive, included an explicit element on the disclosure of energy performance in buildings: "...Member states shall ensure that, when buildings are constructed, sold or rented out, an energy performance certificate is made available to the owner or by the owner to the prospective buyer or tenant...". This has led to the implementation of national energy performance certificates (EPCs) for dwellings as well as utility buildings (e.g., office, retail, schools and healthcare facilities) across the European Union. In the absence of EPCs, investors may be unable to accurately assess the energy efficiency of a property and portfolio, as some features are imperfectly visible. Indeed, following Akerlof (1970)'s "lemons" model, information asymmetry between seller and buyer is generally accepted as one of the main reasons leading to underinvestment in energy efficiency in the real estate market (Gillingham et al., 2009). Hence, greater transparency enables private and corporate occupiers and investors to take energy efficiency into account

when making long term investment decisions[4]. From an economic perspective, the energy performance certificate could have financial utility for both real estate investors and tenants, as the energy savings flowing from more energy efficient buildings may capitalize in lower operating costs and higher property values, ceteris paribus.

2.2. Energy rating literature

Thus far, the academic literature provides some empirical evidence on this hypothesized relationship between energy efficiency 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, 2013). For the residential market, using a sample of dwellings with energy performance certificates (EPCs), Brounen and Kok (2011) document that consumers pay a four percent premium for homes labeled as "efficient" (labels A, B or C) in the Netherlands. Kahn and Kok (2014), using transaction data from the California housing market, document that homes labeled with a "green" certificate are sold at a small price premium as compared to non-labeled homes. As energy labels are not necessarily available in other countries, researchers have also used alternative approaches to identify the market value of energy efficiency. Zheng et al. (2012) document that "green" buildings, which are identified based on an index created using Google search, are sold at a price premium during the pre-sale stage.

Unfortunately, the finance literature on 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 an empirical link between energy efficiency and sustainability of properties and the operating

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[4] In recent years, energy labels have been proposed as a remedy to this potential market failure – comparable to food labels (Bollinger et al., 2011) and restaurant hygiene scorecards (Jin et al., 2003).

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 operational and in their stock performance. For the non-listed real estate fund market, academic work has been hampered by the lack of data and information. But this has changed recently by the emergence of the Global Real Estate Sustainability Benchmark (GRESB).

2.3.   The Global Real Estate Sustainability Benchmark

From 2009 onwards, GRESB, an investor-driven organization, started to transform the way investors assess the environmental, social and governance (ESG) performance of real assets globally. More than 250 members, of which about 60 are pension funds and their fiduciaries, use the GRESB data in their investment management and engagement process, with a clear goal to optimize the risk/return profile of their investments. Since 2009, GRESB has assessed nearly 1,000 property companies and funds, jointly representing more than USD 2.8 trillion in property under management, as well as almost 200 infrastructure assets and funds, on behalf of close to 60 institutional investors. GRESB's objective is to provide real assets investors and managers with the tools they need to accurately monitor and manage sustainability performance of participating funds and companies, and to prepare for increasingly rigorous ESG obligations. Institutional investors that use GRESB data are increasingly scrutinizing the quality of sustainability disclosure. They want credible, quantitative data, based on relevant metrics that they can use in their investment decision-making process.

Over the past eight years, real estate investors have come to see GRESB participation as a sign of a fundamental commitment to ESG performance. They know that they can access information about GRESB participants and recognize that participants have taken a significant step toward leadership on ESG issues. GRESB results help investors understand the sustainability related strengths and weaknesses of their investments. Similarly, participating companies and funds can use the information to identify specific opportunities for improvement. In both cases, GRESB's information provides both absolute and relative measures of performance, including key performance metrics such as greenhouse gas emissions and rankings within peer groups. This information supports engagement with critical stakeholders, communicating strengths to external audiences and highlighting relative weaknesses to operational teams.

GRESB conducts annual assessments of real estate portfolios, capturing critical information regarding ESG performance and sustainability best practices. The assessments are guided by what investors consider to be key issues in ESG integration in real asset investments. They are aligned with international reporting frameworks, such as GRI and PRI. After a data quality control process, the data is scored with each company, fund and asset receiving a GRESB Score, which is compared against peers in the region and same property type for real estate, and the same region and sector for infrastructure. In addition, the GRESB Rating provides an overall, high-level metric for investors to evaluate the ESG performance of real asset investments. These are aggregated in two sub-scores; (1) management & policy, which is focused on the measurement of corporate intend and ambitions, (2) implementation & measurement, which quantifies the realization of sustainability at corporate level. Both aspects are also blended in the total GRESB score.

-    Insert exhibit 2: Distributions of annual GRESB scores and sub scores –

In exhibit 2, we plot the distributions of the GRESB scores, and sub scores for the period 2011-2015. In 2011, 91 INREV members were GRESB rated with fund scores ranging from 5 to 80 on a 100 point scale. Ever since, the average GRESB score increased from 35 to 56 in 2015. Exhibit 2, however, also shows a wide and increasing variation around this average. It appears that the firms that joined GRESB later have widened the score variation. Moreover, this increasing time trend in the total GRESB scores is not robust across the sub scores. For the sampled INREV fund in our analysis, we observe a steady increase in the management & policy aspects after 2012, while the measurement & implementation gradually decrease after 2013. Both these cross-sectional variations and time trends will be part of our empirical analysis.

3. Learning from GRESB adoption

Today, well over 150 European non-listed fund covered by INREV are rated by GRESB. However, not all of them started reporting to GRESB at the same time. In fact, the adoption process of GRESB among non-listed funds still has some way to go, as over 190 INREV funds have not adopted GRESB. Hence, before we dig into the relationship between GRESB scores and fund performance, we will first compare the funds that have adopted GRESB at different moments in time. Just like any innovation, GRESB has gone through a diffusion process. Starting with the early adopters and ending up with the laggards. In this study, we have both the INREV fund performance data and GRESB scores on a firm level from 2011 onwards. Hence, we categorize our full fund sample into three groups; the early adopters, which are the funds that adopted GRESB before 2013, the late adopters, which adopted GRESB from 2013 onwards, and the non-adopters. It is important to compare these funds, before we analyze any relations between the GRESB scores and INREV returns. We need to verify whether any

differences between these three groups can help us to explain the adoption process and identify key firm characteristics that need to be controlled for later on in our empirical performance analysis.

-    Insert exhibit 3: Non-listed firm characteristics of early-, late- and non GREB-adopters -

In exhibit 3, we report a relevant list of sub sample characteristics across these three groups. As discussed, the group of non-adopters is the largest with 192 funds. In total, 144 European non-listed funds, with INREV coverage, reported to GRESB by 2016. A group that grew rapidly before 2013, with 97 early adopters, and 47 funds joining in later. In both cases, the early- and late adopters, we observe a distinct size difference, compared to the non-adopters. Especially, the early adopters are over three times larger than the non-adopters. A difference, which may be due to economies of scale, which allowed them to free up resources to join GRESB at an early period. The three groups are comparable, when it comes to their leverage, investment styles, and geographic portfolio focus. The late adopters tend to be tilted a bit more towards the closed end structures, but these variations are mild at best. When averaging their annualized returns, we find more compelling differences. In both sub periods – before and after 2013 – we document the strongest fund returns across the early adopters, while the late adopters ended third on both periods. Obviously, little can be inferred from this simple comparison of averages, as numbers are not corrected for the other firm variations. We also cannot assess any causality as returns can result from the period before GRESB participation, the participation itself or other factors. More detailed analyses are needed for those insights. Before, we use multivariate regressions to get there, we first focus on the distributions behind these reported return averages.

- Insert exhibit 4: Performance of listed and non-listed real estate funds -

INREV returns offer a clear view on the performance of Europe's non-listed real estate fund market. During our sample period, the INREV returns averaged 5.8% total return a year. To put this into perspective, over the same period publicly listed real estate firms in Europe in GPR's General index yielded 7.1%. This annualized 1.3% spread is, however, compensated for by the difference in the corresponding risks, as the standard deviations for GPR and INREV were 15.8% and 9.7%, respectively. The higher public returns came at a price. For a fair comparison of both performances, we also listed the Sharpe ratios of both indices, which mildly favors the non-listed market. But more important than this comparison with public real estate returns, are the comparisons within the non-listed group itself.

- Insert exhibit 5: Distributions of INREV total returns per annum –

In exhibit 5, we box-plot the distributions of the INREV total returns for the increasing sample over time. Average returns (indicated by the crosses) ranged between -2.9% in 2011 to 9.2% in 2014. It is also remarkable to see that in most years the median is higher than the average, implying that large funds tend to exhibit lower returns. Beyond these annual averages, we observe a wide spread in fund returns. In 2014, this 9.2% average, covered a fund spread between -30% and 50%. Hence, it is more important to identify this variation, and select into the top quartiles, than to be able to understand and predict the moving sample average. Therefore, we continue our analysis with plotting funds pairing

GRESB scores and INREV returns, to see whether GRESB scores can help to understand the fund return variation within a year.

- Exhibit 6: GRESB total score versus contemporaneous total returns, per annum -

In exhibit 6, the scatter plots of INREV-GRESB fund pairs are combined for three different years; 2011-2013, and 2013-2015. For each year, we also included a trend line, which informs us about the relation between GRESB scores and total returns. Lines that trend upwards indicate that both items are positively related. In the first years, 2011 and 2012, the slope was rather flat, but from 2013 onwards it steepened. These were also the years during which the distributions of both INREV returns and GRESB scores widened. Hence, the cross-sectional variation in both appears to be related and informative. Still, we are limiting ourselves to one-on-one comparisons. To better grasp the effects of GRESB scores on fund returns, we ought to switch to regressions that allow us to control for other variations and include time effects.

4. Learning from GRESB scores

In this final part of our analysis, we examine fund specific returns using multivariate OLS regressions. These regressions are run on five-year average total fund returns (TR_i), which are the 2011-2015 average total returns for firm i. We try to explain the cross-sectional variation in TR_i using different combinations of six factors:

$$TR_i = \alpha + \beta_1 \cdot Size_i + \beta_2 \cdot DR_i + \beta_3 \cdot Core_i + \beta_4 \cdot OpenEnd_i + \beta_5 \cdot SingleCountry_i + \qquad \beta_6 \cdot$$
$$GRESB_i + \varepsilon_i \qquad\qquad\qquad\qquad\qquad\qquad (2)$$

,where $Size_i$ is the log of the market value of fund i, DR_i is the debt ratio (debt as percentage of equity), $Core_i$ is a dummy indicating whether fund i has a core style, $OpenEnd_i$ is a dummy indicating whether fund i is open-end, $SingleCountry_i$ is a dummy indicating whether fund i only invests in one country, $GRESB_i$ is a (dummy) variable indicating GRESB participation. This last variable is specified in different ways. First, we use a binary dummy differentiating between GRESB participants and non-participants. Next, we combine this dummy with a second binary dummy that identifies the early adopters. We then replace these dummies with the 2015 GRESB score for each individual fund. This total GRESB score, is then replaced by the two 2015 sub scores, to assess their impact on excess fund returns. Finally, we replace these contemporaneous GRESB variables lagged 2014 GRESB scores, to assess the timing of the effect. In all models we have tested for multicollinearity using Variance Inflation Factors (VIFs), but none of the VIFs we calculated exhibited worrisome levels.

- Exhibit 7: Non-listed fund performance regressions. -

The results of our regressions are presented in exhibit 7. Results are grouped across seven expanding model specifications. In the first model, we estimate the baseline model in which we explain the cross-sectional variation in the five-year average total returns of the 196 non-listed funds by a set of traditional fund characteristics. The resulting (and statistically significant) coefficients are in line with literature and expectations, as excess returns increase with size and portfolio focus, and decrease with leverage. The latter is most likely the result of the leverage effect, which has not been beneficial to

non-listed funds during the sample period, when asset returns quite often have been less than the cost of debt. The size effect is the likely result of economies of scale, which tend to be stronger in this market, as the average fund size is still modest. The portfolio focus premium aligns with the economy of scale argument. It is harder and more expensive to spread and manage investments across multiple markets and countries, when funds and organization lack the scale to do this efficiently. Understanding returns requires a sharp eye for risk, which is proxied in this private equity market with investment styles. The core funds ended up on top, although they are associated with the lowest risk loadings. In this case, this is most likely the effect of the 2011-2015 period, the higher risks and leverage of opportunistic funds have not be rewarded. The final control variable in this first baseline specification identifies the open-end structure of funds. Compared to the closed-end funds, we document an excess return premium of 2.6% a year, which is robust and increasing across model specifications. This open-end premium can be interpreted as a liquidity premium, that was rewarded during recent years. Having the opportunity to exit the funds at net asset values, has been appreciated during the post crisis period. The baseline model explains 41% of the observed cross-sectional variance, a strong model fit that is further enhanced in the subsequent model extensions.

In model (2) we include GRESB for the first time. This we do by means of a GRESB dummy, indicating whether funds are GRESB participant or not. The positive 1.9% excess return premium indicates that being GRESB participant paid off, but this result lacks statistical significance at the standard 95% confidence level, and therefore needs to be interpreted with care. Moreover, the model fit only strengthens marginally, again indicating that GRESB participation alone does not help a lot to understand returns. In model (3), we therefore further extend the model with an additional variable, which separates the early from the late adopters among the GRESB participants. This additional early

adopter variable, however, yields an almost zero result. Although the earlier descriptive statistics of exhibit 3 showed large differences in fund performance between early and late adopters, the differences are mostly absorbed by the control variables in place. This is important, as being a first mover is typically not an isolated characteristic. In this case, the INREV data tell us that size matters, as early GRESB adopters have been the largest firms in the sample, and model (1) already taught us that this size came at a premium. Thus, the combined effect of being large and early, comes at one premium.

During the next step of our regression analysis, we replace the GRESB participation dummy by the GRESB score itself. As a result, the regression model uses fewer funds, as non-participants have no GRESB score to include. The regression results should therefore be seen as an explanation between performance among GRESB participants. In model (4), we find a barely significant GRESB premium, as higher total scores turn out to be related to higher returns. A GRESB participant with a maximum total score of 100 could therefore be rewarded with a 7.6 percent annual return enhancement, which seems to be worth making the effort to improve your GRESB score. In models (5) and (6), we split this score and premium into the two sub scores. Both elements – the implementation/measurement and management/policy – are rewarded with premia, but also lacked significance. Hence, we cannot claim any firm insights from this sub score analysis, more data and time series are needed for that. What we can claim is that the GRESB score helps to identify quality. From a non-reported regression specification, we learn that GRESB score also correlate with other firm attributes, which in practice can effectively turn the GRESB score into a broader quality indicator. For instance, once we dropped the leverage variable, model (4) yielded very strong significant GRESB score results. In other words, high GRESB total scores correspond with lower leverage. When investors need to choose without insights into the capital structure details, the GRESB score can serve as a proxy. The sustainability

quality of high GRESB scores appears to go beyond that of traditional environmental, social and governance qualities of the fund.

We finished the regression analysis, with a model specification in which we lagged the strongest GRESB coefficient, which turned out to be the GRESB total score. Thus far, all regressions were specified contemporaneously. But, it's likely that the interlink between GRESB scores and INREV returns requires some time to sink in. GRESB scores are published nine months after the corresponding year-end. Hence, investors cannot adjust their investment decision during the same year. Therefore, we lagged the GRESB total scores with one year. This results in a strong coefficient that is both economically and statistically significant. The positive effect of GRESB scores was confirmed and strengthened, once processing time was included by the lag structure.

5. Conclusions and implications.

In this paper, we analyzed the performance of European non-listed real estate funds, by combining the data of INREV and GRESB. The GRESB participation and subsequent scores offer new insights in the private equity investment fund market, a market which has matured into well over 200 billion euros of asset value, spread across more than 300 funds. A market, which has attracted a lot of institutional investments, but at the same time is still in need of performance evaluation innovations. Hence, we analyze the GRESB initiative as an instrument that can help to provide signals and information to investors. We studied the GRESB adoption process across INREV members, and used the GRESB scores and sub scores as means to enhance non-listed fund performance.

We have learned at least three lessons from these GRESB analyses. First of all, that the diffusion of a new initiative like GRESB separates the industry into early, late and non-adopters, which differ in firm characteristics and performance. In case of GRESB, we observed that large funds opted in first. We also discovered that the total returns of early adopters well exceeded that of the late adopters. But once we correct for the variations in fund characteristics, this return difference is reduced to zero. In other words, investors can learn from observing the adoption process of new rating processes, strong performers tend to adopt sooner than later. This strong performance, however, appears to be pre-existing and resulting from other fund specifications.

A second lesson, is that the GRESB score itself can help us to understand the observed cross-sectional variation of non-listed fund returns. Even after correcting for fund size, leverage, style and structure, we report added explanatory power for the GRESB score results. High total GRESB scores are associated with higher excess returns, a result which is important in a market in which information is harder to find. Here, we also established that in cases of informational restrictions, the GRESB total score manages to pick up the qualities of non-observables. In case, leverage information of funds is missing, we find that the GRESB score premia are capable of incorporating these latent variations as well.

Finally, we also learn that the effects between GRESB and fund returns are not immediate. Although time series are still short and infrequent, we already observed that lagged specifications pick up more. A perfectly normal result, given that GRESB scores are released nine months after the corresponding year-end. Hence, in order to affect investor preferences and decisions, GRESB

scores need to lagged in order to properly help understand the subsequent INREV fund returns.

One needs to be a little patient in the private equity part of the real estate investment market.

But once you are, there are valuable lessons to be learned by collecting and observing new and

additional fund information.

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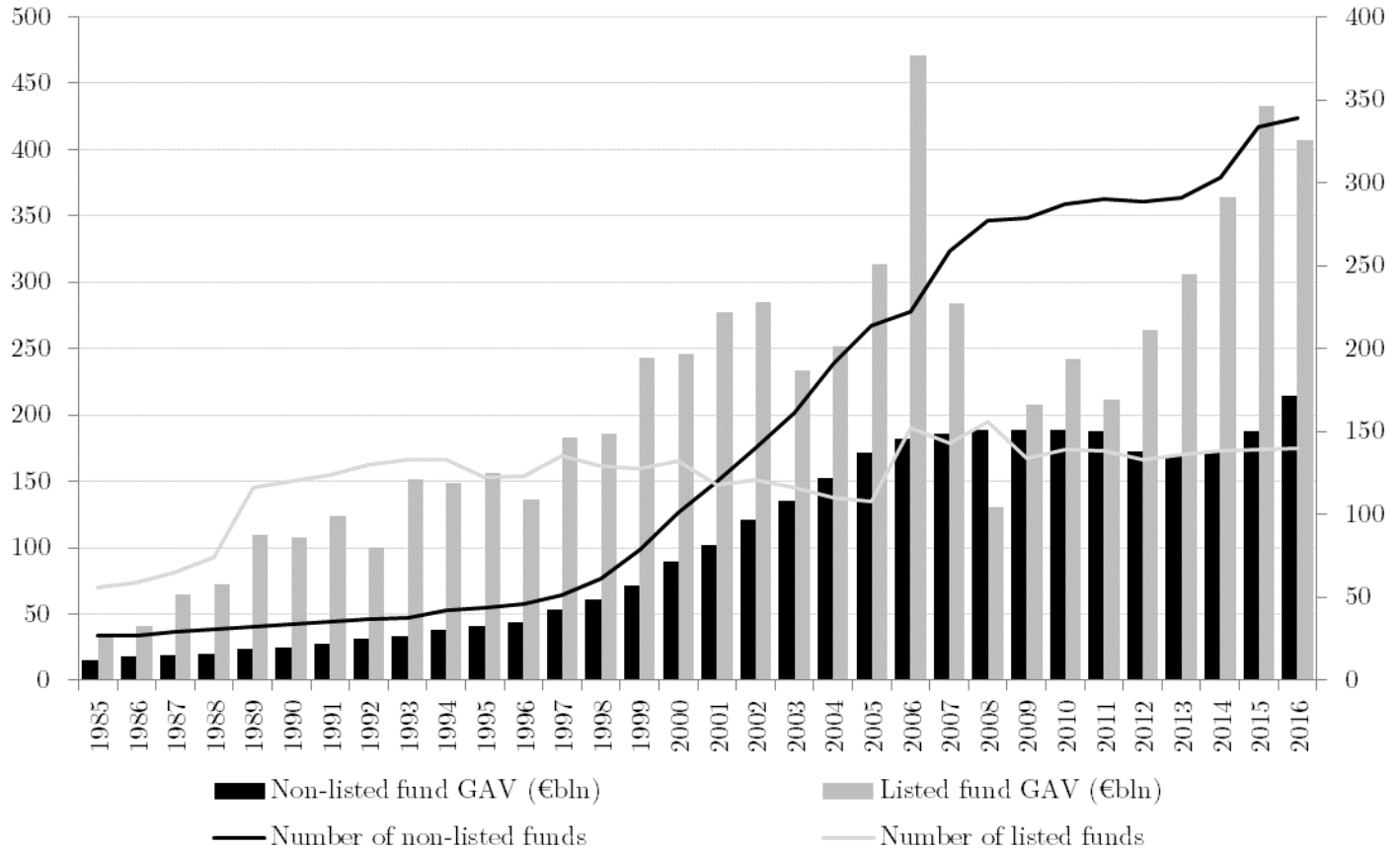Pagliari, J. 2017, "Real Estate Returns by Strategy: Have Value-Added and Opportunistic Funds Pulled Their Weight?" *Real Estate Economics*, Vol. 45, No. 3.

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Exhibit 1:   **Market development of European listed and non-listed markets**
The total market asset value is measured in year-end gross assets values in billion euro's
and plotted in bars. The number of firms is represented by the line graph (right axis).

Legend:
- ■ Non-listed fund GAV (€bln)
- ▨ Listed fund GAV (€bln)
- —— Number of non-listed funds
- —— Number of listed funds

source: INREV, GPR

Exhibit 2:   **Distributions of annual GRESB scores and sub scores.**
The vertical line represents 95% of the distribution around the median, indicated by the horizontal line within the box. The box indicates the spread of the second and third quartile. The mean of the distribution is plotted as a cross. The number of constituents are between brackets below each year.
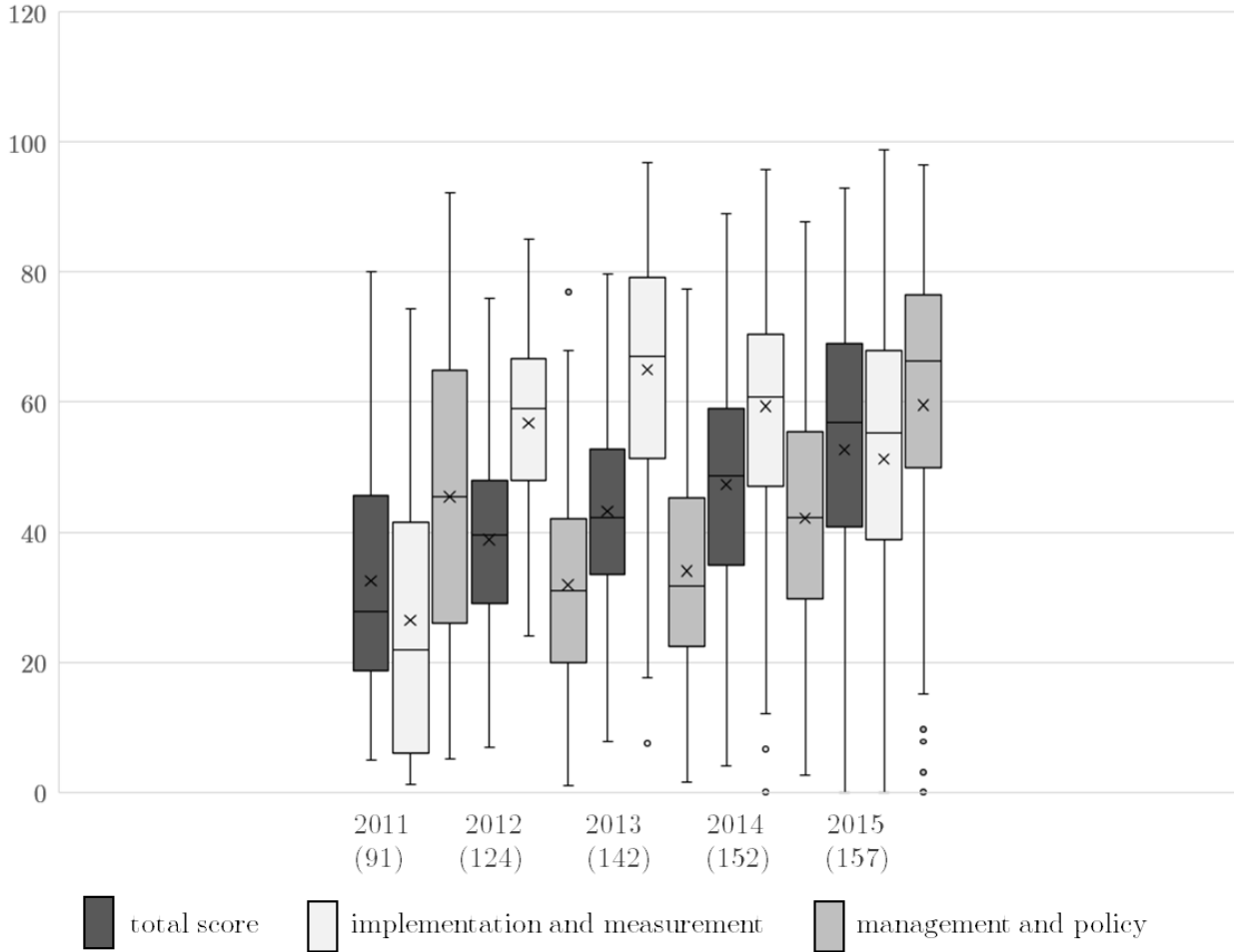
Exhibit 3:   **Non-listed firm characteristics of early-, late- and non GRESB-adopters.**
In this table, we list the 2016 year-end fund size, gearing, the fraction of core funds, the fraction of single country funds, the fraction of open-end funds, and the 2011-2013 returns, and 2013-2015 returns across three groups of non-listed real estate funds (those that adopted GRESB before 2013, versus those that adopted later, and not at all).

	Early adopters	Late adopters	Non adopters
Number of funds	97	47	192
Size (GAV in million €)	1,128	845	376
Leverage (%)	28	27	27
Core (%)	68	70	77
Single Country (%)	52	53	59
Open end (%)	51	40	56
2011-2013 Returns	1.1	-3.9	0.3
2013-2015 Returns	5.3	2.9	3.1

Exhibit 4:   **Performance of listed and non-listed real estate funds.**
Total return, risk, represented by the standard deviation, and Sharpe ratio of the European non-listed versus the listed real estate market, measured over the period 2011-2016.

	INREV All Fund Index	GPR General Europe
Standard deviation	9.7%	15.8%
Average	5.8%	7.1%
Sharpe ratio	0.28	0.26

Exhibit 5:   **Distributions of INREV total returns per annum.**
The vertical line represents 95% of the distribution around the median, indicated by the horizontal line within the box. The box indicates the spread of the second and third quartile. The mean of the distribution is plotted as a cross.
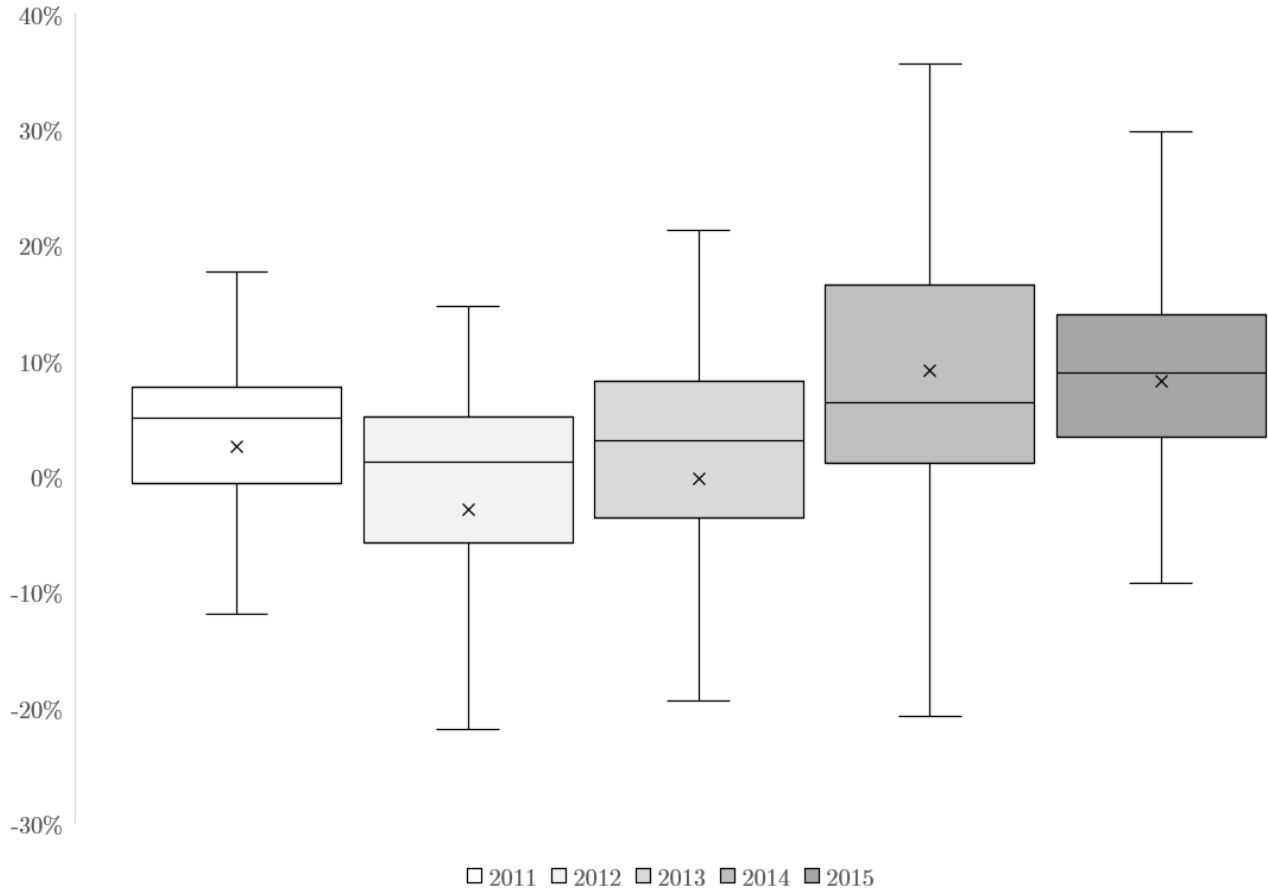
Exhibit 6:   **GRESB total score versus contemporaneous total returns, per annum.**
The dots represent the firm pairs of GRESB total score and corresponding total return, the lines are the trend line per year.
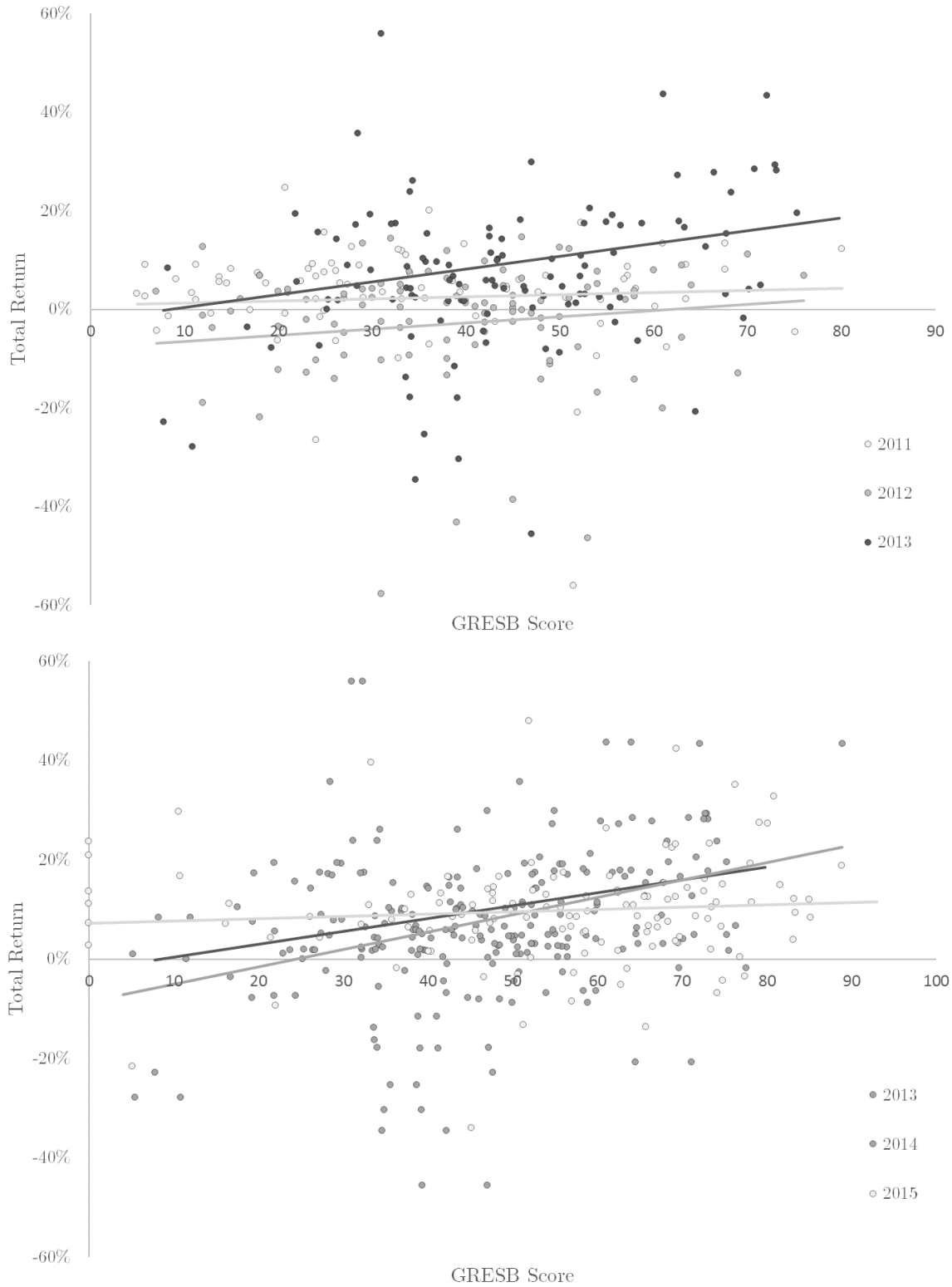
Exhibit 7: **Non-listed fund performance regressions.**

In this table, we list the coefficients of our multivariate total return regressions. In each regression we explain the cross-sectional variation in fund returns over 2011-2015, with a set of expanding variables, including size, leverage, style, structure and GRESB adoption, and –scores. In the final model (7), we lagged the GRESB total score used in model 4 to examine the time structure of the relationship.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	-0.261	-0.201	-0.201	-0.141	-0.160	-0.131	-0.288
	(-2.75)	(-1.99)	(-1.99)	(-1.12)	(-1.24)	(-1.04)	(-1.89)
Size (GAV)	0.035	0.026	0.026	0.021	0.025	0.021	0.033
	(3.07)	(2.16)	(2.15)	(1.41)	(1.70)	(1.40)	(1.73)
Leverage (%)	-0.033	-0.034	-0.034	-0.043	-0.044	-0.043	-0.029
	(-7.24)	(-7.42)	(-7.38)	(-6.59)	(-6.84)	(-6.82)	(-4.26)
Core (%)	0.029	0.031	0.031	-0.007	-0.008	-0.006	0.024
	(2.31)	(2.47)	(2.45)	(-0.41)	(-0.44)	(-0.35)	(1.30)
Single Country (%)	0.021	0.021	0.021	0.011	0.011	0.009	0.015
	(2.02)	(2.07)	(2.05)	(0.81)	(0.81)	(0.66)	(0.97)
Open end (%)	-0.026	-0.026	-0.026	-0.032	-0.031	-0.037	-0.038
	(-2.23)	(-2.25)	(-2.24)	(-2.08)	(-1.90)	(-2.45)	(-2.14)
GRESB dummy		0.019	0.019				
		(1.71)	(1.41)				
GRESB early adopter			-0.0004				
			(-0.03)				
GRESB total score				0.076			0.107
				(1.76)			(2.15)
GRESB I&M score					0.048		
					(1.14)		
GRESB M&P score						0.060	
						(1.69)	
N	196	196	196	88	88	88	94
R-squared adj.	0.41	0.42	0.42	0.59	0.59	0.59	0.43