Tilburg University

Improving transparency of indirect private real estate

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Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

Link to publication in Tilburg University Research Portal

Citation for published version (APA):
van der Spek, M. (2018). *Improving transparency of indirect private real estate*. CentER, Center for Economic Research.

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Improving Transparency of Indirect Private Real Estate

Proefschrift

ter verkrijging van de graad van doctor aan Tilburg University op gezag van de rector magnificus, prof. dr. E.H.L. Aarts, in het openbaar te verdedigen ten overstaan van een door het college voor promoties aangewezen commissie in de aula van de Universiteit op vrijdag 2 november 2018 om 14.00 uur

door

Maarten Ruben van der Spek

geboren op 23 juli 1976 te Amsterdam

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	Dr. Rick Frehen
	Dr. Gianluca Marcato

Acknowledgements

This book concludes a special period for me, in which I had the opportunity to focus on academic research. My ambition has always been to get a PhD, and during my work with institutional investors, I realized that there are ample real estate topics where academic research is insufficient to support investors. When I started working for the institutional investor PGGM, I finally had the opportunity to analyze some of these topics in more detail, to improve PGGM's real estate strategy. One of these topics was leverage, which was clearly misunderstood by many investors given the substantial impact it had on performance during the global financial crisis. It was frustrating to see that some investors believed that leverage would simply increase their return, while underestimating the impact leverage has on risk. They thought the relationship between leverage and risk was linear, while risks are clearly skewed. Improving the transparency of the risk of investing in real estate is thus important for institutional investors, especially since most of these investors do not have the resources to analyze these risks on their own. Hopefully, my dissertation will help investors to improve their understanding of real estate and the relevant risks and drivers and will support them with optimizing their real estate strategy.

I am very grateful for all those people who supported me with my research and writing this dissertation. First of all, I would like to thank my promotor Dirk Brounen. He helped me a lot with his bright and innovative views, and his ability to bridge the gap between academia and industry was very valuable. It is always a pleasure to work with him; his enthusiasm is contagious and inspired me to do the necessary extra work. I truly hope that we can keep working together, somehow, sometime.

I would also like to thank PGGM for their support and providing me the opportunity to work on my PhD. I am grateful for the support of my former colleagues from the Real Estate department, in particular Steven and Peter for their great feedback and help. Lastly, I am also very grateful to my former manager, Guido Verhoef, for his continuous support. Without him I wouldn't have started this adventure.

In addition, I would like to thank all those who helped me improve my papers by providing valuable feedback. Therefore, a very special thanks to Johan van der Ende, Peter Hayes, Randy Mundt, Joseph Pagliari, and Tom Arnold. Special thanks go to Robert Muilwijk, who helped me with building the foundation of my work on fees, and Huib Vaessen and Hans Op 't Veld, who provided valuable feedback as fellow PhD students. In addition, I would like to thank GRESB, RCA, and INREV for their support and for providing valuable data. Finally, I would particularly like to thank Chris Hoorenman, who was always available to help or discuss some of my work if necessary.

I would also like to thank my family and friends for their mental support throughout the process. Even though most of you haven't contributed directly to this work, your company and friendship is very important to me and helped me through this period. Sister, thanks for being who you are and supporting me unconditionally. Mam, thanks for continuous support and for stimulating me to keep on learning and to aim high. Without that I wouldn't have made it this far.

Most of all I am grateful to Helen. Your love and support is very important to me and helped me a lot in this period of my academic dedication. I couldn't have done this without you!

Maarten van der Spek

Abu Dhabi, September 2018

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Chapter 1

Introduction

These are extraordinary times, with interest rates close to or even below zero, central banks pouring money into the system to keep rates low and push inflation higher as if it is all without risk, and political instability in many developed economies. Due to the low interest rates, bonds are very expensive and can only generate low returns, and as a consequence, equities and all other asset classes are expensive as well. As a result of these high valuations, it is harder and harder for institutional investors to meet their target returns, while uncertainty increases. Asset allocation is therefore becoming more important, but also is a bigger challenge.

Many pension funds have had to cut pensions due to the low interest rates and the increasing life expectancy. A lot of people believed that their pension was guaranteed. Confidence and trust in pension funds has deteriorated. More specifically, confidence and trust in the Dutch pension system has fallen deeply, despite international acknowledgement that the Dutch pension system is one of the best in the world and the fact that investment returns have been very good over the long term. The financial crisis, however, caused a lot of pain and distress with strong negative returns as a consequence. Especially real estate performed weakly, as the crisis was partly driven by the US housing market and too much leverage in the system. For many institutional investors, the global financial crisis was a wake-up call to reassess the risks they were taking, specifically in private real estate as the liquidity disappeared rapidly and values dropped severely, leading to many defaults.

Most medium to large institutional investors invest in real estate. In the past, these investors bought the buildings themselves, and, as a result, a disproportionately large part of the organization was working within the real estate investment team. This led to a period in which management of the real estate portfolio was outsourced to real estate investment specialists, and it even led to some management buyouts. In that period, a lot of private real estate funds for institutional investors were set up, underpinning the start of the growth of the non-listed real estate fund market. Because of the private nature of these vehicles, transparency, data, and knowledge about this type of real estate structure was rather limited. In 2002, the European Association for Investors in Non-Listed Real Estate Vehicles (INREV) was launched as a non-profit organization to improve the accessibility of non-listed real estate by promoting greater transparency, accessibility, professionalism, and standards of best practice. One of the most important achievements of INREV so far, I think, is the creation of a non-listed fund database and index, which is currently sufficiently large enough to really start analyzing performance and thus providing transparency to the market. At the end of 2017 the database consisted of almost 450 funds with a total gross asset value of almost € 300 billion, while the index consists of more than 350 funds with a total market capitalization of € 225 billion. A number of years after the start of INREV, the Asian sister organization, ANREV, was launched with the same goals, but focusing on Asia Pacific. In the United States, an organization with similar goals, NCREIF, provides a lot of market data to the industry. Combined, these organizations produce a quarterly private real estate fund index, which is called GREFI (the Global Real Estate Fund Index). This index covers over 500 funds and over $ 735 billion of gross asset value.

Despite the fact that transparency is improving and data availability has increased, not many academic researchers have analyzed the private real estate fund market. It helps that organizations like INREV are sponsoring academic research with their data and knowledge and with funding. As a result, some very good research has been done on the return drivers of non-listed real estate funds; see for instance Fuerst and Matysiak (2012) and Delfim and Hoesli (2016). Nonetheless, academics are still more likely to analyze direct real estate or real estate securities, as there is more data to work with. Consequently, there are still a lot of under-researched topics that institutional investors struggle with.

Before the global financial crisis, the lack of knowledge of institutional investors on certain topics amazed me. The reasons are understandable, as there was a clear lack of resources, data, and available research. Nevertheless, seeing this lack of knowledge triggered a desire to do something about it.

A very good example was the lack of research or information about the impact of leverage on a real estate portfolio. The typical alignment of fund managers pushes them to use as much leverage as possible within the targeted risk return profile of the fund or mandate, and, moreover, all of their analyses show that more leverage increases the expected return. I was deeply convinced that that action wasn't in the best interest of the investor, and, once I started working for an institutional investor, I started analyzing this topic. The paper "Leverage: Please Use Responsibly" (van der Spek and Hoorenman [2011]) resulted and showed that investors should keep their leverage under 40 percent in the long run. Since then, a lot more research has been done on this topic (see for instance Alcock et al. [2013] and Delfim and Hoesli [2016]), and most of these papers support our outcome. This literature is important for investors, who often don't have the resources to analyze these themes themselves. It helps them to set the framework for their portfolio and provides support in strategic asset allocation and managing risk.

In my dissertation, I will focus on a few themes within the non-listed real estate fund market that are not well covered by the finance or real estate literature, like sustainability, fee structures, real estate debt funds and leverage. The reason for this lack of coverage is predominantly a lack of good data. The problem, however, is not only the data, but also how real estate data typically is assembled and stored. In the world of big data, this problem will probably lessen going forward, but it is still an issue for the real estate market at this moment. Hence, to do the analyses, I had to create a database and make use of recently created or improved databases.

So, for instance, I created a database with information about fees retrieved from private placing memoranda (PPMs). A large institutional investor typically receives a lot of these PPMs, as a PPM is a way for fund managers to show or sell their product/fund. The fund fee structures are all well described in these PPMs, but there is no "public" database that keeps track of these structures. Another way to cope with a lack of data is the use of simulation models. This method is especially useful when analyzing private real estate funds, as there is enough data available on the real estate asset level, while the fund structures are reasonably standard and static through time. Hence, implications of real estate market developments for a private real estate fund can easily be analyzed by simulation. This method is extremely powerful when analyzing risks and comparing different structures.

My work should be useful for a wide range of industry participants. It should also be useful for academics, as it covers a gap in the literature and hopefully will trigger further research. It should be especially valuable for investors and other real estate professionals, as it covers some very relevant strategic issues that real estate investors are faced with within their portfolios.

This dissertation includes four studies on private real estate of which three are focused on non-listed funds and the fourth is focused on an element that is essential when analyzing leveraged real estate funds, the relationship between the amount of leverage and the related interest rate.

Chapter 2 provides an introduction of the non-listed real estate fund market in Europe. It offers an overview of the performance of these types of funds through time and looks at the link between the commitment to improve sustainability on one hand, and performance and firm characteristics on the other. In this chapter, a database of Global Real Estate Sustainability Benchmark (GRESB) for non-listed funds is combined with the INREV performance database. By combining these data, three valuable lessons can be learned within a market in which information is still scarce. The first lesson is about fund agility and strength, learned by observing the diffusion of GRESB participation, as early adopters differ greatly from late adopters, both on firm characteristics and performance. Second, the GRESB total score helps to better understand the cross-sectional variation in non-listed fund performance, as GRESB score and INREV returns move together. And third, it is necessary to allow for lagged relationships to grasp the full and positive impact of GRESB scores on fund performance.

In Chapter 3, I provide transparency on a rather opaque theme that is hardly covered by the real estate literature, but very important for investors: fees. This chapter examines fee structures for non-listed real estate funds from an investor's perspective. Fee structures, as proposed by fund managers in placing documents, are used to calibrate the total fee load. My database covers over 400 funds, and I demonstrate that the average total fee load for closed-end funds equals 2.7 percent. Through regression and simulation, I show that Core and Value Add funds charge significantly lower performance fees compared with Opportunistic funds, while, surprisingly, there is no difference in management fees. Moreover, larger funds charge significantly less management fees, and investors can substantially reduce fees by controlling the amount of leverage and avoiding commitment fees and catch-ups.

Chapter 4 examines the risk and return profile of real estate debt funds and how this form of real estate could fit the investor's portfolio. Many investors have a problem understanding whether real estate debt is real estate or fixed income, and there is hardly any real estate literature to provide a solid answer. To cope with the lack of data on real estate debt investments, I use a simulation tool to analyze this theme. Using a Monte Carlo simulation model, I analyze two different debt layers, mezzanine and senior, and compare them to real estate investments. The results clearly show that senior debt is not really correlated to real estate, and therefore behaves more like fixed income and should be valued accordingly. Mezzanine, however, is correlated to real estate, especially when markets are falling, and should clearly be underwritten as such. The theme of this chapter is a clear example of something that is not well covered by the literature and lacks data on a debt fund level. Simulation, however, is a very strong tool to cope with these problems, as there is sufficient data available on a real estate level, and fund structures are reasonably standard.

When analyzing a leveraged private investment fund structure using simulation, a key assumption is the relationship between the amount of leverage and the interest rate spread. Van der Spek and Hoorenman (2011) showed that this is one of the most important reasons why the added value of leverage is limited to 40 percent. The problem is that the correlation between leverage and spreads is often shown by the literature to be weak or even negative. The reason for this problem is the endogeneity of the loan-to-value choice. Higher leverage is typically provided to assets of higher quality, leading to even lower rates. The solution for this problem is presented in Chapter 5 by introducing an instrumental variable that measures the quality of the underlying building. This measure for quality was only recently created and therefore has not been used in previous literature. The analysis demonstrates that the influence of leverage on the spread is strong. The quality of the underlying real estate is proven to be an important factor for lenders in setting the loan-to-value ratio. Other important variables to explain rates are the size of the property, cap rates, market risk measures, and loan-specific characteristics such as the debt service coverage ratio, maturity, prepayment, and whether the originator is a bank.

Finally, Chapter 6 offers a summary of the main findings. It combines the results of each chapter and provides valuable lessons for investors. Furthermore, it provides recommendations for further research.

Chapter 2

Non-Listed Real Estate Performance and Sustainability[1]

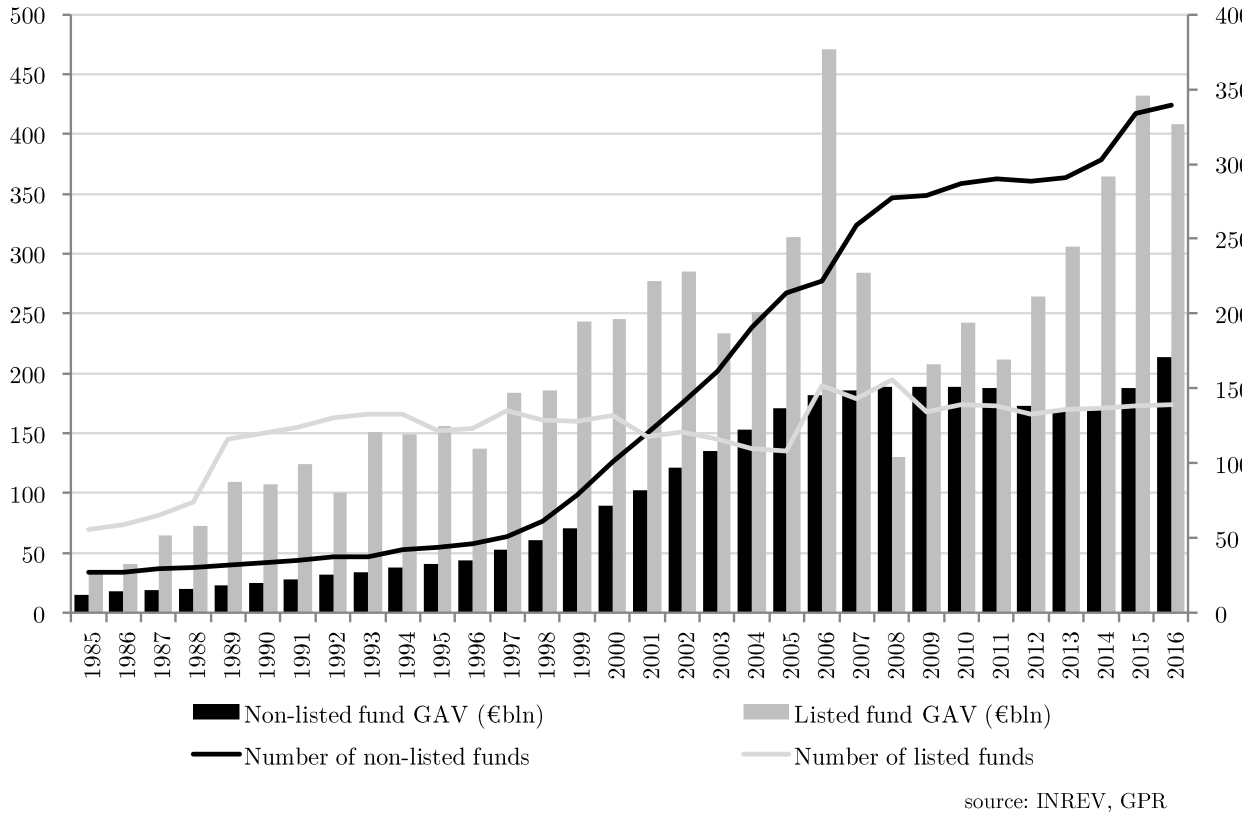
2.1 Introduction

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.[2] 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. But on the flipside, public listings are also well documented and tend to correlate with general equities, especially in the short run, which increases the volatility of this investment category.

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 changed since then. INREV[3] data in Figure 2.1 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 show.

[1] This chapter is based on D. Brounen and M. van der Spek, July 2017, Sustainable Insights in Private Equity Performance: Evidence from the European Non-listed Real Estate Fund Market, *Working paper*
[2] 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.
[3] 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.

Figure 2.1: 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).



In this chapter, the evolution of European non-listed real estate funds will be examined and discussed, by analyzing the adoption and effects of GRESB[4], 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 on improving transparency and enhancing the 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 chapter, we carefully study the diffusion process of GRESB

[4] 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.

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 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), when analyzing the non-listed real estate portfolios of pension funds. Part of the reason for this size effect was the fact that smaller (pension) funds faced higher costs. Fuerst and Matysiak were the first to empirically analyze the European non-listed fund returns using INREV data. In their analysis of the first seven years of INREV fund returns they 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 the most important factors. 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 fell short of the low risk core funds in the US market. By combining two unique European data initiatives, INREV and GRESB, this chapter 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, which can partially be explained by smoothing of valuations. 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 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 captures 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 chapter continues 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 to identify the key factors that drive non-listed real estate returns. We conclude the chapter with a summary of the most important findings and implications.

2.2 Energy Efficiency and Sustainability

Given that real estate is responsible for over 30 percent of total energy consumption, and for 40 percent 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.

2.2.1 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[5]. 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.

2.2.2 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 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

[5] 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).

equity, the ratio of funds from operations to total revenues. Green REITs performed better, both operationally 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).

2.2.3 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. Sustainability performance is measured on a fund level, focusing on management, policies, measurement and implementation, and is not specifically measured on individual asset level. 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 funds, 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. The assessment is survey based and evaluates performance against 7 sustainability aspects and contains approximately 50 indicators. The survey data is subjected to a validation process and will result in a GRESB Score between 0 and 100, with 100 being most sustainable, which is then 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 intent and ambitions, (2) implementation & measurement, which quantifies the realization of sustainability at corporate level. Both aspects are also blended in the total GRESB score. Although there are several alternative sustainability measures for the listed real estate market, there is no alternative for the unlisted real estate fund market. The only other option would be to analyze real estate on a property level, which is not the same as on a fund or manager level. Moreover, this property level data is not available as linked data to these private real estate funds, so it needs to be requested for each individual fund to the specific fund manager, which is almost impossible to do.

In Figure 2.2, 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 points scale. The average GRESB score has since increased from 35 to 56 in 2015.

Figure 2.2: 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 is between brackets below each year.

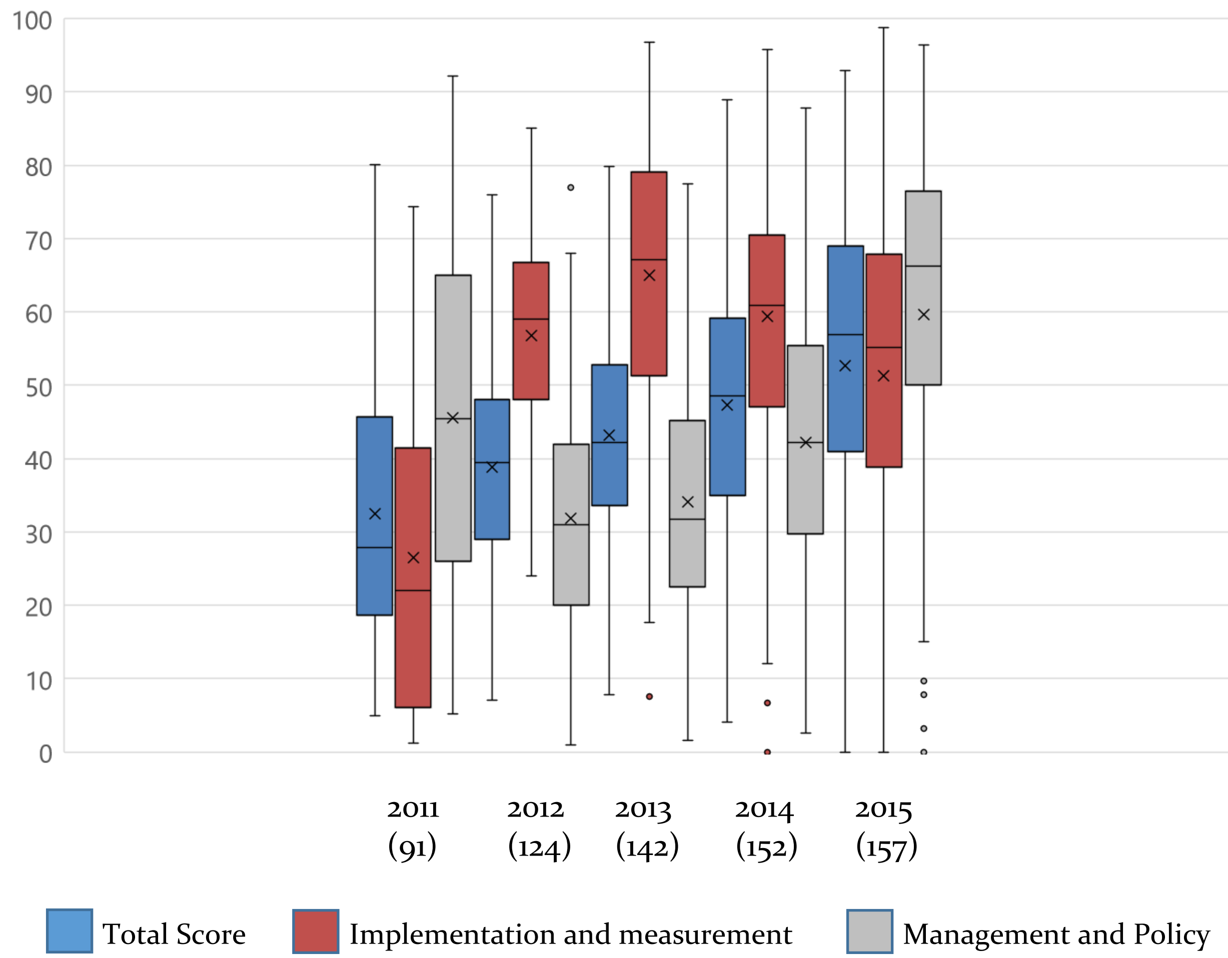


Figure 2.2, however, also shows a wide and increasing variation around this average. It appears that the firms that joined GRESB later have widened the score variation. Moreover, this increasing time trend in the total GRESB scores is not robust across the sub scores. For the sampled INREV funds in our analysis, we observe a steady increase in the management & policy aspects after 2012, while the measurement & implementation aspects gradually decrease after 2013. This decline is rather surprising, as one would expect results to improve over time. There are a few reasons why this decline happened. Firstly, it is partly driven by

new entrees, as these typically have lower scores. Adjusting for these new entrees reduces the decline significantly. Secondly, GRESB introduced a validation process in 2014 to improve the quality of the scores. Finally, the GRESB methodology has evolved over time and the number of questions has increased. Clearly, this indicates that the quality of the scores have increased over time and therefore it is better not to do a time series analysis using the GRESB score. Our empirical analysis will therefore focus on the cross-sectional variations.

2.3 Learning from GRESB adoption

Today, well over 150 European non-listed funds 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. So, 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 four groups; the early adopters, which are the funds that adopted GRESB before 2013, the late adopters, which adopted GRESB from 2013 onwards, the adopters (which is the aggregation of the first two groups) and the non-adopters. We expect a positive correlation between GRESB adoption and return, similar to the return premium shown by the literature on asset level. If a fund manager actively works on sustainability, he will improve the sustainability of its assets which should lead to better performance, as shown by the literature. It is also possible that fund managers with strong underlying performance are quicker to adopt GRESB. In both cases GRESB could be an indication of strength. Before we analyze any relations between the GRESB scores and INREV returns, it is important to compare the key statistics of these four groups. We need to verify whether any differences between these four groups can help us to explain the adoption process and identify key firm characteristics that need to be controlled for in the next step of empirical performance analysis.

Table 2.1: Non-listed firm characteristics of early- and late adopters, adopters 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 four groups of non-listed real estate funds (those that adopted GRESB before 2013, versus those that adopted later, adopted in general, and not at all).

	Early adopters	**Late adopters**	**Adopters**	**Non-adopters**
Number of funds	97	47	144	192
Size (GAV in million €)	1,128	845	1,035	376
Leverage (%)	28	27	28	27
Core (%)	68	70	69	77
Single Country (%)	52	53	52	59
Open end (%)	51	40	47	56
2011-2013 Returns	1.1	-3.9	0.0	0.3
2013-2015 Returns	5.3	2.9	4.7	3.1

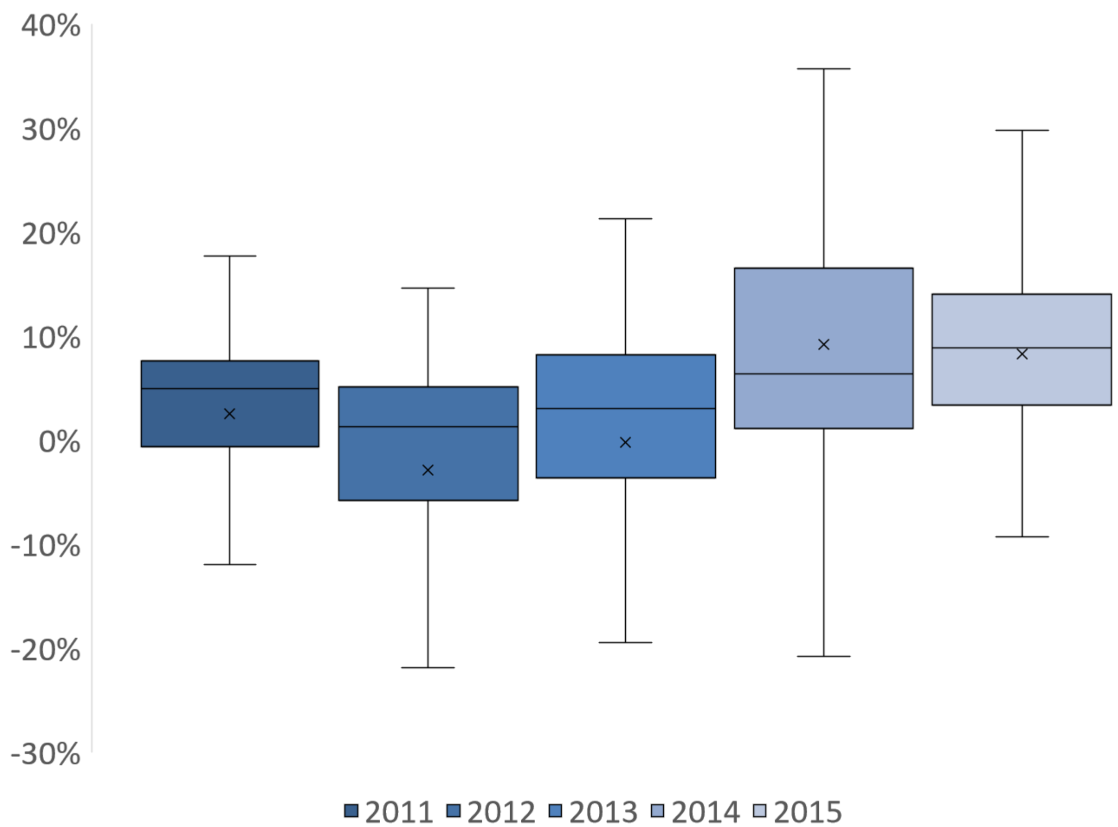
In Table 2.1, we report a relevant list of sub-sample characteristics across these four groups. As discussed, the group of non-adopters is the largest with 192 funds. In total, 144 European non-listed funds, with INREV coverage, reported to GRESB by 2016. A group that grew rapidly before 2013, with 97 early adopters, and 47 funds joining 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 four 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 last in both periods. The adopters on aggregate show similar performance to the non-adopters in the earlier period while outperforming in the second period. 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 (self-selection bias) or other factors. It is, for instance, likely that funds with a strong historical performance are more likely to adopt GRESB. More detailed analyses are needed for those insights. Before we use multivariate regressions to understand the relation between GRESB and performance, while controlling for other characteristics, we first focus on the distributions behind these reported return averages.

Table 2.2: 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 2001-2016.

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

INREV returns offer a clear view on the performance of Europe's non-listed real estate fund market. As shown in Table 2.2, the INREV returns averaged 5.8 percent a year during the sample period. To put this into perspective, over the same period publicly listed real estate firms in Europe in GPR's General index yielded 7.1 percent. This annualized 1.3 percent spread is, however, compensated for by the difference in the corresponding risks, as the standard deviations for GPR and INREV were 15.8 percent and 9.7 percent, respectively. The lower risk for non-listed funds can partly be explained by the fact that these returns are based on valuations. In the short term this will smooth the returns, but this will not affect the long-term performance, as all assets are transacted within closed-end funds in the long run and open-end funds provide liquidity by transactions in the short term. 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.

Figure 2.3: 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.



In Figure 2.3, 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 percent in 2012 to 9.2 percent 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 percent average, covered a fund spread between -30 percent and 50 percent. Hence, it is more important to understand this variation, to be able to select from 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.

In Figure 2.4a and 2.4b, 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.

Figure 2.4a: GRESB total score versus total returns, for the years 2011, 2012 and 2013. The dots represent the firm pairs of GRESB total score and total return, the lines are the trend line per year.

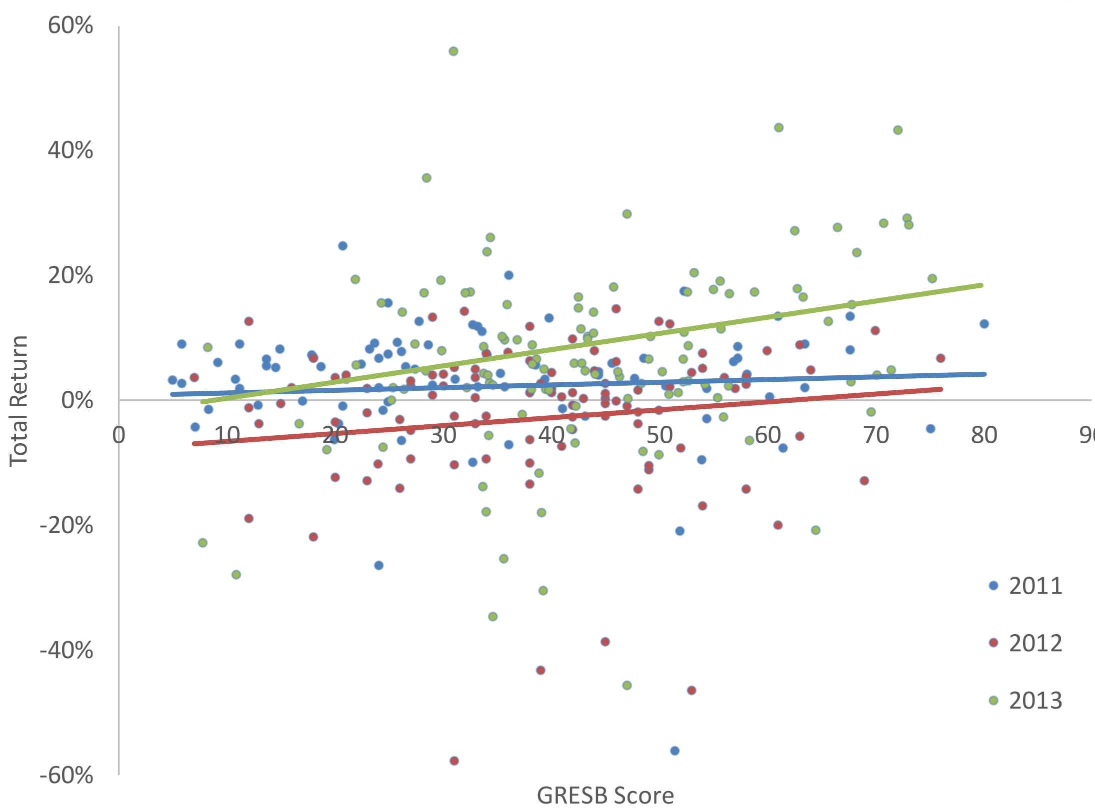
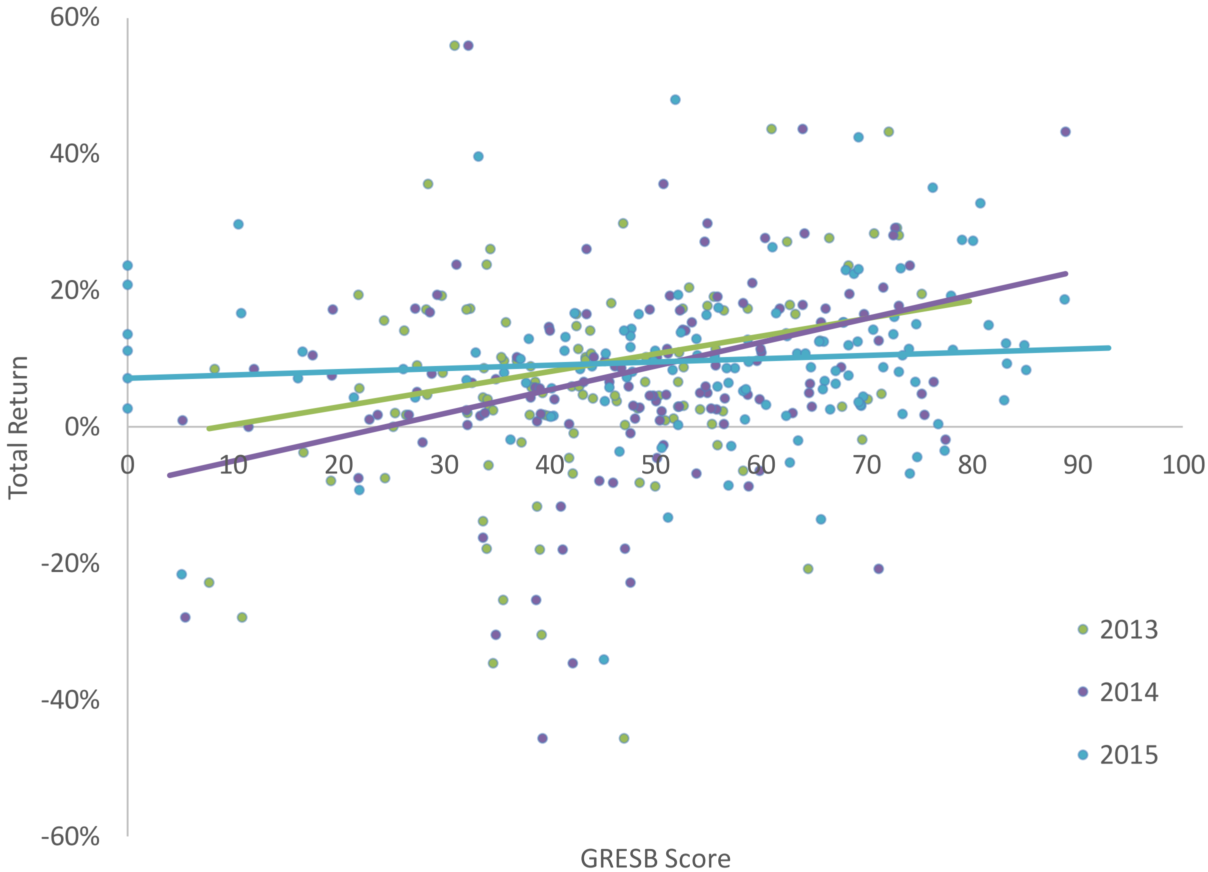


Figure 2.4b: GRESB total score versus total returns, for the years 2013, 2014 and 2015. The dots represent the firm pairs of GRESB total score and total return, the lines are the trend line per year.



2.4 Learning from GRESB scores

In this final part of the 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:

$$TR_i = \alpha + \beta_1 \cdot Size_i + \beta_2 \cdot DR_i + \beta_3 \cdot Core_i + \beta_4 \cdot OpenEnd_i + \beta_5 \cdot SingleCountry_i + \beta_6 \cdot GRESB_i + \varepsilon_i \quad (2.1)$$

,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 with 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.

As mentioned before, we expect GRESB participation and score to have a positive effect on return, as we expect better organized companies more likely to be able to free up resources to join a standard like GRESB and moreover expect poor performing funds not to join GRESB, as they are more likely to focus their time on performance issues rather than sustainability.

The results of our regressions are presented in Table 2.3. 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.

Table 2.3: 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. T-statistics are in brackets.

	(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

The premium for portfolio focus (single-country dummy) 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, when the higher risks and leverage of opportunistic funds have not been 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 discount of 2.6 percent a year, which is robust and increasing across model specifications. This open-end discount can be interpreted as a liquidity cost. Having the opportunity to exit the funds at net asset values, has been a drag on performance during the post crisis period. The baseline model explains 41 percent 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. We do this by means of a GRESB dummy, indicating whether funds are GRESB participant or not. The positive 1.9 percent excess return premium indicates that being a GRESB participant paid off, but this result lacks statistical significance at the standard 95 percent 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 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 Table 2.1 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. As a GRESB participant with a maximum total score of 100 could be rewarded with a 7.6 percent annual return enhancement, it would imply that it would 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.

2.5 Conclusions and implications

In this chapter, 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, 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 expose a stronger relationship. 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.

Chapter 3

Fee Structures in Private Equity Real Estate[6]

3.1 Introduction of fees in the private equity industry

One of the most important topics for investors in the private investment market is also one of the least researched: fees. No standardization exists, yet the impact of fees on the net performance of investors can be substantial. Moreover, because we are in a low interest rate and economic growth environment as a result of the global financial crisis, returns are expected to be modest. In this kind of environment, every small return enhancement can make a difference. Institutional investors are keen to reduce costs in order to add value, and since fees are an important part of that, investors are likely to discuss and negotiate fees. On the other hand, managers need to charge fees to compensate for their time and effort and to make a profit. With this in mind, it would be reasonable to expect more insight into what would be a fair amount of fees for each type of investment vehicle. Such an expectation would also align with the most recent trend in regulations to improve transparency and to protect investors. Unfortunately, transparency on fees is far from market practice.

This chapter analyses the fee structure and fee load for private equity real estate funds to help improve transparency. The central question is how investors can compare different investment opportunities with different fee structures and how investors can best reduce fee load. To achieve this, I introduce a single fee metric and use regression to determine the main fee drivers.

Phalippou (2009) was one of the first to analyze private equity market fee structures. He determined that the average private equity fund effectively charges a 7 percent fee per annum and concluded that investors are fooled, as compensation contracts are opaque and

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[6] This chapter is based on: M. van der Spek, 2017, "Fee Structures in Private Equity Real Estate", *Journal of Real Estate Research,* Vol 39(3), pp 319-348

show lower fees at first sight. In a previous paper with Gottschalg (Phalippou & Gottschalg [2007]), Phalippou even proved that private equity underperformed the S&P 500 on an after-fee basis. Interestingly, Harris, Jenkinson and Kaplan (2014) found the opposite to be true, using actual cash flow data from institutional investors, sourced by Burgiss; they showed that private equity outperformed the S&P 500 by 3 percent annually. Unfortunately, they didn't analyze the impact of fees, as all data were net of fees, and only examined private equity and not private real estate funds. While Fisher and Hartzell (2013) did analyze the private real estate funds using the same database, they discovered that the US private real estate funds in the database on average underperform US private real estate and REIT benchmarks. Again, the data set consisted of net of fees return and fees were not investigated. Moreover, the data they used were skewed towards Value Add and Opportunistic funds in the United States, while Core and European and Asian funds were not sufficiently covered.

Most of the other literature on fees focuses on the relationship between the investor and the manager, the agent. The importance of agency theory was shown by Eisenhardt (1989). Interestingly, Gompers and Lerner (1999) proved there is no relationship between incentive compensation and performance, while this would normally be the reason to introduce performance fees. Furthermore, Robinson and Sensoy (2011) found no relation between manager compensation and ownership and the funds' cash flow performance. In the mutual fund industry, Adams et al. (2012) discovered that agency considerations and competition are important determinants in the pricing of mutual funds. Using a cross-sectional regression model, they found that disproportionately high fees are prevalent in funds with multiple share classes and those with weak governance structures. These findings are relevant for investors, as the information can be used to develop fund selection criteria.

Besides the fund's management and performance fees, managers have another incentive. Chung et al. (2010) showed that there is a reward stemming from the effect of current (good) performance on the ability to raise larger funds in the future. Explicit fee structures of private equity funds thus understate the actual incentive for the general partner. In a later paper, Chung et al. (2011) explained that indirect pay for performance from future fundraising is of the same order of magnitude as direct pay for performance from carried interest. Capozza and Seguin (2000) demonstrated that misalignment of the external manager results in underperformance of externally managed real estate investment trusts (REITs) compared with their internally managed counterparts, thus concluding that the right incentive structure is crucial to the performance of REITs. As a result, and due to their superior ability to resolve conflicts of interests between REIT management and shareholders, internally advised REITs will dominate externally advised REITs (Ambrose & Linneman, 2001). While most research is focused on investment products, private investment funds, Andonov et al. (2012) analyzed a database with pension fund allocations and costs, and showed that larger pension funds are more likely to invest in real estate internally and have lower costs and higher returns. Moreover, US pension funds' investment costs are twice as high as those of foreign peers, while returns are lower.

This chapter focuses on the fee load of private equity real estate funds; these specific private equity funds have several features that make them particularly attractive for an empirical study. First, most of these funds are closed-end with a specific finite lifetime, typically seven to ten years. Compensations are agreed upon beforehand and are therefore fixed and rarely renegotiated during the funds' lifetime. Second, it is uncommon that managers are removed and replaced from managing the fund during this period, as removal is rather difficult and expensive and usually only done as a last resort. Third, unlike for private equity, there is scarce literature available on private real estate fund fees. Real estate industry bodies (such as the European and Asian Association for Investors in Non-Listed Real Estate Vehicles, INREV and ANREV respectively, and the Pension Real Estate Association, PREA) publish management fee studies annually but report mostly on individual fees and not entire fee structures. As a result, fee structures between funds remain relatively difficult to compare. Finally, focusing on one industry, real estate, allows for better comparability between different funds; as such, the results will be more meaningful for the industry.

The analysis shows that private equity real estate funds have an average fee load of 2.7 percent – substantially lower than private equity funds. A number of fund characteristics impact this fee load. Core funds and club deals are generally cheaper, but remarkably this bears little significance. Only the performance fee of Core funds is significantly lower than that of Opportunistic funds; the same can be concluded for Value Add funds. Another important characteristic is size: larger funds have significantly lower management fees. Funds investing in multiple countries charge somewhat more management fees, because of the necessary additional work, resources and complexity. The same is applicable to funds investing in developing countries (+30 basis points), while the opposite is true for industrial funds (–27 basis points). Additionally, investors need to be aware of the main fee drivers that will have a substantial impact on fees but can be controlled for: leverage, commitment fees and catch-up clauses. The more leverage, the higher the fee load on average – and in particular, leverage has the highest impact when returns are negative, which is the worst circumstance for investors. Meanwhile, funds with fees on commitments are on average 46 basis points more expensive, and a catch-up clause can cost investors 27 basis points on average but can be as high as 84 basis points in market scenarios in which target returns are met. During fund selection and negotiation, investors should take these aspects into account to reduce their costs.

This chapter is structured as follows: Section 2 is a description of the most common parts of a fee structure and introduces the database used for the analysis. The methodology used to investigate fee structures is explained in Section 3. Section 4 presents the results of the average fee load of private real estate funds, split by fund type and between management and performance fees. In Section 5, a regression model is applied to further examine the fee load and its characteristics and main drivers. In Section 6, a simulation model is used to analyze the impact of a volatile market on the fee load and drivers. Finally, the last section concludes with a discussion on the impact and drivers of private real estate fund fees.

3.2 An introduction to private equity real estate fund fees

For this chapter, a hitherto unexplored database was obtained from the Dutch institutional investor PGGM. This database contains hundreds of private equity real estate placing documents, including the terms and conditions of each investment proposal. As PGGM is a large institutional investor and well known by investment managers, most managers try to pitch their product to this investor. As a result, many placing documents are provided to the investor in support of the proposition. Similar databases have been used to analyze private equity markets. Metrick and Yasuda (2010) used these investor contracts for their research and found that two-thirds of expected revenue comes from fixed-revenue components that are not sensitive to performance. Litvak (2009) studied venture capital compensation based on partnership agreements; one of her conclusions was that compensation is often more complex and manipulable than it should be. More complex fee structures, however, predict lower total compensation. Again, both studies focused on private equity, but the database used for this analysis is for a specific private equity investment type: real estate.

Most funds in the database were raising capital between 2005 and 2015, covered a wide spectrum of styles, property types and geographies, and were mostly closed-end. All of these funds were offered to institutional investors as an investment product, but whether these funds were eventually launched is unknown. Other information that is unavailable include the actual fee structure and levels after negotiations, and the actual performance. The possibility to negotiate differs per investor and per market. The more capital there is chasing investment opportunities with a limited number of fund managers, the more fund managers can determine the fee height. On the other hand, investors are better positioned to influence fees when markets are in decline, like during the years after the global financial crisis. In general, larger institutional investors can negotiate lower management fees and even remove catch-ups, while smaller investors are rarely in a position to influence fees. In addition, many existing Core funds, mostly open-end, have specific fee structures in place where fees are lower for investors investing over a certain threshold. Negotiation would still be possible but only to make additional arrangements, like tailor-made reporting. Fees for these funds are fixed. Some of the negotiation results will apply to all investors, even the smaller ones, but large investors will in general benefit most from negotiations. Another way for investors to reduce fees is by investing more directly via JVs or separate accounts; due to the large involvement and substantial commitment of investors, fees tend to be lower. Only a few JVs have been captured by the database, but separate accounts are not included, as these are even more tailor-made solutions. Fees can be avoided by investing in real estate directly. In that situation, investors would bear all the costs involved themselves and would have to cope with finding and hiring the right local experts; this arrangement carries organizational challenges and it is questionable if performance could keep up with the more specialized managers. Unlike private equity, co-investments within private real estate are not necessarily fee reducing. Consequently, most investors typically do not target real estate co-investment opportunities when selecting a private real estate fund. For some larger investors, however, this has become an important consideration in order to create the opportunity to increase exposure to the best deals.

The database provides a very good overview of what is available in the market, what the average asking fee set by fund managers is, and what smaller investors, who are unable to negotiate lower fees, should expect to pay. To have as much consistency as possible between the different funds and to allow for the best comparisons, the analysis in this chapter only includes closed-end funds and club deals (typically structured as a closed-end fund with only a few investors). Table 3.1 provides an overview of the type of funds in the database.

Unlike private equity, private real estate fee structures are not standardized, but rather complex. There is a wide variation of fee structures, even by style. Typically, there are three different styles for private real estate, namely Core, Value Add and Opportunistic. These styles are related to the type of activities done within the fund and therefore to the risk taken. Core is the least risky type where the fund mainly invests in income-producing investments, like fully occupied shopping centers, uses low leverage, has no or very low development exposure and generates a high proportion of return through income. A Value Add fund may invest in any property type and deliver returns from a balance of income return and capital appreciation. The fund may allocate part of its investments in real estate development. Typically, it will also invest in forms of active management, such as active leasing risk, repositioning or redevelopment to generate returns through adding value to the property. Usually the fund will use moderate leverage. An Opportunistic fund is the riskiest style; typically, it is able to use high amounts of leverage, has a high exposure to development or other forms of active asset management and will deliver returns primarily in the form of capital appreciation. The fund may invest in any market or sector and may be highly focused on individual markets or property types (source: European Association for Investors in Non-Listed Real Estate Vehicles, INREV). The database consists of 78 Core, 161 Value Add and 174 Opportunistic funds.

Table 3.1: Descriptive statistics private real estate fund database

Descriptive statistics private real estate funds							
Style	**#**	**Structure**	**#**	**Target countries**	**#**	**Catch-up**	**#**
Core	78	Closed-end	403	Single country	307	Yes	162
Value Add	161	Club deals	10	Multi country	106	No	251
Opportunistic	174						
Region	**#**	**Sector**	**#**	**Year**	**#**	**Target leverage**	**#**
Mature Americas	80	Office	66	≥2013	33	0%	15
Emerging Americas	15	Retail	62	2012	57	>0% & ≤40%	74
Mature Europe	137	Residential	58	2011	51	>40% & ≤50%	95
Emerging Europe	18	Industrial	30	2010	34	>50% & ≤60%	110
Mature Asia Pacific	71	Mixed	175	2009	56	>60%	119
Emerging Asia Pacific	58	Debt	10	2008	75		
Mixed Asia Pacific	30	Other	12	2007	42		
Other	4			2006	30		
				≤2005	35		

The average fund has a target equity size of almost half a billion euros, and combined with an average 50 percent loan to value target, it aims to invest a billion euros in real estate. It is remarkable that the average LTV level for Core funds is over 40 percent. There are a number of reasons for this relatively high level of LTV. While the average LTV for open-end funds is more likely to be in the range of 20–30 percent, closed-end funds are using levels of leverage of even up to 50 percent. Some Japanese funds are even presented as Core funds with 70 percent leverage. However, these high levels of leverage are mostly used for funds launched pre-crisis, and are no longer in line with what is currently expected for Core funds. That Opportunistic funds have lower leverage than Value Add funds can be explained by the substantial amount of Opportunistic funds invested in emerging countries where finance is not always readily available and therefore use lower LTVs. Value Add funds, on the other hand, are more focused on mature economies where sufficient leverage is available.

Usually Core funds require less active management and should therefore charge lower management fees. Value Add and Opportunistic funds require more active management and thus charge higher fees as risk and expected returns are higher. Managers of these funds are more incentivized, making performance fees more important. Table 3.2 displays the types of fees most often used and what the average for each type is. These averages are similar to the averages available in private real estate industry management fee studies by INREV, ANREV[7] and PREA.[8]

In general, there are three types of fees: fees related to fund management, active management and performance. Fund management fees are paid quarterly or annually to a fund's manager for his or her management services to the fund, covering services such as the fund level structure management, arrangement of financing, fund administration, fund reporting and investor relations. Approximately 55 percent of all funds apply different fees during the investment or commitment period (generally the first three years) compared with the holding period. Fund management fees can be based on gross asset value (GAV, the value of the underlying real estate portfolio), net asset value (NAV or equity), commitment (the amount for which the investor has committed to invest), invested equity

[7] ANREV is the Asian association for investors in non-listed real estate vehicles.

[8] PREA is the Pension Real Estate Association.

(the amount the investor has actually invested in the fund), gross operating income (GOI) and net operating income (NOI). Except from management fees charged on income, fund management fees tend to be higher when style risk increases. Thus, fund management fees for Opportunistic funds are higher than those for Core funds. The most popular are management fees based on GAV, on commitments during investment periods and on invested equity during holding periods. When looking at the regional differences (not shown in the table), funds in the Americas region are less likely to charge management fees on GAV and NAV, while European funds are more likely to do so.

Table 3.2: Summary fee statistics private real estate fund database, average fees are in %. GAV is Gross Asset Value, NAV is Net Asset Value, GOI is Gross Operating Income and NOI is Net Operating Income. Acquisition and disposition fees are fees charged on GAV and more specifically on the purchase price and sale price respectively. The set-up fee is charged on commitment, while the finance fee is charged on the amount of debt.

	Core		**Value Add**		**Opportunistic**		**Total**	
Number of funds	78		161		174		413	
Average target size (in €M)	458		437		532		481	
Median target size (in €M)	349		300		359		338	
Average target loan to value	43%		57%		53%		53%	
Fund Management Fees								
# of fund changing fee after commitment period	22		95		112		229	
During commitment period	**#**	**Average**	**#**	**Average**	**#**	**Average**	**#**	**Average**
Fee on GAV	25	0.55	28	0.68	10	0.86	63	0.66
Fee on NAV	13	1.09	13	1.23	7	0.90	33	1.11
Fee on Commitment	21	1.05	89	1.21	131	1.53	241	1.37
Fee on Invested Equity	17	1.11	44	1.13	31	1.19	92	1.15

Table 3.2 (continued): Summary fee statistics private real estate fund database, average fees are in %. GAV is Gross Asset Value, NAV is Net Asset Value, GOI is Gross Operating Income and NOI is Net Operating Income. Acquisition and disposition fees are fees charged on GAV and more specifically on the purchase price and sale price respectively. The set-up fee is charged on commitment, while the finance fee is charged on the amount of debt.

	Core		Value Add		Opportunistic		Total	
During holding period	**#**	**Average**	**#**	**Average**	**#**	**Average**	**#**	**Average**
Fee on GAV	28	0.54	44	0.67	14	0.75	86	0.64
Fee on NAV	17	1.06	18	1.31	10	1.28	45	1.21
Fee on Commitment	5	0.98	14	1.12	38	1.46	57	1.33
Fee on Invested Equity	28	1.21	93	1.40	115	1.58	236	1.46
Fee on GOI	10	4.02	8	3.34	4	3.13	22	3.61
Fee on NOI	2	5.88	5	4.05	10	4.29	17	4.40
Active Management Fees	**#**	**Average**	**#**	**Average**	**#**	**Average**	**#**	**Average**
Acquisition Fee	29	0.76	52	0.83	32	0.86	113	0.82
Disposition Fee	18	0.69	32	0.82	19	0.88	69	0.80
Set-up Fee	9	0.51	8	0.81	10	0.90	27	0.74
Financing Fee	4	0.30	5	0.40	1	1.75	10	0.50
Performance Fee Features (in %)								
Charging performance fee	91		96		99		96	
1st Hurdle	9.2		9.8		10.3		9.9	
Carried interest	19.7		20.7		21.2		20.7	
2nd Hurdle	12.7		14.9		15.1		14.8	
3rd Hurdle	11.3		19.8		19.8		19.3	
Catch-up	6		32		61		39	
Catch-up split	55		55		61		59	

The active management fee is paid for certain activities a manager needs to perform to execute the strategy of the fund; these fees are typically paid only once. Around 35 percent of all funds charge at least one active management fee, whereas funds in the Americas region are less likely to charge active management fees. The most common fees are:[9]

[9] Definitions are from INREV.

- Acquisition fee, 82 basis points of purchase price on average and used by 27 percent of all funds. This fee is charged to a fund upon the acquisition of assets. Acquisition fees are not typically charged if a property developer/operator contributes assets to a fund. Unfortunately, it is not always clear from the acquisition fee whether costs for external advisors (that is, property agents) are charged to the fund or paid by the manager.
- Disposition fee, 80 basis points of sale price on average and used by 17 percent of all funds. This fee is charged to a fund upon the disposal of assets and is similar to the acquisition fee.
- Set-up fee, 74 basis points of commitments on average and used by 7 percent of all funds. Set-up fees are charged to cover all costs directly related to the structuring and establishment of a fund. These costs include, for example, legal fees, tax advisory fees, structuring fees and administration costs.
- Financing fee, sometimes referred to as debt arrangement fee, 50 basis points of par value of debt on average and used by 2 percent of all funds. A financing fee is paid to the manager for services in arranging debt for asset purchases or refinancing. This fee would be in addition to any arrangement fees paid to debt providers.

The last type of fee that can be charged to the investor is the performance fee. This is mostly back-ended and is typically structured as a percentage of all cash flows after the fund achieves a certain hurdle. The key terms used to structure the performance fee are hurdle rate, carried interest and catch-up. The hurdle rate is the annualized percentage return beyond which the outperformance of net investor returns is shared with the fund manager. The hurdle rate can be stated relative to an absolute hurdle rate or to an index/benchmark. Within the database, a performance fee, and therefore a hurdle, was used by 96 percent of all funds and the average first hurdle was 9.9 percent. Up to the hurdle rate, no performance fee is paid, but once the hurdle rate is achieved, profits are split as agreed to in the fund documentation. This split is called the carried interest. A carried interest is equivalent to the share of a fund's profit that will accrue to the general partner. The average carried interest is 20.7 percent (the most typical percentage is 20 percent). The final key term is the catch-up fee. A catch-up takes effect when an investor's return reaches the defined hurdle rate, an agreed level of preferred return. The fund manager then enters a catch-up period in which he or she may receive an agreed percentage of the profits until the profit split determined by the carried interest agreement is reached. This means the manager will be paid performance fees for any return below the hurdle rate, but only after achieving this rate, hence the name "catch-up". Opportunistic funds are most likely to charge a catch-up and Core funds the least likely. Overall, 39 percent of the funds charge a catch-up fee and the average split is 59 percent (that is, 59 percent of the return over the hurdle rate is paid to the manager until he or she has achieved a percentage of the total return equal to the carried interest rate). Once the catch-up is paid, the additional return is then split according to the carried interest percentage. In some cases, there is even a second (14.8 percent on average) or third hurdle (19.3 percent on average), and after these hurdles, carried interest changes as well (not included in the table) to 25 percent and 27 percent on average, respectively. Funds in the Americas region are more likely to charge a catch-up (55 percent on average). Finally, a few managers are paid a performance fee relative to a benchmark. Only four funds (1 percent) in the database used a relative benchmark. This type of fee is very difficult to model; thus, for this study, it is assumed that managers will not outperform the market. The impact of this assumption is rather low given the number of funds using a relative benchmark. Nevertheless, the performance fee might be slightly underestimated.

3.3 Modelling fee structures

In order to compare fees among funds, each using different fee structures, one fee metric must be introduced to cover the complete fee structure. This fee metric will be the aggregation of all fees paid to the fund manager and will be called the total fee load (TFL). To determine this metric, a cash flow model has been developed in which all fees are included. Investors and fund managers in private real estate typically use cash flow models to determine the IRR for each of their investments. The TFL is calculated by taking the difference between the IRR after costs and before fees, and the IRR after costs and fees. This reduction in IRR equals the TFL, the loss of return due to fees paid to the manager. Once this metric is available for each fund, given a certain real estate market scenario, it can be determined which funds are more expensive than others and why. Moreover, by assuming different market scenarios, it is possible to create a better understanding of how sensitive fees are for different market circumstances.

For each fund, the lifetime, the length of the investment period and the potential extension period are known. Nevertheless, a number of assumptions must be made to build a cash flow model that is effective for all funds. First, the cash flow model is on a quarterly basis and investments are done linearly during the investment or commitment period at quarter end. Meanwhile, divestments are done linearly during the last two years of the lifetime and during half of the potential extension period. This period is taken based on the experience that most funds don't sell all assets before the end of the lifetime. In fact, most of the time it is in the manager's interest to continue the fund due to income from management fee. One hundred percent of the cash is returned to the investors each year. Furthermore, fixed-rate debt is preferred by investors and fund managers, but because most terms end before or at the end of the lifetime, it is possible that the interest rate will be reset at a certain point during the lifetime. To avoid complexity, debt is assumed to be fixed-rate debt during the full lifetime. This assumption might underestimate the variability of the interest rate paid by the funds. The percentage of development is 0 percent for Core, 20 percent for Value Add and 60 percent for Opportunistic. These numbers are based on research done by Fuerst et al. (2010), commissioned by INREV, and are necessary because developments take longer to attribute to performance and during the development (which is assumed to take 2.5 years) no income is generated. Value Add funds tend to promise more additional value by reducing vacancies and redevelopment activities. Most of this aims to achieve higher rental growth. For this reason, it is assumed that Value Add funds generate 1.5 percent more NOI growth compared with Core funds. This number is rather arbitrarily chosen, but it will generate a net IRR in line with what Value Add funds, on average, promise to investors. Opportunistic funds, on the other hand, aim to provide more value growth by, for instance, developing and buying distressed assets. For this reason, it is assumed that these funds generate 20 percent additional value growth over the lifetime compared with Core funds. Again, this number is rather arbitrarily chosen, but it will generate a net IRR in line with what Opportunistic funds, on average, promise to investors. A cash sweep is triggered when the net asset value becomes negative. In reality, this can happen much sooner (or even later if the borrower is still able to pay his interest), but this assumption is made for simplicity's sake and because LTV and DSCR (debt service coverage ratio) covenants are unknown for most funds. This assumption might underestimate distress during poor market scenarios.

Finally, some assumptions have been made to create a real estate market scenario. Net operating income (NOI) growth equals inflation, which equals 2 percent. For emerging markets, NOI growth and inflation are increased by an additional 2 percent, as these markets tend to generate higher economic growth, inflation and thus NOI growth. The interest rate is 3.1 percent as long as the loan to value (LTV) is less than or equal to 50 percent. When LTV is between 50 percent and 60 percent, interest rate is increased by 40 basis points; between 60 percent and 70 percent, it is increased by 130 bps; between 70 percent and 80 percent, it is increased by 270 bps; and finally, between 80 percent and 90 percent, interest rate is increased by 550 bps. These spreads are in line with observations in today's market (see, for instance, Principal Capital Markets Insights, 5 January 2015). The cap rate on a property portfolio level is 5.5 percent, which is similar to the year end 2014 situation in the US market based on NCREIF[10] data, and the average vacancy is 5 percent. This vacancy might be on the low side given the average market, but most institutional funds target the better end of the market and relatively new assets, so it is fair to assume a somewhat lower figure. No distinction has been made between property types, so these general assumptions are used for all property types. This assumption affects funds charging management fees on income; since these are only a small portion of all funds, a significant impact on the results is unlikely.

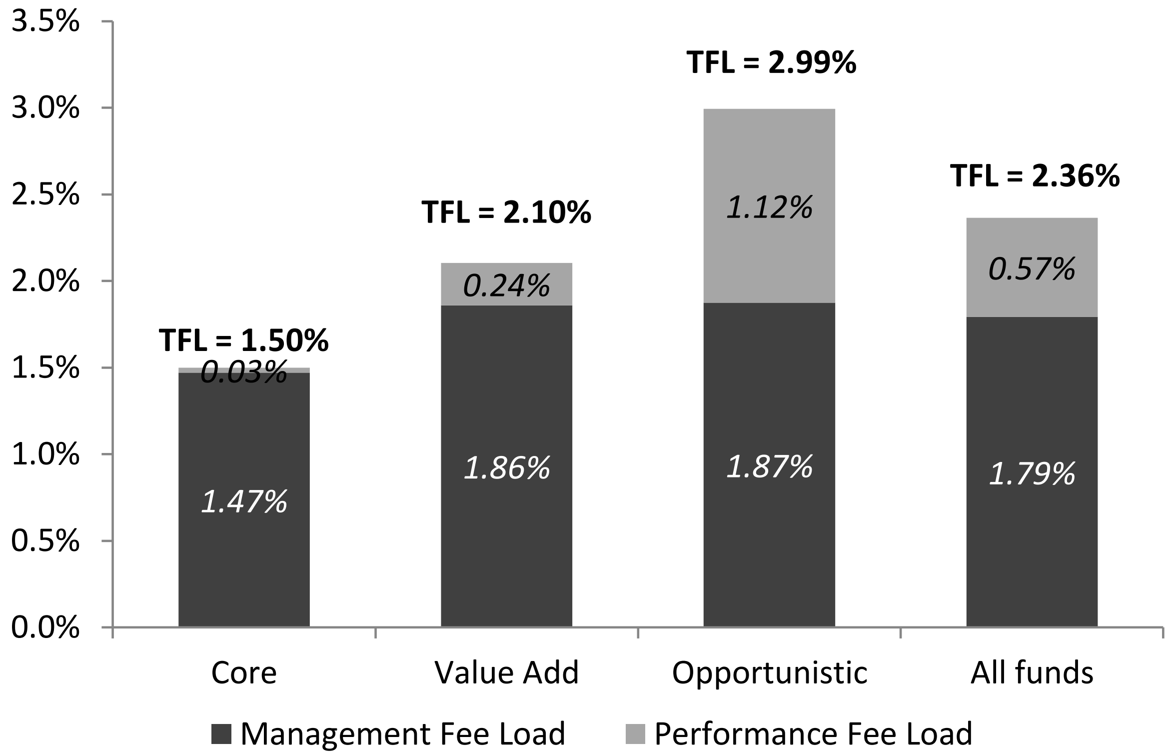
[10] NCREIF is the National Council of Real Estate Investment Fiduciaries.

Using IRR for analysis purposes can cause problems. Multiple IRRs are possible, and because the process is iterative, it can take time to calculate the IRR. In addition, Altshuler and Schneiderman (2011) highlighted the consequences of using IRR-based instead of preferred return–based performance fees. They proved that in some cases IRR-based incentive fees are much higher than preferred return–based incentive fees. Such cases involve investments where capital and profit are returned before the last capital is called and where an interim promote is paid as well. Due to the assumptions, this situation cannot occur in this analysis. Even though there are some issues with using IRR, it is important to use this metric because it is the most significant metric used by investors to evaluate private fund performance and by managers to determine performance fee.

3.4 The average fee for private real estate funds

It is important for investors to understand the total fee that's to be paid to the fund manager. The difficulty is there is no real market average with which to compare this information. Based on the database and modelling of the previous section, however, it is possible to determine the average total fee load per fund and establish a market average. Because all fees are calculated given a single market environment, fee loads between funds are comparable. In reality, differences between markets are substantial and funds do not start at the same time; as such, making a comparison between fees is actually harder. Figure 3.1 presents the average TFL overall and by style, and includes a split between management and performance fees. The management fee (1.79 percent) is the biggest proportion of the TFL, approximately 76 percent, which is somewhat higher than the results Metrick and Yasuda (2010) found for private equity. For Opportunistic funds, this ratio is much more skewed towards performance fees, as the management fee is 1.9 percent and the performance fee is 1.1 percent.

Figure 3.1: Total Fee Load (TFL) per style and split between management and performance fee



The average TFL is 2.36 percent, which is much lower than the average fee for private equity, according to several aforementioned studies. Furthermore, the TFL, or even the management fee load, is significantly higher than the average management fees as shown in Table 3.2. The main reason for this difference is that fees are often not based on equity, while the IRR and the TFL are. Even if the fee on commitments seems relatively low, on net asset value the fee is a lot higher. Assuming that investments are made gradually over time, fees on commitments can more or less be doubled to obtain the fee on net asset value. Additionally, costs charged in the first year of an IRR calculation impact an IRR more negatively than when charged in the fund's later stage. Also, leverage will multiply fees on GAV, NOI, GOI and some of the active management fees. Lastly, TFL is a combination of multiple fees and includes active management fees, like acquisition and disposition fees. These fees should not be ignored by investors, as the impact can be significant. Therefore, in line with Phalippou's (2009) conclusions on private equity fees, investors must look at aggregated figures, like TFL, to understand the full fee impact on return. So long as it is not standard practice to include such information in the documentation, investors might be fooled by seemingly lower fees.

As a robustness check to see whether the assumptions made in the cash flow model are reasonable, a comparison can be made of the fee loads in Figure 3.1 by style to the historical average difference between gross and net returns. This information is, unfortunately, only available for the US market through the NCREIF Townsend fund returns data series. These data series include open-end Core and Value Add funds, which are excluded from the fee load analysis but are known to charge lower management fees. In addition, the NCREIF data were calculated on an annual basis, whereas the fee loads are calculated on an IRR – that is, full lifetime – basis. The comparison is shown in Table 3.3.

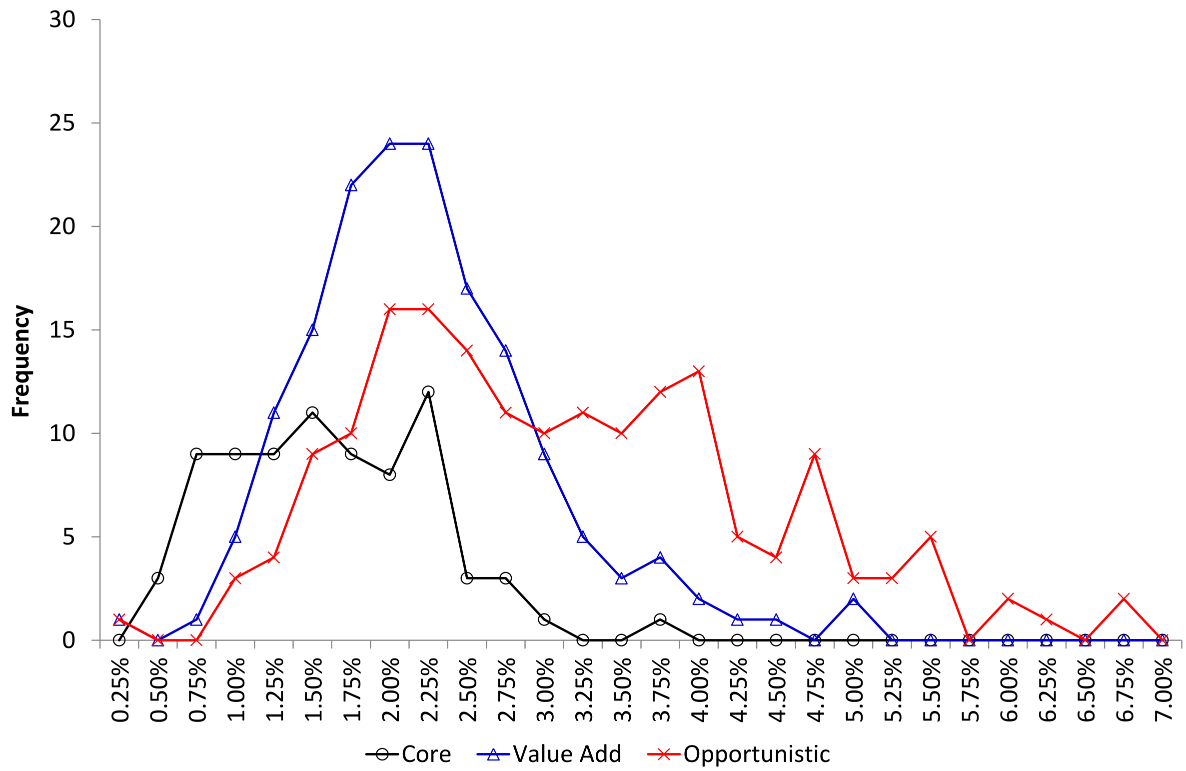
Table 3.3: Total fee load (TFL) and management fee load (MFL) for US funds compared to the historical fee load and return in % based on rolling annual NCREIF Townsend data 1988Q4 – 2012Q4 (returns are value weighted).

	TFL, US only	**MFL, US only**	**NCREIF Townsend Gross – Net return**			**NCREIF Townsend Gross Return**
			5% percentile	**Average**	**95% percentile**	
Core	1.4	1.3	0.8	1.0	1.1	6.5
Value Add	1.9	1.6	0.9	1.5	2.8	6.5
Opportunistic	2.9	1.7	0.9	2.9	8.4	10.7

Given the time period and the returns in the final column, most Core and Value Add funds are unlikely to have achieved their performance targets and thus performance fees are likely to be low. As a consequence, the historical fee leakage should be compared to the management fee load (MFL). The MFL for Core funds is 1.3 percent, while the historical fee leakage is 1.0 percent. For Value Add funds, these numbers are 1.6 percent and 1.5 percent, respectively. Opportunistic funds, however, are more likely to have achieved their targets, as the realized return is over 10 percent, and thus some performance fee is likely to be paid. Given these observations, TFL estimates seem to be close to the empirical results; therefore, the assumptions and modelling appear very reasonable.

Also shown are the 5 percent and 95 percent percentiles to provide a better understanding of the distribution of fees over the funds' history. The variation between Core funds is minimal, while it is rather wide for the Opportunistic funds. The difference between gross and net return for Value Add funds runs from 0.8 percent to 2.8 percent, which is a significantly smaller range compared with the same range for Opportunistic funds. The variation in TFL between funds within the different styles for the analyzed database is presented in Figure 3.2.

Figure 3.2: Distribution of the Total Fee Load (TFL) by style



Both Core and Value Add funds have some lognormal distribution, while the spread of average TFLs for Opportunistic funds is much wider and can even be as expensive as a private equity fee, as shown by the literature, with TFL levels of over 5 percent. Only the Core funds distribution is a lot wider than the presented interval for US funds; this is because the NCREIF database is dominated by open-end funds, which are rather large. Most of the funds with the highest TFLs are obviously driven by performance fees. In addition, it is unlikely to be optimal for an investor to only select managers from the left-hand side of the chart, representing those funds with the lowest TFLs. These funds are, for instance, more likely to aim for lower returns and it is questionable whether the strategy fits the portfolio of the investor. Finally, due to the private closed-end character, most funds are only open for a short period of time at the launch of the fund and are therefore not open to all investors all the time.

Besides the distribution, the variation between certain segments is substantial. In Table 3.4 the TFL is presented for different segments. This overview provides clear indications of which type of fund is more expensive than others. Mixed sectors and residential funds, for instance, are the most expensive, while industrial and debt funds are relatively cheap.

Table 3.4: Average and standard deviation of the Total Fee Load (TFL), per segment in %.

Segment	Average TFL	Standard Deviation	Segment	Average TFL	Standard Deviation
Property Type			**Vintage year**		
Mixed	2.69	1.20	≤ 2005	2.11	1.12
Residential	2.41	1.19	2006	2.39	1.09
Office	2.21	1.06	2007	2.56	1.25
Other	2.13	0.67	2008	2.77	1.43
Retail	2.05	1.07	2009	2.44	1.12
Industrial	1.76	0.75	2010	2.01	0.98
Debt	1.45	0.40	2011	2.24	0.85
			2012	2.29	1.09
Size in target equity			≥2013	1.84	0.46
≤ 250 million	2.40	1.44			
>250 and ≤ 500	2.24	1.16	**Catch-up Clause**		
>500 and ≤ 1,000	2.48	1.21	Catch-up	2.98	1.23
>1,000 million	2.61	1.32	No Catch-up	1.97	1.16
Structure			**Country diversification**		
Closed-end	2.37	1.15	Multi Country	2.44	1.45
Club deal	1.96	1.22	Single Country	2.34	1.18

Funds investing in multiple countries have higher fee loads than single-country funds. This seems fair, as managing a portfolio in more than one country is considerably more difficult, complex and time consuming. The additional management cost of this is 10 basis points. One of the most common phenomena in the investment industry is the size effect, and the opposite seems to be the case in fees within the private real estate fund market. Large funds (measured by the target equity size) have higher fee loads than small funds. In particular, funds exceeding 1 billion euros in equity have higher fees, and the difference can be as much as 37 basis points for funds between 250 million and 500 million euros. TFL does not seem stable over time. Based on the results shown, old funds, funds launched just after the crisis and the newest funds are relatively inexpensive, while funds launched during the peak of the market, 2007 and 2008, are the most expensive. Club deals charge lower TFLs (41 basis points on average), which can again be explained by lower complexity of the structure. Fund managers have less marketing to do, less investors to manage and receive higher amounts of capital to invest and therefore are satisfied with lower fees. Finally, the most apparent fee booster based on these segmentations is the catch-up clause. When a catch-up is included in the fund's fee terms, the TFL is increased by over 101 basis points. If investors can negotiate for this clause to be excluded, expenses drop significantly.

Although these segmentations provide some clear guidance in explaining TFL, they do not provide the complete story, as some of these segments likely overlap. The difference between small and large funds, for instance, might also be explained by the investment style. For this reason, it is necessary to control for these effects, which is done in the next section through a regression model.

3.5 Explaining the private real estate total fee load

To analyze the relationship between the calculated total fee load and the fund and fee structure characteristics, a cross-sectional regression model has been constructed. The explanatory variables that are included have been discussed in the previous section. It is expected that higher complexity will have an increased impact on fees. So, funds investing in multiple countries or developing economies and Opportunistic and Value Add funds should have higher TFLs. In addition, a positive relation is expected between return and leverage and the TFL and a negative relation with size. Lastly, funds with a catch-up clause or fees on commitments during the holding period are expected to have higher fee loads, as these terms are generating higher fees for managers. Funds also have been tested over vintage years, as pre-crisis funds demanded higher fees on average. However, the result was disappointing: none of the years was significantly different from the average. The difference between the years was clearly attributable to, for instance, a change in style and structure rather than to vintage. For this reason of insignificance and to keep the results accessible and readable, vintages have been excluded from the regression. Successful fund managers might be able to charge higher fees on consecutive funds, as investors are more willing to provide (more) capital. Chung et al. (2010), for instance, showed that consecutive funds are likely to be larger and therefore generate more fees. Unfortunately, the database does not provide sufficient information to include this into the regression. The model used for the regression is shown in formula 3.1.

$$TFL_i = \alpha + \beta_1 \cdot NetIRR_i + \beta_2 \cdot Leverage_i + \beta_3 \cdot Size_i + \beta_4 \cdot Club_i + \beta_5 \cdot Core_i + \beta_6 \cdot ValueAdd_i + \beta_7 \cdot MultiCountry_i + \beta_8 \cdot Developing_i + \beta_9 \cdot Retail_i + \beta_{10} \cdot Office_i + \beta_{11} \cdot Residential_i + \beta_{12} \cdot Industrial_i + \beta_{13} \cdot Debt_i + \beta_{14} \cdot OtherSector_i + \beta_{15} \cdot CatchUp_i + \beta_{16} \cdot CommitmentFee_i + \varepsilon_i \quad (3.1)$$

The dependent variable in the regression is the TFL_i, the average total fee load for fund i. The independent variables are: $NetIRR_i$, which is the net IRR for fund i; $Leverage_i$, which is the target debt to equity ratio, a rather common metric used in corporate finance literature; and $Size_i$, which is the logarithm of the fund's target equity amount in millions. All other independent variables are dummy variables. $Club_i$, $Core_i$ and $ValueAdd_i$ take the value 1 if it is a club deal, Core or Value Add fund, respectively. $MultiCountry_i$ takes the value 1 if fund i invests in more than one country. $Developing_i$ takes the value 1 if fund i invests in a developing (or emerging) economy.[11] $Retail_i$, $Office_i$, $Residential_i$, $Industrial_i$, $Debt_i$ and $OtherSector_i$ take the value 1 if the fund is focused on investing in retail, office, residential, industrial, debt and other sectors of real estate, respectively. The dummy $CatchUp_i$ or $CommitmentFee_i$ is 1 if the fund uses one of these types of fees. Finally, this model has not only been used to estimate the impact of different fund characteristics on the TFL, but on the management fee load (the aggregation of fund and active management fees) as well as the performance fee load. The results of these regressions are shown in Table 3.5 and all coefficients are in percentages.

A number of features have a clear impact on the TFL, MFL and PFL. The net IRR has a clear positive impact on the PFL but an insignificant negative impact on the MFL. As there is an effect on the fee load by design, it needs to be included in the regression. The net effect on the TFL is significantly positive with a coefficient of 4.32, which means that a 1 percent higher net IRR will result in a 4.32 basis point higher TFL. Leverage is a clear fee booster. Both the MFL as well as the PFL rise when leverage is increased. If leverage is 2, which means that the debt is twice as much as the equity stake, and loan to value equals 67 percent, the TFL is increased by 68 basis points (2 x 0.34 percent). Over a third of this effect is included in the management fee load. Therefore, leverage seems to be an easy way to increase income for fund managers. Although size does not have a significant effect on the TFL, it does have a clear negative effect on the management fee load. Hence, the bigger the fund, the less the management fee is needed to cover fund management activities. Interesting to note, however, is the positive impact on the PFL. Larger funds are apparently able to demand higher performance fees. What is interesting to note is the contrast to the previous table, where fee loads seem to be higher for bigger funds. This higher fee load for larger funds can therefore primarily be explained by other factors than size. Club deals are structured as closed-end funds and do not show significantly different fee loads, even though overall fee load is somewhat lower, caused by a 30 basis points lower MFL.

[11] Definition according to IMF.

Table 3.5: Regression results for the total fee load (TFL), management fee load (MFL) and performance fee load (PFL), based on a flat market (flat net operating income growth and net initial yields). Coefficients are in percentages and t-statistics are shown between brackets. Coefficients with *** are significant at 1%, ** at 5% and * at 10%. Number of observations is 458.

	TFL	MFL	PFL
Constant	0.79* (1.81)	1.93*** (6.28)	-1.13*** (-3.49)
Net IRR	4.32** (2.26)	-0.96 (-0.72)	5.27*** (3.74)
Leverage	0.34*** (5.46)	0.12*** (2.66)	0.23*** (4.88)
Log(Size)	-0.03 (-0.26)	-0.22** (-2.36)	0.18* (1.89)
Club	-0.10 (-0.37)	-0.30 (-1.51)	0.20 (0.93)
Core	-0.37** (-2.09)	-0.14 (-1.16)	-0.23* (-1.73)
Value Add	-0.41*** (-3.35)	0.06 (0.75)	-0.48*** (-5.25)
Multi Country	0.09 (0.84)	0.14* (1.83)	-0.05 (-0.60)
Developing economy	0.47*** (3.48)	0.32*** (3.39)	0.15 (1.50)
Retail	-0.11 (-0.80)	-0.01 (-0.06)	-0.10 (-1.03)
Office	0.12 (0.86)	0.15 (1.58)	-0.03 (-0.33)
Residential	-0.13 (-0.90)	0.09 (0.98)	-0.22** (-2.15)
Industrial	-0.40** (-2.30)	-0.19 (-1.56)	-0.21 (-1.63)
Debt	-0.40 (-1.39)	-0.27 (-1.35)	-0.13 (-0.61)
Other	-0.36 (-1.40)	-0.07 (-0.38)	-0.30 (-1.54)
Catch-up	0.47*** (4.23)	-0.01 (-0.10)	0.48*** (5.82)
Commitment Fee	0.49*** (4.77)	0.26*** (3.58)	0.23*** (3.07)
R^2	0.47	0.18	0.50
Adjusted R^2	0.45	0.14	0.48

The results also reveal differences between styles. Core has a 37 basis points lower TFL than Opportunistic funds, driven by a 14 bps lower MFL and a 23 bps lower PFL. Value Add funds, however, are 41 bps less expensive, which is mainly driven by a lower PFL. Management fees are more or less the same. Funds investing in multiple countries or in developing economies are more expensive due to higher management fees, which makes sense as costs and complexity are higher. For bigger investors, this may be a good reason to focus on single-country funds, as investors are able to diversify across countries themselves. When looking at the different property types, there are a number of interesting observations to make. Residential funds have a 22 bps lower PFL compared with mixed funds, which is difficult to explain. Industrial funds on average are 40 bps cheaper. Management for this type of property is less intensive and complex, and performance fees are generally lower.

Perhaps the most remarkable result is the impact of a catch-up clause. If the manager introduces a catch-up, the average TFL is increased by 47 bps, which can be fully attributed to the performance fee. Though this effect is according to expectations, the volume is staggering. Almost half a percent of return will be lost due to a catch-up clause. Fees on commitments do not grow when the net asset value grows and are stable in absolute terms when values fall. Furthermore, this fee is very high in the first couple of years when only a few investments are done. Therefore, it makes sense that funds using fees on commitments are more expensive (49 bps), although the management fee only accounts for half of this increase. Funds using fees on commitments are also more likely to demand higher-than-average performance fees.

With the number of variables used, multicollinearity may be a problem that warrants further investigation. To analyze this potential issue, variance inflation factors (VIF) are used. Generally, a VIF exceeding 4 is seen as a sign that problems of multicollinearity exist. In this research, the highest VIFs are around 2.7, which are for the Core dummy variable and the net IRR. As such, multicollinearity is not an issue with this regression.

All results are very plausible, and the goodness of fit of the regression model is reasonably high, given R^2 is around 50 percent for the TFL and PFL and almost 20 percent for the MFL. The lower R^2 for MFL can be explained by the fact that there are many different types of management fee structures, while performance fees are rather similar and more homogeneous. However, these regression results are based on a very stable real estate market scenario in which NOI growth and yield movements are the same for each year. This is unlikely to occur in reality, and thus a Monte Carlo simulation has been used to better reflect reality.

3.6 Impact of changing markets on total fee load

In real life, real estate markets are not stable, but instead have great variability. Fund managers predominantly use IRR models assuming a flat market for their fund's placing documents. As this is not a fair reflection of investment markets, variability must be incorporated into these models; thus, a Monte Carlo simulation model is suitable for this research. Four market variables were used to simulate the market: inflation, vacancy, NOI growth and net initial yield. As this study focuses on the impact certain fund characteristics have on the average fee load under different market scenarios and not the exact level of return within a certain scenario, it is sufficient to model each variable simply. Hence, all variables are assumed to be normally distributed, as shown in formula 3.2.

$$x \sim N(\mu, \Sigma) \tag{3.2}$$

Here, x is the vector of the aforementioned four market variables, μ is the mean vector of these four variables and Σ is the respective covariance matrix. Variables of change in vacancy and change in net initial yield are assumed to follow a random walk and therefore have an average of 0. Inflation and NOI growth are assumed to have the same average of 2 percent, which means that rents will follow inflation in the long run. Two percent inflation is more or less what is currently expected. The standard deviations of the three real estate variables – change in vacancy rate, NOI growth and change in net initial yield – are based on NCREIF historical data,[12] but are increased by 30 percent since these portfolios are generally less diversified than the market (see, for instance, Callender et al. [2007a] and Callender et al. [2007b]). The standard deviation of inflation is based on data retrieved from Bloomberg. These data also showed a negative and significant correlation of –0.45 between NOI growth and the change in vacancy rate, which makes sense as rents are likely to rise when vacancy rate falls. As a result, a correlation coefficient between NOI growth and the change in vacancy is included. As no other correlation was significantly different from 0, the covariance matrix was built according to formula 3.3.

$$\Sigma = \begin{bmatrix} \sigma^2_{INFL} & 0 & 0 & 0 \\ 0 & \sigma^2_{DVAC} & \rho_{DVAC,DNOI} \cdot \sigma_{DVAC} \cdot \sigma_{DNOI} & 0 \\ 0 & \rho_{DVAC,DNOI} \cdot \sigma_{DVAC} \cdot \sigma_{DNOI} & \sigma^2_{RENT} & 0 \\ 0 & 0 & 0 & \sigma^2_{DNIY} \end{bmatrix} \quad (3.3)$$

Here, σ_{INFL} is the standard deviation of inflation, σ_{DVAC} is the standard deviation of the change in vacancy rate, σ_{DNOI} is the standard deviation of NOI growth, σ_{DNIY} is the standard deviation of the change in net initial yield and $\rho_{DVAC,DNOI}$ is the correlation between the change in vacancy rate and NOI growth. Vacancy rate and the net initial yield cannot be negative and thus some minimum values have been set. The minimum value for the net initial yield is 3.5 percent, and although this number is set arbitrarily, there is no historical observation of the average market yield below these levels and thus this assumption is realistic. The minimum value for the vacancy rate is set at 0 percent.

With the Monte Carlo simulation, 50,000 scenarios were generated, in which 15 years have been modelled using the assumed distributions described above. So, during this 15-year period, variables are following a random walk. Each scenario has been applied to each fund's cash flow model. Because the main goal is to capture the variability of the market in the fee load, the analysis will focus on the average impact and not on the outliers or extreme scenarios. Based on these 50,000 scenarios, the average management, performance and total fee load per fund were calculated. These averages are shown in Table 3.6.

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[12] NCREIF Property Index (NPI) data is used for the period 1988–2012.

Table 3.6: Average Management Fee Load (MFL), Performance Fee Load (PFL), Total Fee Load (TFL) and net IRR in %, based on a Monte Carlo simulation model, reflecting dynamic real estate market scenarios, and a linear model, reflecting a flat real estate market scenario.

	Simulation Model				**Linear Model**			
	MFL	**PFL**	**TFL**	**IRR**	**MFL**	**PFL**	**TFL**	**IRR**
Core	1.52	0.31	1.83	8.6	1.47	0.03	1.50	9.2
Value Add	1.94	0.71	2.65	10.6	1.86	0.24	2.10	12.0
Opportunistic	1.93	1.19	3.13	14.4	1.87	1.12	2.99	15.2
All funds	1.86	0.84	2.70	11.8	1.79	0.57	2.36	12.8

Based on the simulation, the average TFL is 2.7 percent, 34 basis points higher compared to the linear model. The primary reason for this increase is a surge in the PFL. This can be explained by option theory, as the performance fee is a kind of call option, and an increase in volatility increases the value. Core funds are 33 basis points more expensive when adjusting the IRR for changing market circumstances, and this is also mainly due to an increased PFL. Value Add funds are 55 basis points more expensive. Opportunistic funds, on the other hand, are only 14 bps more expensive. The reason for this limited increase for Opportunistic funds is that in the simulation results the average IRR is lower for highly leveraged funds; this effect was also documented by Van der Spek and Hoorenman (2011). In fact, the average IRR for Opportunistic funds in the simulation study is 0.8 percent lower compared to the linear model.

For a better understanding of the results, the average fee loads generated by the simulation were used as inputs for the regression analysis. This provides a more robust way to understand the different drivers of fees. The regression was done in a similar manner as the one before, and the results are shown in Table 3.7. As some of the assumptions are made to match the return for each style with the average market return by style, it is important to add the net IRR to the regression analysis to capture this effect. Again, no significant effect was found for vintages; as such, these were excluded from the regression analysis.

Table 3.7: Regression results on the average total fee load (TFL), management fee load (MFL) and performance fee load (PFL), based on a Monte Carlo simulation of the real estate market (inflation, vacancy, NOI growth and net initial yields). Coefficients are in percentages and t-statistics are between brackets. Coefficients with *** are significant at 1%, ** at 5% and * at 10%.

	TFL	MFL	PFL
Constant	0.66* (1.89)	1.49*** (4.86)	-0.80*** (-3.85)
Average Net IRR	6.40*** (6.83)	1.44* (1.75)	4.99*** (8.94)
Leverage	0.54*** (11.29)	0.18*** (4.22)	0.36*** (12.45)
Log(Size)	-0.15 (-1.40)	-0.20** (-2.13)	0.05 (0.73)
Club	-0.15 (-0.63)	-0.33 (1.61)	0.18 (1.29)
Core	-0.16 (-1.19)	-0.01 (0.07)	-0.15* (-1.90)
Value Add	-0.06 (-0.64)	0.14 (1.60)	-0.19*** (-3.32)
Multi Country	0.11 (1.27)	0.11 (1.47)	-0.01 (-0.11)
Developing economy	0.30*** (2.78)	0.22** (2.34)	0.07 (1.04)
Retail	-0.16 (-1.37)	-0.02 (-0.21)	-0.14* (-1.98)
Office	0.16 (1.47)	0.16 (1.60)	0.01 (0.16)
Residential	0.08 (0.72)	0.12 (1.17)	-0.03 (-0.39)
Industrial	-0.27* (-1.82)	-0.20 (-1.57)	-0.06 (-0.69)
Debt	-0.23 (-0.95)	-0.23 (-1.09)	0.00 (0.01)
Other	-0.23 (-1.04)	-0.03 (-0.14)	-0.19 (-1.46)
Catch-up	0.27*** (2.97)	0.04 (0.52)	0.22*** (4.00)
Commitment Fee	0.46*** (5.44)	0.24*** (3.23)	0.22*** (4.39)
R^2	0.52	0.18	0.57
Adjusted R^2	0.50	0.15	0.55

The results are similar to the results based on a flat market, although there are some clear differences. In the MFL regression, the IRR coefficient became positive and significant. This means a strong return will have a positive impact on management fees, which is in line with expectations as some of the management fees are based on value and thus linked to performance. Another remarkable difference is the effect of leverage on each type of fee load. This effect is much stronger than in the linear scenario and is driven by the increased option value of carried interest due to the increase in volatility. Leverage of 50 percent (which equals an equity-to-debt multiple of 1) implies an increase of TFL of 54 basis points and not the 34 bps in the linear scenario. Therefore, if investors solely rely on one scenario provided by the placing document, they will underestimate the effect of leverage on fees. The size effect is still present but only has an effect on the management fees, which is in line with expectations; larger funds charge less management fee. Another interesting observation is that on average club deals charge lower management fees, while the performance fee is somewhat higher. This is not surprising since more emphasis is put on alignment, but this effect is marginally insignificant since the amount of observations is low.

Styles only differ on the performance fee, where unmistakably Opportunistic funds charge the highest performance fee. Nevertheless, Value Add funds charge the highest, nearly significant, management fee. The most remarkable observation is that it cannot be concluded that closed-end Core funds have lower management fees. This is contrary to the amount of work that is involved and the expectation, as Value Add and Opportunistic funds require more work on the assets. Other fee drivers, like lower leverage and return, make average fees lower, but the style itself has no impact. The variable that became insignificant was the multi-country dummy. Apparently, the relationship is not as strong as the initial results suggest, though the effect is still positive. Another relationship that is weaker than initially indicated is the effect of investing in developing economies. The TFL coefficient is reduced by a third to 30 basis points. Across the different sectors, retail and residential stand out. Retail has a significantly lower performance fee, which is understandable since this sector is a more Core and long-term investment compared to other sectors. In contrast to initial findings, residential stands out, as none of the fee loads is significantly lower, which is more in line with expectations. The effect of a catch-up, based on simulated scenarios, is less severe, though the impact is an average increase of 22 basis points on performance fees. One can argue that top-quartile managers – that is, managers who achieve higher returns on average compared to their peers – are more likely to have a catch-up, as investors are more likely to accept this type of arrangement with these managers. The additional return they achieve could offset the additional 22 basis points of fees. To analyze this, an attempt was made to incorporate and link additional return data from the industry platforms INREV and ANREV. Unfortunately, the combined data resulted in a sample too small to properly link additional returns and catch-up fees. Nevertheless, this is an interesting topic for further investigation.

Finally, it is interesting to note that the sum of the MFL and PFL coefficients is more or less similar to the TFL coefficient, which would make perfect sense when most of the TFL is explained. Furthermore, R^2 slightly improved in the simulated scenarios. For this regression, the potential problem of multicollinearity has been checked. The highest VIF in this regression is only 2.3 for the Core dummy variable, while all other VIFs are below 2. Therefore, there is no problem with multicollinearity in this regression.

Table 3.8: Average Management Fee Load (MFL), Performance Fee Load (PFL) and Total Fee Load (TFL), based on a Monte Carlo simulation model per Loan-To-Value (LTV) cluster in %.

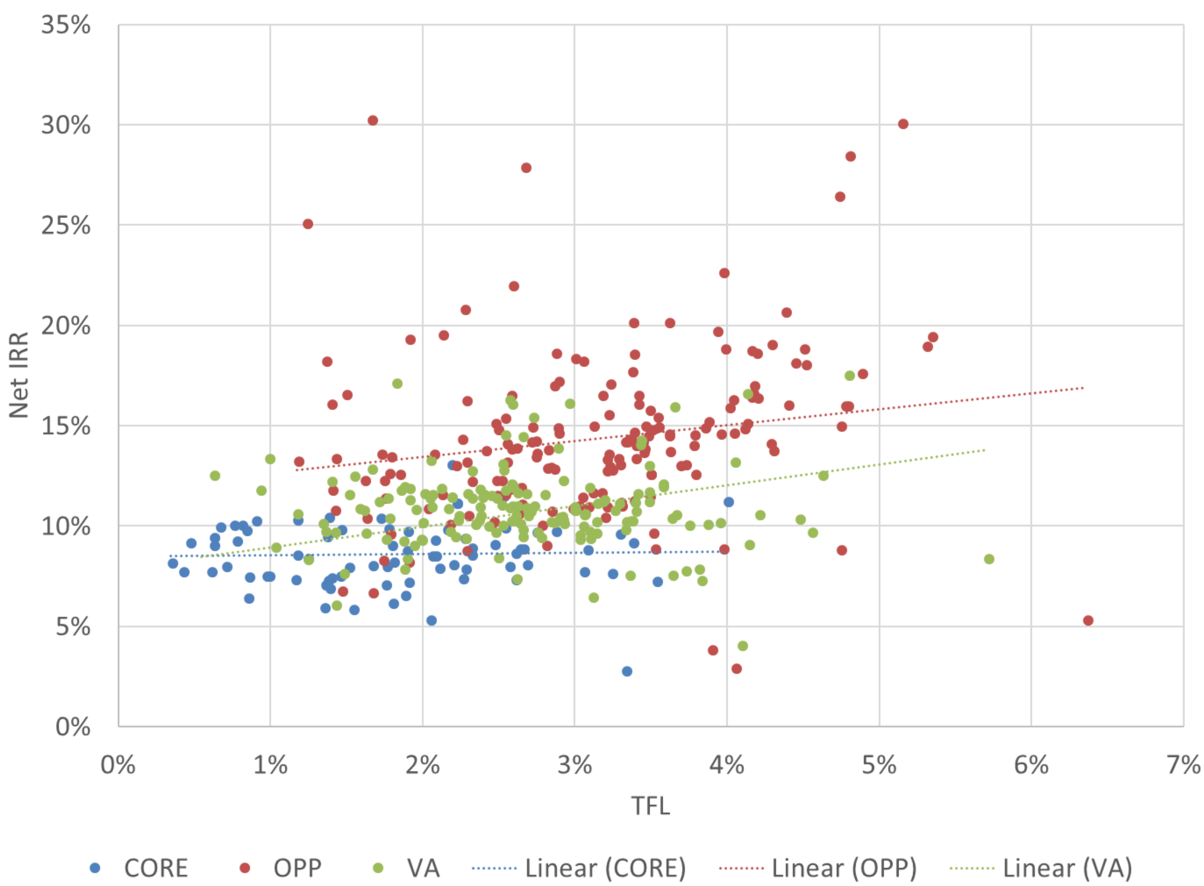
	Number of observations	**MFL**	**PFL**	**TFL**
LTV = 0%	15	1.60	0.12	1.72
0% < LTV ≤ 40%	74	1.54	0.43	1.97
40% < LTV ≤ 50%	95	1.79	0.68	2.47
50% < LTV ≤ 60%	110	1.86	0.97	2.84
LTV > 60%	119	2.14	1.19	3.34

The impact of leverage on the TFL can also be shown by clustering each fund in five ascending LTV clusters. As shown in Table 3.8, a clear relationship exists between leverage and fee load for private real estate vehicles where management typically is externalized.

Therefore, increasing leverage creates a direct boost to the total fee load, implying more profits for the manager. MFL and PFL increase substantially as a result of an increase in leverage. Without leverage the average fee load is 1.7 percent, but with a leverage of over 60 percent, it can be as high as 3.3 percent.

Because a fee is dependent on the return, it is interesting to see how the TFL relates to the average return. Figure 3.3 shows this relationship per style. Interestingly, the relation between Core funds and return is rather weak and TFL is therefore clearly dependent on other factors. For Value Add and Opportunistic funds the relationship is stronger, which is mainly driven by the performance fee. Nevertheless, most of the TFL is clearly not return related and will be analyzed further.

Figure 3.3: Average Total Fee Load (TFL) relative to the Net IRR per style.



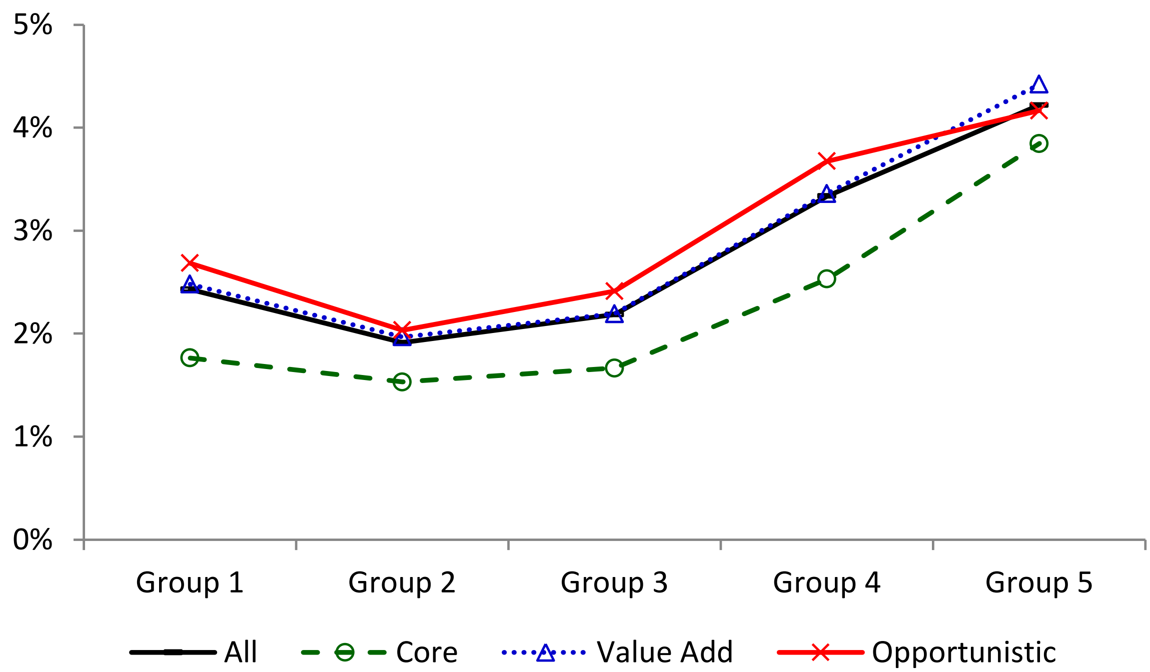
Another way to analyze the TFL relative to the IRR is to group the results by return and see whether the coefficients and parameters are stable for different return levels. These return groups are shown in Table 3.9, which includes the percentage of observations in each group, the average TFL per group and the standard deviation of the TFL within the group. It is remarkable that the TFL in the lowest return group is higher than in the second group, meaning the loss of IRR due to fees is higher when returns are negative than in the case when returns are modestly positive. This can be explained by the fact that NAVs will be a lot lower in these scenarios; as a result, fees on commitments or invested equity are relatively high compared to NAV. Consequently, the variation in TFL is a lot higher as well, resulting in a standard deviation of 1.3. Furthermore, not surprisingly, the variation in TFL increases as the return increases.

Table 3.9: Total Fee Load (TFL) simulation results grouped by return, including distribution, average TFL and the standard deviation of the TFL in %.

Group	Net IRR interval	% of observations	Average TFL	Standard deviation TFL
Group 1	Net IRR < 0%	6.8	2.43	1.32
Group 2	0% ≤ Net IRR < 7.5%	19.0	1.91	0.66
Group 3	7.5% ≤ Net IRR < 15%	38.2	2.19	0.81
Group 4	15% ≤ Net IRR < 22.5%	26.6	3.34	1.24
Group 5	Net IRR ≥ 22.5%	9.4	4.22	1.72
All	---	100	2.70	1.00

Figure 3.4 shows the differences between styles within these IRR groups. It is remarkable that the difference between Opportunistic and Value Add funds is rather low. Core, on the other hand, is significantly lower for all returns. All styles have higher TFLs in the lowest return group. Also remarkable is the lower TFL for Opportunistic funds compared with Value Add funds in the highest return group. The reason behind this is that Value Add fund fees are mostly not structured for these high levels of performance, while Opportunistic fund fees are. Therefore, fee loads seem very high, while in practice they are unlikely to be achieved.

Figure 3.4: Average Total Fee Load (TFL) per return group by style and the average TFL by style based on the simulation results



Finally, TFLs per group are used in the regression model; the results are displayed in Table 3.10. Most coefficients are rather stable across return groups, though some clear differences exist in the lowest and highest return groups. Leverage, for instance, slowly increases for each higher return group but has the biggest impact on fees in a negative return environment. Investors are thus confronted with a double negative impact with too much leverage, as it amplifies the negative return and increases the fee load – another reason for investors to be wary of using much leverage.

Table 3.10: Regression results on the average total fee load (TFL) per return group, based on a Monte Carlo simulation of the real estate market (simulating inflation, vacancy, NOI growth and net initial yields). Coefficients are in percentages and t-statistics are shown between brackets. Coefficients with *** are significant at 1%, ** at 5% and * at 10%.

	Group 1	Group 2	Group 3	Group 4	Group 5
Constant	0.32 (0.64)	1.76*** (6.58)	1.62*** (5.37)	2.31*** (5.14)	3.86*** (5.17)
Leverage	0.76*** (10.26)	0.12*** (3.14)	0.18*** (4.13)	0.19*** (2.87)	0.20* (1.77)
Log(Size)	0.12 (0.70)	-0.17* (-1.78)	-0.10 (-1.00)	-0.06 (-0.39)	-0.14 (-0.54)
Club	-0.56 (-1.49)	-0.30 (-1.49)	-0.27 (-1.17)	-0.09 (-0.27)	-0.18 (-0.33)
Core	-0.34* (-1.73)	-0.17 (-1.59)	-0.15 (-1.28)	-0.22 (-1.24)	-0.24 (-0.79)
Value Add	-0.17 (-1.14)	0.05 (0.62)	-0.00 (-0.04)	0.03 (0.21)	0.12 (0.55)
Multi Country	0.02 (0.13)	0.13* (1.72)	0.13 (1.59)	0.22* (1.78)	0.29 (1.33)
Developing economy	0.12 (0.71)	0.29*** (3.36)	0.22** (2.23)	0.08 (0.54)	0.43* (1.78)
Retail	-0.17 (-0.91)	0.00 (0.02)	-0.07 (-0.61)	-0.13 (-0.81)	-0.23 (-0.84)
Office	0.16 (0.91)	0.15 (1.61)	0.14 (1.34)	0.20 (1.28)	0.37 (1.41)
Residential	-0.01 (-0.05)	0.11 (1.16)	-0.08 (-0.75)	-0.12 (-0.70)	0.27 (1.00)
Industrial	-0.30 (-1.28)	-0.20 (-1.57)	-0.28** (-1.98)	-0.14 (-0.65)	0.05 (0.14)
Debt	-0.06 (-0.15)	-0.25 (-1.24)	-0.35 (-1.52)	-0.48 (-1.39)	-0.30 (-0.43)
Other	0.05 (0.16)	-0.02 (-0.12)	-0.13 (-0.61)	-0.08 (-0.26)	-0.63 (-1.17)
Catch-up	0.18 (1.27)	0.01 (0.18)	0.42*** (4.93)	0.84*** (6.58)	-1.18*** (-5.65)
Commitment Fee	0.17 (1.29)	0.29** (3.97)	0.36*** (4.45)	0.66*** (5.37)	0.83*** (4.11)
#Observations	413	413	413	413	383
R^2	0.30	0.20	0.32	0.36	0.13
Adjusted R^2	0.27	0.17	0.29	0.33	0.10

Given a certain return, there is little difference in TFL between styles. Core funds are consistently less expensive but only significantly lower when returns are negative, while Value Add fee structures additionally increase fees when returns are high. In contrast, it is more likely that Opportunistic fund returns are higher. When the return exceeds the hurdle, the catch-up is operational and thus has a large significant positive impact on the TFL in groups 3 and 4. The additional fee amount due to this catch-up can be as much as 84 basis points, which is substantial. Interestingly, the effect is strongly negative in group 5. This can only be explained by the catch-up that is already fully paid out in group 5 and the average additional carried interest that is higher for funds without a catch-up clause (average carried interest of 22.8 percent) compared to those with a catch-up clause (20.4 percent on average). Finally, funds with commitment fees are consistently more expensive.

3.7 Conclusions

This chapter aims to improve the transparency of the rather opaque world of private equity real estate fees. The analysis is based on a unique investor's private equity real estate fund database containing ex-ante fee structures, as recorded in corresponding placing documents. Through IRR modelling and simulation, it is demonstrated that the average total fee load for private equity real estate funds is 2.7 percent, which is clearly lower than the average private equity fund fee load. Furthermore, there are substantial differences between fund styles. These differences, however, cannot be explained by a difference in the level of management fees, which conflicts with the impression that more work needs to be done managing Value Add and Opportunistic assets. Rather, performance fees and other fee drivers are responsible for such differences. Core and Value Add funds charge less performance fees compared with Opportunistic funds. As in most other financial studies, size is an indicator that predominantly impacts management fees: the bigger the fund, the lower the management fee on average. Funds investing in the retail sector on average have a 14 basis points lower performance fee, reflecting the more long-term characteristic of this property type. The 27 basis points lower total fee load for industrial funds, on the other hand, is primarily a reflection of the lower management intensiveness of this property type. Funds investing in developing countries tend to have a 30 basis points higher total fee load, mainly as a result of a 22 basis points higher management fee; this reflects the relative amount of work that needs to be done for this type of strategy. Complexity has its price.

The most striking features affecting fee loads are the commitment fee, leverage and catch-up clause. Funds applying a commitment fee are on average 46 bps more expensive, as the fee is being paid over capital that is not yet invested and thus not providing any return. Leverage increases management and performance fees, even when controlling for the increase in return. Putting a 50 percent loan to value in place means that the total fee will increase by 54 basis points on average. For fund managers, this looks like an easy way to improve their profitability, while investors should be aware of this effect and limit the amount of leverage. In negative market scenarios, the leverage effect is even stronger. The other easy way for fund managers to boost profits is to introduce a catch-up clause. Funds charging a catch-up are on average 27 basis points more expensive than other funds, though no additional work is involved. In normal or somewhat more positive market scenarios, this effect can be as high as 84 basis points. Private equity real estate fund investors should therefore take this impact into consideration during negotiations and only accept this feature with top-quartile managers. The same applies for leverage and commitment fees. It would, for instance, be advisable to have a policy in place for the amount of leverage or how it may affect fees, so limit the impact by having management fees calculated based on NAV and include a cap on the amount of leverage. Also limiting the fees on commitments would be desirable.

Finally, it must be mentioned that the total fee load doesn't tell the full story. Fund expenses and other costs are excluded from this research, as these are not well documented in placing documents. More transparency is needed to include these costs in research and to determine and analyze the total expense ratio. Moreover, it must be stated that the placing documents hold fee structures before negotiations, and hence (larger) investors, in reality, will have lower fee loads due to negotiations. Finally, further research should be done on actual return data to analyze these fee structures. Currently, there is not enough data available to perform such an analysis. Nonetheless, fee structures should be a prominent topic on the agenda when investors perform due diligence. This research reveals some features that impact total fee load, making it easier for investors to negotiate fair terms.

Appendix

Table 3.A.1: All assumption used for the real estate cash-flow, real estate and simulation modeling

Assumptions Real Estate Fund Cash-Flow Model		
1	All investments are done at each quarter end and equally distributed over the investment period	
2	Divestments are done linearly over last 2 years of the fund's life plus half of the extension period	
3	Excess cash is distributed every quarter	
4	Debt is fixed rate over full lifetime	
5	Development is 0% for Core, 20% for Value Add and 60% of Opportunistic funds	
6	Developments take 2.5 year and no income is generated during development	
7	Value add funds generate 1.5% higher rental growth per annum	
8	Opportunistic funds generate 20% additional value growth at exit	
9	Cash sweep (to pay off debt) is activated when NAV < 0	
Assumptions Real Estate Market		
1	NOI (=Net Operating Income) growth = Inflation = 2.0%	
2	Emerging Market NOI growth = NOI growth + 2%	
3	Cap rate = 5.5%	
4	Vacancy = 5%	
5	Interest rates:	3.1% if LTV ≤ 50%
	(Source: Principal, 5 Jan 2015)	3.5% if 50 < LTV ≤ 60%
		4.4% if 60 < LTV ≤ 70%
		5.8% if 70 < LTV ≤ 80%
		8.6% if 80 < LTV ≤ 90%
Assumptions Simulation (all variables follow normal distribution)		
1	Inflation ~N(2%, 1.3%)	
2	Change in vacancy ~N(0%, 1.3%), with a minimum vacancy of 0%	
3	NOI Growth ~N(2%, 4.2%)	
4	Change in cap rate ~N(0%, 0.5%), with a minimum cap rate of 3.5%	
5	Correlation (ΔVacancy, NOI Growth) = -0.45	
6	All real estate standard deviations have been increased by 30% to proxy the effect of idiosyncratic risk of a relatively small not fully diversified portfolio	

Chapter 4

Investing in Real Estate Debt: Is it Real Estate or Fixed Income?[13]

4.1 Introduction

Before the global financial crisis, it was possible for real estate investors to use substantial leverage, resulting in numerous subsequent defaults and solvency problems during the downturn. Right from the start of the credit crisis, banks needed to account for their latent risk exposures in the real estate debt portfolios. Banks were forced to reduce their balance sheets and are therefore still reluctant to finance real estate, triggering the emergence of real estate debt funds, a market that was already rather mature in the US, though relatively new in Europe and Asia. In the years after the credit crunch, these funds have been very popular among institutional investors. The number of real estate debt funds raising capital has significantly increased since 2009 and around 24 percent of institutional investors are still aiming to increase their allocation (INREV [2015]). More than half of the investors, however, do not invest in real estate debt. Another reason for the increased popularity of these funds is Basle III. The Basle III regulations are likely to further reduce the desire of banks to expand their real estate loan book, as the capital charge for this type of loan has increased.

Despite the surge in debt funds and their becoming more mainstream, many investors are still struggling with whether this debt is fixed income or real estate. Because this answer is not provided by financial literature, real estate debt is too often excluded from the fixed income and real estate mandates of pension funds. In addition, although 55 percent of real estate is financed by debt[14], 95 percent of the real estate literature analyzes equity instead.

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[13] This chapter is based on: M. van der Spek, 2017, Investing in Real Estate Debt: Is it Real Estate or Fixed Income?, *Abacus* Vol 53, No 3, pp. 349-370

[14] See DTZ Money into Property 2015

Market research from INREV (2012) showed that, despite its real estate base, senior debt is often viewed by investors as fixed income and managed accordingly. Mezzanine debt, however, is usually managed by the real estate teams.

The ultimate question is whether real estate debt should be considered fixed income, since the biggest component of the return is a f ixed (or floating) interest rate, or whether it should be considered real estate, since those are the underlying assets, subject to market declines. Alternatively, should it even be considered equity, as this debt is secured by equity in the property? Applying a Merton model would suggest that components higher up the capital stack have a stronger link with the value of the underlying portfolio. On the other hand, there are clear signs that the equity component is dominant in performance and classification. This chapter will clarify this argument to ensure it cannot be used as an obstacle to investing in real estate debt. To do so, senior and mezzanine real estate debt characteristics are simulated to analyze their risk return; these profiles and correlations will then be compared to each other and the underlying real estate.

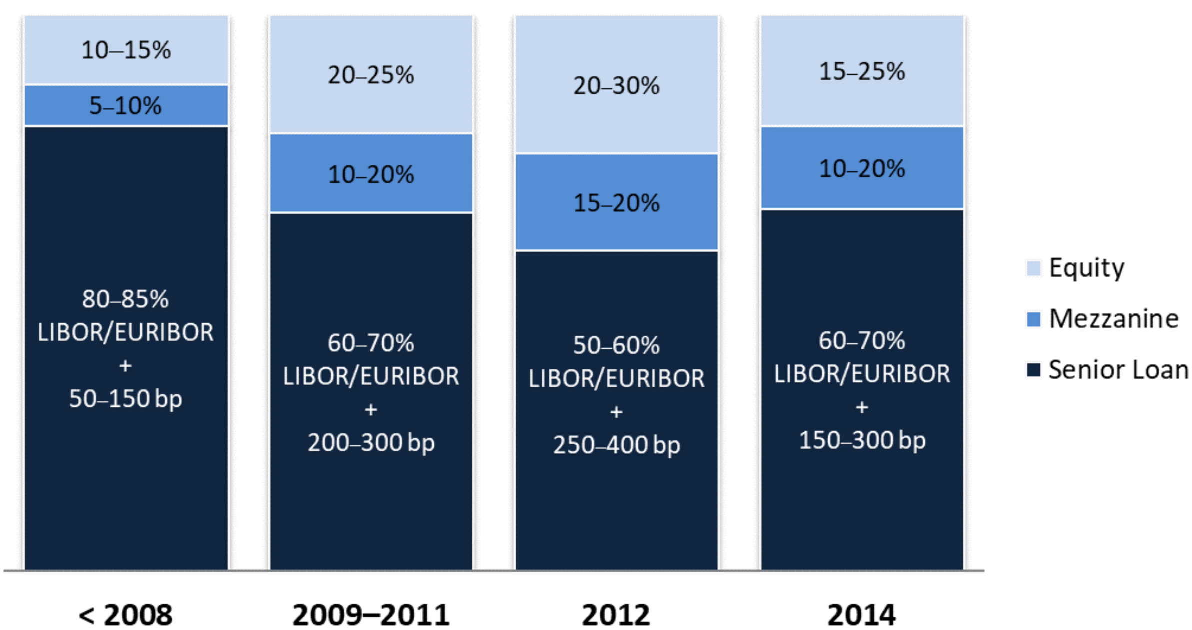
This chapter is structured as follows: Section 2 provides an overview of the existing literature, while Section 3 describes the model and data used. Section 4 reports the results, and the last section contains the conclusions.

4.2 Literature

Of the many ways to invest in real estate debt, the most common products are senior and high yield, such as bridge loans, mezzanine debt, and preferred equity. Another type of debt structure frequently used is Commercial Mortgage-Backed Securities (CMBSs), whose income payments and hence value are derived from and collateralized (or "backed") by a specified pool of underlying commercial mortgages. CMBSs are typically structured in multiple tranches of different seniority and therefore different interest rates. As a result, both senior and mezzanine notes can be created, albeit in a pool of mortgages. Generally, CMBSs are seen as senior debt, although a very small tranche, the first-loss piece, is seen as mezzanine.

The most straightforward product is senior debt, which takes priority over all others in the event the issuer defaults. In real estate, senior is often secured by a mortgage on the underlying property. Senior typically has a fixed interest rate and is often quoted as a spread over US Treasuries. Maturity is generally medium to longer term. Mezzanine comes in many forms, but a useful definition was presented by Ballard and Muldavin (2000), that is, an investment in a debt, equity, or hybrid debt/equity position subordinate to the first mortgage and senior to the property owners' equity. As a result, mezzanine is less secure than senior, but more secure than the equity holder. Because senior debt is more secure than mezzanine, its interest rates are much lower. Unfortunately, rates and loan-to-value (LTV) ratios on senior and mezzanine are not very well documented; nevertheless Figure 4.1 indicates the development of the capital structure through time, including the average interest rate spread for senior debt.

Figure 4.1: Capital structures for commercial real estate loans and rates through time (source: INREV).



Data on the mezzanine debt market are even scarcer. Interest rates for mezzanine debt are, for instance, only very rarely publicly available, which could be a consequence of conditions varying widely. Anecdotal evidence suggests a wide dispersion of interest rates and LTV levels. Pre-crisis, spreads over LIBOR up to 600 basis points were not uncommon for a 15 percent mezzanine position that was subordinate to a 70 percent senior loan. In that period, LTV levels sometimes even increased to over 90 percent. Due to the crisis, required LTV levels declined rapidly and spreads inflated to 1,000 basis points for a high-quality portfolio, or even more for riskier portfolios. Interestingly, due to exceptionally low interest rates, all-in rates on mezzanine remained rather stable and even declined somewhat. Currently, leverage levels are heading up again almost to pre-crisis heights and spreads moved in, although not as low as in 2007.

The literature on real estate debt is rather diverse, covering legal aspects of mezzanine and (the differences with) preferred equity and copious research on the position of mortgage Real Estate Investment Trusts (REITs) within a balanced portfolio. Mortgage REITs are predominantly investing in CMBSs. Some academic papers are not very positive on the contribution of mortgage REITs to an institutional investor's portfolio; Kuhle (1987), for instance, concluded that mortgage REITs didn't add that much value to a portfolio containing common stocks, based on a full Markowitz analysis. Equity REITs, on the other hand, were shown to add more value by providing more efficient portfolios. Another study by Han et al. (1998) showed, using a regression analysis, that on average institutional investors prefer equity REITs over mortgage REITs. This result, however, was only found in the latter part of their analyzed period and the effect was not very significant. Hybrid REITs are, however, clearly the least preferred of all REITs.

A possible reason for this somewhat weaker interest in mortgage REITs might be given by Kuhle et al. (1986), who showed that they underperformed equity REITs in a period of strong REIT performance, while volatility was higher. This might be because mortgage REITs often use more leverage, although the authors did not investigate this. Mortgage and equity REIT research by Lee and Chiang (2004), however, showed that since these two types are substitutable, and therefore should be treated as a single asset class, it is fair to say that debt should be part of the real estate portfolio. The difficulty with this research is that it does not distinguish between different seniority levels of debt. Senior and mezzanine debt are, for instance, both part of the portfolio; therefore, it is difficult to measure their individual added value and it might account for these mixed results.

Some investors will always seek the highest amount of leverage to maximize the expected after-tax rate of return to equity, as proved by McDonald (2007). However, when adjusting for market volatility, van der Spek and Hoorenman (2011) empirically showed that the opposite is true for high-leverage REIT structures in the long term. Therefore, it is questionable whether investors should use much leverage, including mezzanine. There are two reasons why obtaining a mezzanine loan makes sense for an investor, even though interest rates can sometimes be as high as 20 percent. The first is to increase leverage, as more equity is unavailable. In this case, a 20 percent interest rate on mezzanine will "only" translate in a 200- or 300-basis-point increase in interest rate on the full loan amount. Investors are willing to accept this for a number of years to achieve a substantially higher return. One example would be to assume a mezzanine rate of 20 percent for the last 15 percent of the 85 percent LTV. Furthermore, let the other 70 percent be a senior loan at a 5 percent rate. The combined interest rate is therefore 7.65 percent, which is "only" a 265-basis-point increase. In addition, if the overall interest rate is still well below the average real estate return expectations, an investor could find it acceptable. The other reason is to deleverage. After the global financial crisis, many property portfolios had to be refinanced at a lower leverage, as banks demanded return of (some) capital and lower LTV ratios. Not all property owners were able to put in more capital and so still are in need of it, even when this means a relatively high interest rate.

Mezzanine is mostly analyzed from a more legal perspective and regularly in comparison with preferred equity; as a result, this literature is more descriptive in nature. Mezzanine and preferred equity are both part of many real estate debt fund strategies and are generally treated as more or less similar products, though there are some clear differences; these are well described by Heller (2012) and Robins et al. (2012). Robins et al. showed that mezzanine loans and preferred equity play similar roles in the capital structure of a transaction, with similar economics and both being subordinate to the senior holder. The differences, though, are significant. The mezzanine lender, for instance, is generally able to obtain an inter-creditor agreement from the senior lender, while the preferred equity holder often is not, which is a reason many real estate debt investors prefer mezzanine. Furthermore, when a preferred equity investor wants to exercise their right to take control of the entity owning the real estate, the "normal" equity holder generally becomes passive, but retains its indirect interest; the mezzanine holder, by contrast, can eliminate all of the indirect interests of the equity holder. The authors generally do not take any position on which form to prefer. Heller, on the other hand, is more opinionated and is surprised that mezzanine has become more popular than preferred equity, because the economic risk and reward profiles are similar and preferred equity seems less complex. Heller concludes that institutional investors' appeal of the "debt" label has made mezzanine more attractive to borrowers, though they have no intrinsic superiority for the holder over preferred equity.

Ballard and Muldavin (2000) provided a good description of the general dynamics of investing in mezzanine debt, along with some guidance on how to position it in an institutional investment portfolio, separating real estate mezzanine debt into four distinct types that all incorporate both risk and investment purpose: stabilized, value added, development, and securitized. Each type has its own characteristics and expected return. The vast majority of mezzanine is on stabilized assets, while value added is generally called bridge mezzanine. Developments are almost completely financed by senior loans (construction loans) and securitization is very rare since the global financial crisis. Ballard and Muldavin argued that mezzanine risks incorporate both debt and equity characteristics depending on the type, but generally they conclude that it needs to be underwritten from an equity perspective. As a result, they believe managing these types of investments should be the responsibility of the real estate team. Although this chapter gives a good reflection of the position of mezzanine debt within an institutional investment portfolio, it does not provide any analytical support and therefore is difficult to prove.

4.3 Research design and data

Empirical evidence on real estate mezzanine loan pricing is very hard to come by. Most providers do not publish details on their deals, making this market rather opaque. Moreover, mezzanine products for European debt funds is a relatively new investment category. Most historical evidence is available on mortgage REITs in the US, which is dominated by housing market mortgages. These REITs also invest in mezzanine debt, but results are not published separately. As a consequence, it is not possible to use historical data for establishing a risk return profile of senior and especially mezzanine real estate debt.

The most common way to model real estate debt is using structural models introduced by Merton (1974). The basis of this approach is that the value of the liabilities of a firm, both equity and debt, depends on the value of its assets as well as the outlook concerning that value. At first sight, this seems very appropriate for real estate as the firm's assets are relatively easy to model. The problem, however, is that the model assumes there is only a single issue of debt and defaults can only occur at maturity. To cope with this, others have extended the Merton model to allow for the simultaneous existence of multiple debt and for default to occur before maturity (see for instance Delianedis and Geske [1998] and Black and Cox [1976]). These models can help overcome these issues individually, but not simultaneously; moreover, complexity increases rapidly. The final issue is that structural models do not reconcile with empirical data on default rates. Eom et al. (2004) tested five structural models and found that Merton's model substantially underpredicts spreads, while the others suffer from overpredicting spreads. Huang and Huang (2012), on the other hand, showed that their tested models predict fairly consistent credit risk premia under empirically reasonable parameter choices. Their spreads, however, are substantially lower than observed spreads.

To determine the risk return profile of real estate debt, a more empirical approach is chosen, although it still follows the same logic as the structural model. For this, a two-stage analysis method will be used. The first stage is to build a "simple" cash flow model that mimics a real estate fund by calculating the return of the underlying real estate, senior loan, mezzanine, and equity stake in a real estate fund, based on a predefined market scenario. The net cash flows are then used to calculate the net internal rate of return (IRR), the metric most used in private real estate, for each part of the capital stack. The second stage is a simulation model that creates different market scenarios, which will be used as input for the cash flow model. Based on these, multiple IRRs can be calculated and therefore risk profiles of and correlations between the different parts of the capital structure can be determined. The simulations are performed using a real-world measure, rather than the risk-neutral measure, because this market lacks transparency and liquidity, reflecting an inefficient market; further, this works better for longer-term simulations, providing a greater flexibility in the assumptions. Even though this simulation will not be the same as historical data providing "real" evidence on risk return profiles and correlations, this will provide a very real proxy of how different parts of the capital structure interact due to the impact on equity and debt being derived from the real estate scenarios. Therefore, as long as the underlying market scenarios are based on realistic assumptions, the impact on the equity and debt structures is realistic as well. For instance, if the real estate return is 10 percent and the interest rate is known, as it is assumed to be fixed rate, then the equity return can be calculated. Return, on the other hand, is likely to be rather dependent on the assumptions and therefore it is important to understand their sensitivity. To provide a better understanding of each stage and the necessary assumptions, both stages are explained in more detail below.

Stage 1: real estate cash flow model

The initial investment at t=0 consists of a US office portfolio; simultaneously, a senior and mezzanine loan is obtained. The portfolio is stabilized with a $500 million asset value consisting of approximately 10 buildings. An investment manager receives an asset management and performance fee for managing the portfolio. After a holding period of five years, the portfolio will be sold and all loans will be repaid. The office portfolio has a cap rate (capitalization rate is the rent divided by the market value) of 5.4 percent, which equals the average office cap rate of the National Council of Real Estate Investment Fiduciaries

(NCREIF) Property Index by Q4 2014. The vacancy rate of the portfolio is 13.0 percent, which is the same as the Q4 2014 average market level by NCREIF.

The senior loan is assumed to have a fixed rate and the mezzanine interest rate is assumed to be floating. As there is no available source for spreads on these types of real estate loans, the assumption is based on certain credit spreads, which are often used as a proxy. The spread over 5 year US Treasury for a senior note is 145 basis points, which is similar to the current AA US corporate bonds spread (source: Macrobond, 2014 year end), and assuming a 50 percent LTV. This spread increases to 185 basis points when LTV is 60 percent, 275 basis points at 70 percent, 375 basis points at 80 percent, and 525 basis points at 90 percent. As a result, the spread for mezzanine between 50 and 60 percent equals the incremental interest rate, which is 385 basis points ($\frac{60\% \cdot 185bps - 50\% \cdot 145bps}{60\% - 50\%}$). All other mezzanine rates are calculated similarly. These spreads are in line with observations in today's market (see for instance Principal Real Estate Investors [2015]). The interest rate on 5 year US Treasury Note is 1.65 percent (source Macrobond, 2014 year end) and the inflation rate is 0.8 percent (source Macrobond, 2014 year end).

The real estate portfolio value is modeled according to Formula 4.1. Based on this, the first-year net operating income (NOI) can be calculated, as the initial real estate value, inflation and cap rate is known.

$$RE_t = \frac{(1 + CPI_t) \cdot NOI_t}{CR_t} \tag{4.1}$$

Here RE_t is value of the real estate portfolio in year t, CPI_t is the inflation in year t, NOI_t is the net operating income in year t and CR_t is the cap rate in year t. The NOI in a certain year depends on the previous year, the change in vacancy, and the rental growth, which is shown in Formula 4.2.

$$NOI_t = NOI_{t-1} \cdot \frac{(1 - VAC_t)}{(1 - VAC_{t-1})} \cdot (1 + RG_t) \tag{4.2}$$

Here VAC_t is the vacancy in year t and RG_t is the rental growth in year t. The senior loan is fixed rate debt and the interest is therefore calculated as follows:

$$I_t^{sr} = Sr_0 \cdot (i_0 + Spread^{sr}) \tag{4.3}$$

Here I_t^{sr} is senior loan interest in year t, Sr_0 is the senior loan initial value, i_0 is the initial year's risk-free rate (5 year US Treasury), and $Spread^{sr}$ is the spread of senior debt over the 5 year US Treasury Note. The IRR of the senior note is then calculated using the net present value formula, as shown in Formula 4.4 (r is the discount rate and IRR^{sr} is the r for which the NPV^{sr} equals zero).

$$NPV^{sr} = -(Sr_0) + \sum_{t=1}^{T} \frac{I_t^{sr}}{(1+r)^t} + \frac{Sr_0}{(1+r)^T} \tag{4.4}$$

However, both the interest and the senior loan end value are dependent on the growth of the underlying real estate portfolio. For mezzanine, the cash flow is structured slightly differently, as the interest rate is floating. Formula 4.5 shows the mezzanine interest rate calculation.

$$I_t^{mz} = Mz_0 \cdot (i_t + Spread^{mz}) \tag{4.5}$$

Here I_t^{mz} is the mezzanine interest in year t, Mz_0 is the mezzanine loan initial value, i_t is the risk-free rate in year t and $Spread^{mz}$ is the spread of the mezzanine loan over the 5 year US Treasury Note. The full cash flow of the mezzanine is then obtained by adding the annual interest rates to the initial value Mz_0 in the last year and the origination fee in the first year, which is a common feature for mezzanine loans. Similar to the senior note, the net present value (NPV^{mz}) and IRR (IRR^{mz}) will be calculated.

The third and final part of the capital stack is the equity. The cash flow for the equity holder of the real estate fund is calculated according to Formula 4.6:

$$CF_t = NOI_t - I_t^{sr} - I_t^{mz} - Exp_t - Fees_t \tag{4.6}$$

Here Exp_t is the fund expenses, and $Fees_t$ is the fee load paid to the external manager. As the senior and mezzanine loans are targetted to hold to maturity, it seems reasonable to value these loans at book value and not at fair market value. This is supported by Amel-Zahed and Meeks (2013), although they also concluded that reporting market values is especially important in times of financial crisis, as the borrower needs a liquidation value to support his decision whether to continue to operate. Nevertheless, the equity holder's value is calculated by Formula 4.7.

$$EQ_t = RE_t - Sr_0 - Mz_0 \tag{4.7}$$

Finally, the net present value of the equity holder's cash flow is calculated by Formula 4.8 and is the aggregation of the initial investment, the annual cash flows, and the terminal value. Using this formula, the IRR can be calculated (IRR^{eq}).

$$NPV^{eq} = -(RE_0 - Sr_0 - Mz_0) + \sum_{t=1}^{T} \frac{CF_t}{(1+r)^t} + \frac{RE_T - Sr_0 - Mz_0}{(1+r)^T} \tag{4.8}$$

In order to compare the results to a real estate portfolio excluding any leverage, a reference portfolio called "real estate" is structured and the net present value is calculated by Formula 4.9. Based on this, the IRR^{re} can be calculated.

$$NPV^{re} = -RE_0 + \sum_{t=1}^{T} \frac{NOI_t - Exp_t - Fees_t}{(1+r)^t} + \frac{RE_T}{(1+r)^T} \tag{4.9}$$

An important feature of using debt is the potential for the equity to default. In this analysis, equity defaults when the LTV ratio exceeds 100 percent, so $RE_t < Sr_0 + Mz_0$. This balance sheet criteria is in line with the US law on solvency. When this happens, all remaining cash flows for the equity holder are set to zero, including the terminal value. Mezzanine will then take over the equity position, changing the mezzanine annual cash flow into $CF_t^{mz} = NOI_t - I_t^{sr} - Exp_t - 0.5 \cdot Fees_t$. Fees are halved because the manager lost control and can normally be fired, but will typically stay to manage the portfolio for a reduced fee. The 50 percent reduction is set arbitrarily. Also, the terminal value for the mezzanine holder will change after receipt of the full difference between the portfolio value and the senior's principal. When the portfolio value also falls below the senior's principal ($RE_t < Sr_0$), the mezzanine defaults and the senior note holder will take full control and receive all cash flow and terminal value, while all remaining mezzanine cash flows are set to zero. These default assumptions might overestimate the distress for equity holders during poor market scenarios since, in reality, it is more common to trigger a default when the equity investor is unable to pay the interest to the mezzanine holder as valuations are not always checked annually. Default in these cases are cash flow driven, which is in line with the Australian law on solvency. Meeks and Meeks (2009), however, showed that cash flow insolvency will only matter if it is accompanied by balance sheet insolvency, which supports the default assumption. They also showed that the probability that a company will default significantly affects the valuations assigned to asset and liabilities: balance sheet endogeneity. This would imply that in times of distress, barely solvent companies can be pushed into default due to additional negative valuations effects. As it is not possible to cope with this phenomenon, the model might underestimate the distress. Furthermore, it is also possible that the mezzanine holder gives additional time to the equity investor in return for a capital injection. Alternatively, a default can also happen sooner when LTV or debt service coverage ratio covenants are breached; for simplicity, such covenants are ignored.

In this analysis, it is assumed that the investment has a five-year lifetime, which is more or less in line with a typical mezzanine duration. All net income is paid out as dividends, which is in line with the dividend policy and requirement of REITs, as they need to distribute at least 90 percent of all taxable income to shareholders. If net income is insufficient to pay interest rates on senior or mezzanine debt and the net asset value is still positive, the amount is aggregated to the debt; in other words, interest is accrued. Setup costs are assumed to be 20 basis points of the gross asset value (GAV) and the annual fund expenses are 10 basis points on the initial GAV and are yearly indexed by inflation of the previous year. These expenses are in line with INREV (2014). The manager receives a 60-basis-point management fee on GAV, a 50-basis-point acquisition fee, and a 20 percent performance fee after a 9 percent hurdle. There is no catch-up clause. These assumptions are in line with PREA (2014). The mezzanine holder receives a 1 percent origination fee, which is rather common for mezzanine debt.

Stage 2: Simulation model

In the simulation stage, five important variables generate different market scenarios as input for the cash flow model: interest rate, inflation, rental growth, change in vacancy rate, and the change in real estate cap rate. Because it is important to analyze the return behavior of each capital stack element and their correlation under different market scenarios, it should be sufficient to model each variable relatively simply. Hence, all variables are assumed to be normally distributed, as shown in Formula 4.10.

$$x \sim N(\mu, \Sigma) \tag{4.10}$$

Here x is a vector of the aforementioned five variables, which is assumed to follow a multivariate normal distribution, with mean vector μ and covariance matrix Σ. The averages and standard deviations are derived from market data and are as follows:

- Market rental growth is 7.4 percent at the start of the simulation, which is equal to the NCREIF Q4 2014 net operating income. The expected rental growth, however, is based on the historical geometric mean from the NCREIF Property Index (NPI) based on the period 1983–2014 and is 1.4 percent. The standard deviation is 7.54 percent, which is 30 percent higher compared to the NPI historical standard deviation of 5.8 percent. This increase is due to portfolios constructed with approximately 10 properties, not necessarily similar in value, being approximately 30 percent more risky than market average (see for instance Callender et al. [2007a] and Callender et al. [2007b]). Many investment managers promise to add value by reducing vacancies and by redevelopment. Although in theory this might lead to additional rental growth, this cash flow model limits it to normal market developments;
- The cap rate is 5.4 percent in the first year, which is in line with Q4 2014 US rate based on NPI data. The average change is assumed to be zero, with the standard

deviation being 81 basis points, that is, 30 percent higher than the historical standard deviation of 62 basis points based on NPI data (1983–2014). Because it is rather unrealistic to have a cap rate close to zero, a minimum is set of 3.5 percent in each simulation, resulting in a truncated normal distribution;

- The vacancy rate is 13.0 percent, which is the Q4 2014 market average recorded by NPI. The average change in vacancy through time is assumed to be zero, while the standard deviation per annum is 2.3 percent, which is again 30 percent higher than the historical standard deviation of 1.73 percent recorded by NPI (1988–2014). The minimum vacancy in the simulation is obviously set at zero, which results in a truncated normal distribution;
- The inflation rate is 0.8 percent at the start of the fund's lifetime (source Macrobond, Q4 2014) and the average annual inflation is assumed to be 2.0 percent. This is somewhat lower than the historical geometric mean (1983–2014) in the US of 2.9 percent, but the economic environment today is slightly less favorable, which indicates a somewhat lower inflation rate going forward. The historical standard deviation is 1.3 percent.
- The interest rate is 1.65 percent at the start of the simulation (US 5 year Treasury Note, source Macrobond Q4 2014), and the standard deviation of the change in interest rate is 1.2 percent (based on the same data using the time series 1983–2014). The expected change in interest rate is zero and the minimum interest rate is assumed to be 0.5 percent (based on historical data, the minimum is 62 basis points), which again results in a truncated normal distribution.

The historical data, as described above, also showed a negative and significant correlation of -0.45 between rental growth and the change in vacancy rate; therefore, a correlation coefficient between rental growth and the change in vacancy has been included. As no other correlation was significantly different from zero, the covariance matrix was built up according to Formula 4.11. When adjusting for a time lag, one would expect to find a positive correlation between the change in cap rate and change in interest rate. However, the historical data only shows a weak positive correlation using a 3 years time lag. Due to the relatively short lifetime of the fund and this weak positive correlation only after a number of years, it can be expected that the impact of these correlations would be limited and therefore this correlation has been set to 0.

$$\Sigma = \begin{bmatrix} \sigma_{int}^2 & 0 & 0 & 0 & 0 \\ 0 & \sigma_{inf}^2 & 0 & 0 & 0 \\ 0 & 0 & \sigma_{rg}^2 & \rho_{rg,\Delta vac} \cdot \sigma_{rg} \cdot \sigma_{\Delta vac} & 0 \\ 0 & 0 & \rho_{rg,\Delta vac} \cdot \sigma_{rg} \cdot \sigma_{\Delta vac} & \sigma_{\Delta vac}^2 & 0 \\ 0 & 0 & 0 & 0 & \sigma_{\Delta cap}^2 \end{bmatrix} \tag{4.11}$$

Here σ_{int} is the standard deviation of the interest rate, σ_{inf} is the standard deviation of the inflation, σ_{rg} is the standard deviation of the rental growth, $\sigma_{\Delta vac}$ is the standard deviation of the change in vacancy rate, $\sigma_{\Delta cap}$ is the standard deviation of the change in cap rate, and $\rho_{rg,\Delta vac}$ is the correlation between the rental growth and the change in vacancy rate. A summary of all assumptions is shown in the appendix.

A Monte Carlo simulation generated 100,000 market scenarios; each is then applied to the cash flow model. As a result, the average IRR on real estate ($\overline{IRR}^{re}$), senior ($\overline{IRR}^{sr}$), mezzanine ($\overline{IRR}^{mz}$) and real estate equity ($\overline{IRR}^{eq}$) can be calculated using a simple average over all 100,000 scenarios. Similarly, the correlations between and the volatility (standard deviation) for each part of the capital structure can be determined based on the IRRs. Given the central question, it would be logical to check the differences between the different average IRRs and standard deviations. The hypothesis will be tested whether mezzanine's risk is in line with that of real estate and higher than senior. In addition, the correlation between mezzanine and real estate should be significant and substantially higher than that of senior and real estate. The next section will describe the results of the analysis.

4.4 Simulation results: risk return profile for each part of the capital structure

As there is no standard capital stack structure, a base case structure for the analysis is chosen arbitrarily with 60 percent senior debt, 10 percent mezzanine, and 30 percent equity. Nevertheless, this case is a rather common structure and available in most periods during the real estate cycle. In this case, the interest rate on the senior debt is 3.5 percent, and the mezzanine has an interest rate of 9.8 percent and a 1 percent origination fee. For each of the 100,000 scenarios, an IRR has been calculated for the senior debt holder, the mezzanine debt holder, and the equity holder. In addition, an IRR on the real estate portfolio is determined, as if it were completely financed by equity. The distribution of the five market variables, generated by the siulation, are shown in the appendix. Based on this data, the average IRR and the standard deviation can be calculated. The results of the analysis are shown in Table 4.1.

Table 4.1: Risk and return profile of senior debt, mezzanine debt, the equity position, and the underlying real estate portfolio, assuming 60 percent senior debt, 10 percent mezzanine debt, and 30 percent equity holding

	Real Estate (in %)	**Senior (in %)**	**Mezzanine (in %)**	**Equity (in %)**
Average IRR	7.9	3.5	10.1	8.1
Standard deviation	6.2	0.2	5.1	22.8
% Default			1.1	5.9
Minimum IRR	-13.8	-5.2	-73.3	-99.4
5% level	-1.5	3.5	9.1	-46.0
Median IRR	7.4	3.5	10.1	12.5
95% level	19.0	3.5	12.5	34.7
Maximum IRR	32.8	16.2	67.0	56.7

It is interesting that the average mezzanine IRR (10.1 percent) is higher than the average equity IRR (8.1 percent) with a much lower standard deviation. One explanation for this is that the distribution of the equity IRR is rather skewed. The median equity IRR is, for instance, 12.5 percent, which is much higher than the average IRR and implies that most of the scenarios will show a higher IRR for equity compared to mezzanine. The impact of negative real estate scenarios is rather severe on the average equity return, resulting in a lower-than-mezzanine average IRR.

One can argue that the premium required for mezzanine compared to the real estate yield and the expected average rental growth is relatively high. As mentioned before, there are a number of reasons why it makes sense for equity holders to put mezzanine in place and accept these rates. First, most equity holders are looking at the combined interest rate that needs to be paid to the total debt. In this example, the average interest rate of senior and mezzanine combined is 4.4 percent, which is much lower than the expected return (and even cash yield) of the underlying real estate; therefore, it seems accretive to the overall return. Second, many investors do not have enough capital to make such an investment without debt or with just senior debt. As a result, investors do not always have a choice in using mezzanine as a way to finance the property. Third, most investors are expecting a positive real estate market when they make the investment, so they are biased toward the upside and partly ignore the downside.

Another remarkable result is the standard deviation of senior debt. It seems that there is hardly any risk attached to senior debt. It is, however, important to note that this standard deviation is based on a hold-to-maturity basis and not on an annual fair market value basis. Therefore, standard deviation in this case only reflects the risk related to a mezzanine default (1.1 percent of all scenarios) and its impact on the senior loan. Not surprisingly, mezzanine debt is more risky than senior debt and less risky compared to equity. The fact that the maximum mezzanine IRR is even higher than that of equity is due to mezzanine starting from a lower base (10 percent stake compared to 30 percent for equity) and only applies to a foreclosure scenario followed by a big upswing. The minimum IRR for mezzanine, on the other hand, is not close to -100 percent, like equity, while there are scenarios in which mezzanine defaults as well. The explanation for this is that before mezzanine defaults, interest is paid for at least a certain period; in addition, the holder received an origination fee, meaning total returns will never be close to -100 percent.

The important question is whether senior and mezzanine debt is fixed income, real estate, or even equity. One way to measure this is by looking at the correlations. In Table 4.2, correlations are shown between the different elements of the capital stack and real estate. It seems clear that senior debt is unrelated to the underlying real estate portfolio, as the correlation coefficient is almost zero. Equity, on the other hand, is highly correlated to the underlying real estate portfolio, as the correlation coefficient of 0.87 indicates. Mezzanine shows the same correlation with real estate as with equity. The correlation of 0.18 is substantial, but not very high. This can be explained by the low number of scenarios where equity defaults. Only in those scenarios will mezzanine be fully linked to what is happening to the underlying real estate portfolio. To demonstrate this, the results are split into two groups: (1) those observations when equity defaults, and (2) those when equity does not default. The correlation between mezzanine and real estate in the first group is as high as 0.86, while the correlation in the second group is insignificant. Perfect correlation is only possible for mezzanine when there is some form of performance sharing, so it will also benefit from the upside. In reality, there are types of mezzanine debt available with this feature. Because the downside risk is substantial, as shown in Table 4.1, it is necessary to underwrite mezzanine as if it is real estate.

Table 4.2: Correlation matrix of senior debt, mezzanine debt, the equity position, and the underlying real estate portfolio, assuming 60 percent senior debt, 10 percent mezzanine debt, and 30 percent equity holding

	Real Estate	**Senior Debt**	**Mezzanine Debt**	**Equity**
Real Estate	1	0.03	0.18	0.87
Senior Debt	0.03	1	-0.06	-0.01
Mezzanine Debt	0.18	-0.06	1	0.18
Equity	0.87	-0.01	0.18	1

These results and conclusions are valid for a certain capital structure. Through time, however, the composition of the capital stack is rather dynamic; consequently, it will be necessary to repeat the analysis for different capital structures.

Alternative capital structures

Immediately after the global financial crisis, banks were not willing to lend; as a result, only LTV ratios up to 50 percent were accepted for new loans. Before the crisis, on the other hand, LTV ratios for senior debt even got up to 85-90 percent. To show the impact of this, the model is rerun for different capital structures using the same scenarios. Table 4.3 shows the results. In the first column the capital structure is shown, with E being the equity part of the capital stack, junior to both the Senior (S) and the Mezzanine (M). The last column shows the correlation of each part of the capital stack with the underlying real estate portfolio.

Quite obviously, the higher the LTV ratio, the more likely it is that equity will default and the greater the loss severity. When equity is only 20 percent of the capital stack, the risk starts to get very substantial, as the change of default is almost 18 percent. In addition, the standard deviation is as high as 40 percent. Nevertheless, these capital structures were widely available during the pre-crisis bull market. It is interesting to note that the median IRR for equity increases when the LTV ratios increase. However, when equity is 20 percent of the capital stack, even the median IRR starts to stabilize. The average IRR, on the other hand, starts to decline significantly when the LTV exceeds 60 percent. Clearly, the impact of negative scenario IRRs outweigh the impact of positive ones. Correlations between the equity IRR and IRR of the underlying real estate portfolio (which equals to the real estate fund without leverage) is high for all capital structures, but clearly not 1, as any default will break this correlation. By contrast, senior debt shows stability in every capital structure presented. Standard deviations are low and there is hardly any correlation with real estate. Only when senior debt forms 70 percent of the capital structure an increase is visible, as the default rate for mezzanine increases to 5.9 percent.

Table 4.3: Risk and return profile of senior debt (S), mezzanine debt (M), and the equity position (E) for different capital structures. Real estate as mentioned in the last column is the underlying real estate portfolio excluding leverage.

Capital Structure (S/M/E)		Average IRR (in %)	Median IRR (in %)	Standard deviation (in %)	Defaults (in %)	Correlation with Real Estate
50/0/50	S	3.1	3.1	0.0	-	0.01
	M	-	-	-	-	
	E	10.3	10.9	10.6	0.1	0.98
50/10/40	S	3.1	3.1	0.0	-	0.01
	M	6.0	5.8	1.8	0.1	0.06
	E	10.5	11.9	14.1	1.1	0.94
50/20/30	S	3.1	3.1	0.0	-	0.01
	M	8.1	8.0	2.6	0.1	0.13
	E	8.0	12.5	22.9	5.9	0.87
60/0/40	S	3.5	3.5	0.2	-	0.03
	M	-	-	-	-	-
	E	10.5	11.9	14.1	1.1	0.94
60/10/30	S	3.5	3.5	0.2	-	0.03
	M	10.1	10.1	5.1	1.1	0.18
	E	8.1	12.5	22.8	5.9	0.87
60/20/20	S	3.5	3.5	0.2	-	0.03
	M	11.0	11.4	7.9	1.1	0.31
	E	-1.5	12.6	40.8	17.9	0.82
70/0/30	S	4.4	4.4	0.7	-	0.09
	M	-	-	-	-	-
	E	8.2	12.6	22.7	5.9	0.87
70/10/20	S	4.4	4.4	0.7	-	0.09
	M	10.7	12.7	13.3	5.9	0.37
	E	-1.3	12.6	40.6	17.9	0.82

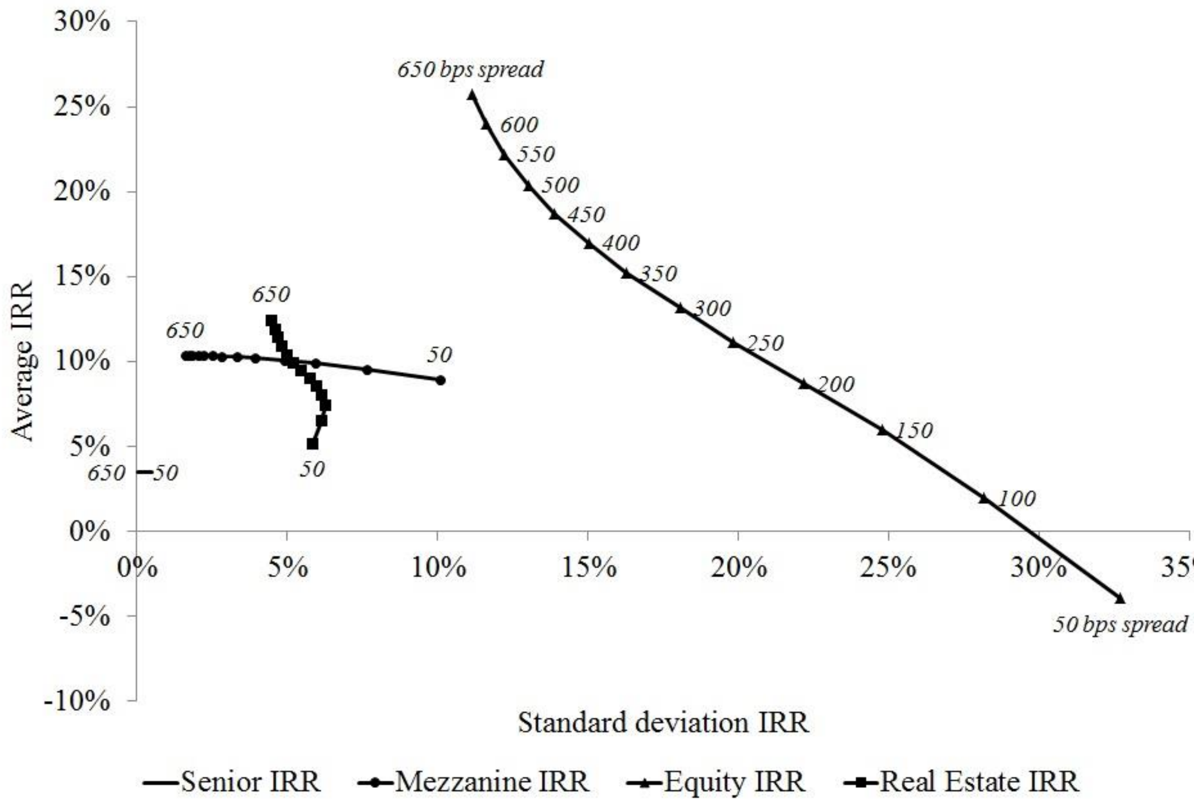
The standard deviation of mezzanine debt is clearly in between senior and equity. Risk rises when mezzanine is higher up in the capital stack, but it is well compensated by the additional return. Interestingly, the risk of mezzanine is substantially lower than real estate when senior debt is only 50 percent of the structure, while return is higher. This seems unrealistic and a sign of an inefficient market, but the reality is that this was precisely the situation after the global financial crisis around 2010. Moreover, as capital values sometimes already had dropped over 40 percent, the real downside risk was even lower than Table 4.3 indicates. Median IRRs increase as mezzanine shifts higher up the capital stack, but average IRRs start to decline when senior debt reaches 70 percent. Important to note is that in all cases the median mezzanine IRR is lower than the median equity IRR, except when senior debt is at 70 percent of the capital stack. Therefore, it seems rather unwise as an equity holder to allow mezzanine in the capital stack when senior debt is already at 70 percent.

Finally, correlation between mezzanine and real estate increases when moving up the capital stack. Perfect correlation will never be achieved, as mezzanine will not benefit when real estate values rise during the holding period. The correlation between mezzanine and equity is the same or lower than with real estate in all cases, implying that mezzanine is more linked to real estate than equity.

Impact of different yield spreads

In the previous section, different capital stacks were analyzed. It was obvious that different structures resulted in different risk and return profiles, and that some are only realistic in market situations when liquidity is low. The current market situation is special as well, with very low interest rates and cap rates. Cap rates are in fact at historical lows and, given the pressure to invest, likely to decline even further. For real estate investors looking for finance, the spread between the interest rate and the unleveraged real estate cap rate is of utmost importance, as it reflects the degree of additional return finance might provide. Because of this, it is important to further analyze this spread. In Figure 4.2, this impact is presented for a capital structure of 60 percent senior debt, 10 percent mezzanine, and 30 percent equity. In this analysis, the simulation is run for different levels of cap rate, representing different spreads. All other assumptions are unchanged. In the most expensive scenario, the cap rate is reduced to 4 percent to reflect a spread of 50 basis points over senior debt. The cap rate is then increased by 50 basis points for each simulation until a maximum spread of 650 basis points is reached.

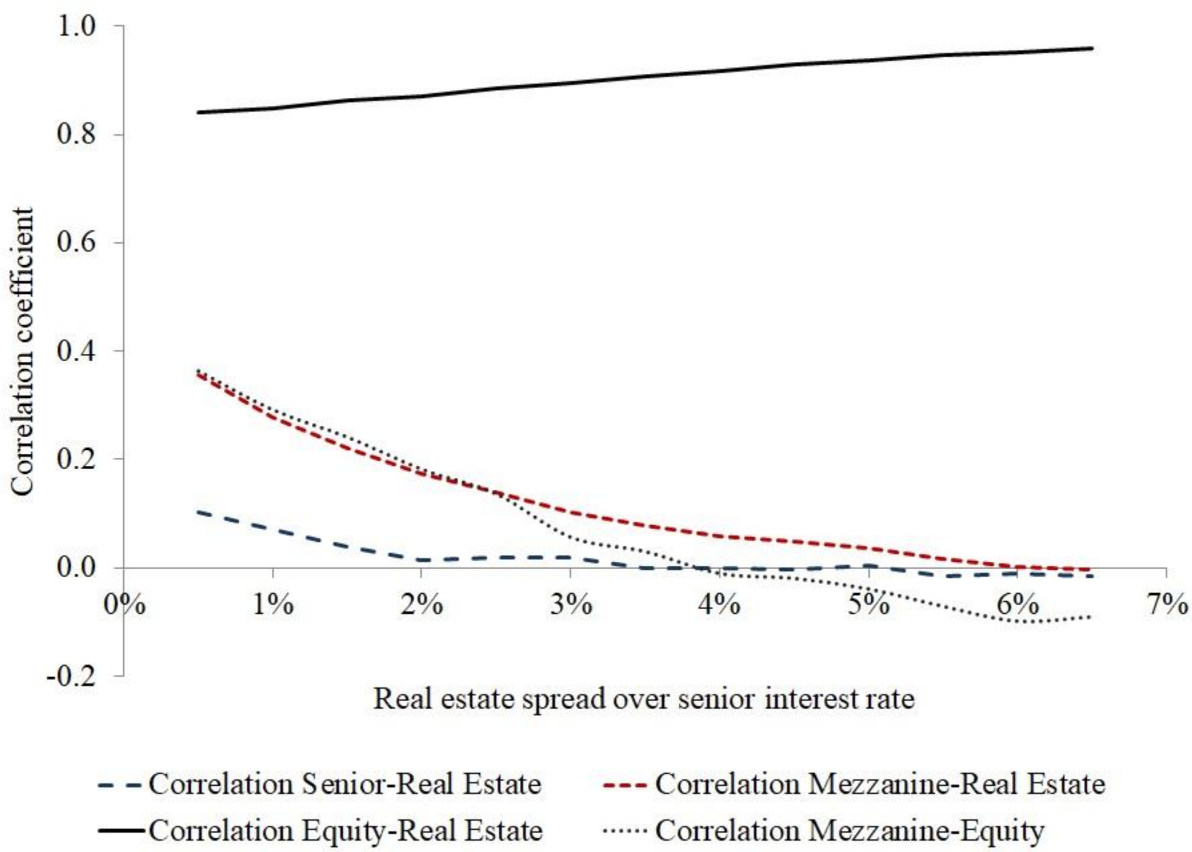
Figure 4.2: Risk and return profile of senior, mezzanine, equity and underlying real estate portfolio by changing real estate spread over senior interest rate.



It is clear that risks increase as spreads decline. The real estate risk only changes marginally, as the only input that changed is the cap rate. The real estate return, however, does decline as a result of lower ingoing cap rates, all else being equal. When spreads are high, $\overline{IRR}^{mz} < \overline{IRR}^{re}$ in line with the risks. Declining spreads will also reduce $\overline{IRR}^{mz}$, as the likelihood of a default increases. The equity holder can expect positive IRRs as long as the spread is at least above 100 basis points. As long as the spread is above 200 basis points, $\overline{IRR}^{eq} > \overline{IRR}^{re}$. So, below 200, an investor should avoid using 70 percent leverage if it is not necessary.

Figure 4.2 also seems to suggest that the mezzanine risk return profile is closer to real estate than it is to equity or senior. Another way to test this is investigating the impact of falling spreads on correlations. In Figure 4.3, correlations are shown. Similar to the analysis with different capital structures, equity is highly correlated to real estate. Senior, on the other hand, does not seem to correlate with real estate. Nevertheless, when spreads approach zero, the correlation starts to rise as mezzanine defaults are more likely.

Figure 4.3: Correlation between the different elements from the capital stack and the underlying real estate portfolio by changing real estate spread over senior interest rate.



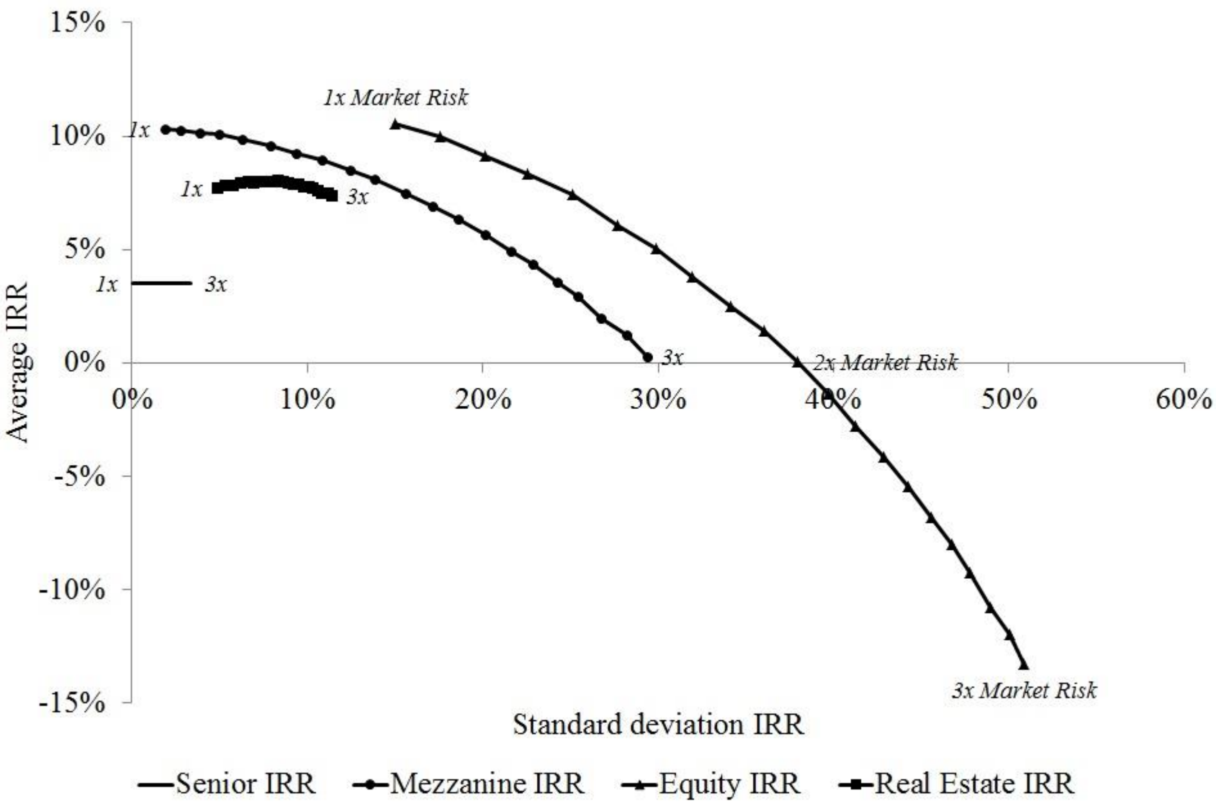
Mezzanine is uncorrelated with real estate when spreads are 500 basis points or higher, but highly correlated when spreads are low. Moreover, the correlation between mezzanine and equity follows a similar pattern to that of mezzanine and real estate, although it is substantially higher when spreads are above 300 basis points. This indicates that even though mezzanine is secured by equity, the relation with real estate is just as strong, if not stronger. As a result, it seems even more important to underwrite mezzanine as real estate during times of low yields and low spreads, like the period we are facing today.

Impact of changing portfolio risk

So far, the real estate portfolio used for the analysis has been relatively diversified. Most portfolios transacted are actually not that diversified and therefore contain more object specific risk or hold more secondary/risky assets. To cope with this issue, risk of the underlying real estate portfolio has been changed vis-à-vis the standard deviations of rental growth, yield and vacancy. Each of these standard deviations has been multiplied by a certain factor β to reflect an increase in object specific risk. With a β of 1, all standard deviations are similar to market-level risks, thereby reflecting a fully diversified portfolio. With only one or two buildings in a portfolio, it is realistic to assume a risk level of more than twice as much as the market. In Figure 4.4, the results are shown of this analysis. The average IRR for each part in the capital stack is displayed for different risk levels.

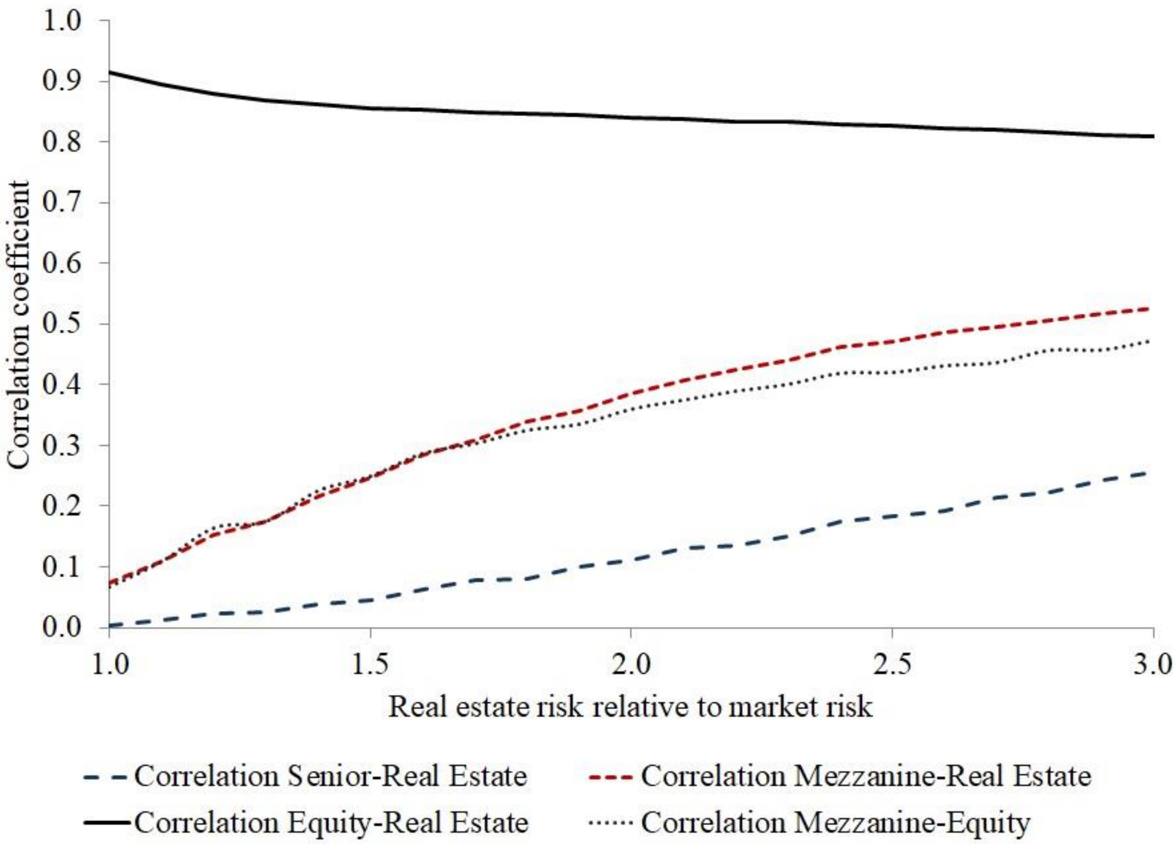
It is rather obvious that an increase in risk in the underlying real estate portfolio leads to increased risk for each part of the capital stack. What is perhaps more surprising is that the average IRR for mezzanine and equity declines consistently when portfolio risk increases. Also, real estate IRRs show a modest decline, but only after risk is increased by more than 90 percent compared to the market. This can be explained by the impact of downside scenarios being more severe than the upside scenarios can compensate for. This analysis shows that small real estate portfolios are more likely to result in disappointing IRRs if the portfolio is leveraged. In this situation, both the $\overline{IRR}^{mz}$ and $\overline{IRR}^{eq}$ are likely to be lower than the $\overline{IRR}^{re}$. Leverage, therefore, has a lot more economic value with diversified portfolios.

Figure 4.4: Risk and return profile of senior, mezzanine, equity and underlying real estate portfolio by changing risk profile of underlying real estate portfolio.



The other interesting aspect to examine is the impact of an increased portfolio risk to correlation coefficients. In Figure 4.5, these results are shown. Again, it is obvious that the equity part of the capital stack and the underlying real estate portfolio are highly correlated. Senior debt is very weakly correlated as long as the β is lower than 1.5. When, however, β is 3.0 (which can be the case, for instance, when investing in a single property or a small portfolio of risky assets) correlation is significant and can be as high as 26 percent. Mezzanine is always significantly correlated, although the correlation is rather low for highly diversified portfolios, as the default probability for equity is low in that situation. On the other hand, the correlation quickly increases to over 40 percent if the portfolio has a β of 2.1 or higher, which is rather high given that in most market scenarios mezzanine receives a fixed interest rate and no upside. This increase in risk of over 100 percent compared to the market risk sounds high, but is rather easily achieved with a portfolio of fewer than five buildings. Finally, it can be concluded that mezzanine is more linked to real estate than to equity, as the latter is consistently below the correlation with real estate for β levels of 1.7 and higher.

Figure 4.5: Correlation between the different elements from the capital stack and variations in the underlying real estate portfolio risk.



Impact of rental growth

The final sensitivity that has been tested is the impact of rental growth on the IRR of the different components of the capital stack. It is rather obvious that a higher rental growth has a positive effect on the real estate return. The question, however, is whether and how much this translates in higher mezzanine and equity returns and how much the correlations and default risks are affected. Table 4.4 presents the results of the analysis.

Table 4.4: Impact of changing rental growth on the average IRR of real estate, senior debt, mezzanine debt en equity, assuming 60 percent senior, 10 percent mezzanine debt and 30 percent equity holding

	Rental Growth (in %)					
	-2.0	-1.0	0.0	1.0	2.0	3.0
Real Estate IRR	5.0	5.8	6.7	7.5	8.5	9.3
Senior IRR	3.5	3.5	3.5	3.5	3.5	3.5
Mezzanine IRR	8.6	9.3	9.6	10.0	10.2	10.3
Equity IRR	-3.3	0.2	3.8	7.1	10.2	12.8
% Mezzanine Default	4.0	2.8	2.0	1.3	0.8	0.5
% Equity Default	13.9	11.0	8.4	6.3	4.8	3.5
Correlations:						
Senior – Real Estate	0.18	0.13	0.08	0.03	0.01	0.00
Mezzanine – Real Estate	0.39	0.33	0.27	0.20	0.15	0.09

The table clearly shows the positive impact higher rental growth has on the IRR of real estate, mezzanine and the equity holdings, but not on senior debt. A 1 percent higher rental growth translates approximately in an additional 1 percent higher real estate IRR, which is in line with the expectations. For mezzanine the impact is much less, while for equity it is much more due to the effect of using 70 percent leverage. The likelihood of a default declines when growth increases and the same is observable for the correlation between the two types of debt with the underlying real estate portfolio. The most interesting observation is the significant correlation between senior debt and real estate in situations where rental growth is negative. Even though the correlations are still low, the level is substantial and is a clear sign that even senior debt can be affected by a downturn in real estate.

4.5 Conclusions

In this chapter, real estate debt has been analyzed vis-à-vis the risk return profile to answer whether it should be viewed as real estate or fixed income. It is clear that senior debt has a very low risk, almost independent of whether it is 50, 60 or 70 percent of the capital stack. Moreover, correlation to the underlying real estate portfolio is very low and therefore it is safe to conclude that senior debt can be viewed as fixed income. Mezzanine is a rather different story. Depending on the position in the capital stack, risk and return can be either lower or higher than the underlying real estate or the equity position. In the most extreme scenario, mezzanine can achieve a higher return than real estate, combined with a lower risk. This seems almost unrealistic, but this situation occurred after the financial crisis when liquidity was desperately thin, balance sheet valuations considerably uncertain and finance hardly available. In most other scenarios, mezzanine provides a higher return and risk compared to the underlying real estate portfolio. Due to the severe impact of negative scenarios on the highly leveraged equity stake of the capital stack, average returns are lower than those for mezzanine, whereas the median is still higher. Correlation between mezzanine and real estate is substantial and somewhat higher than the correlation between that with equity, even though mezzanine is secured by equity. This is a clear indication that mezzanine should be underwritten as real estate. Increasing risk or decreasing the real estate spread over interest rate only amplifies these results.

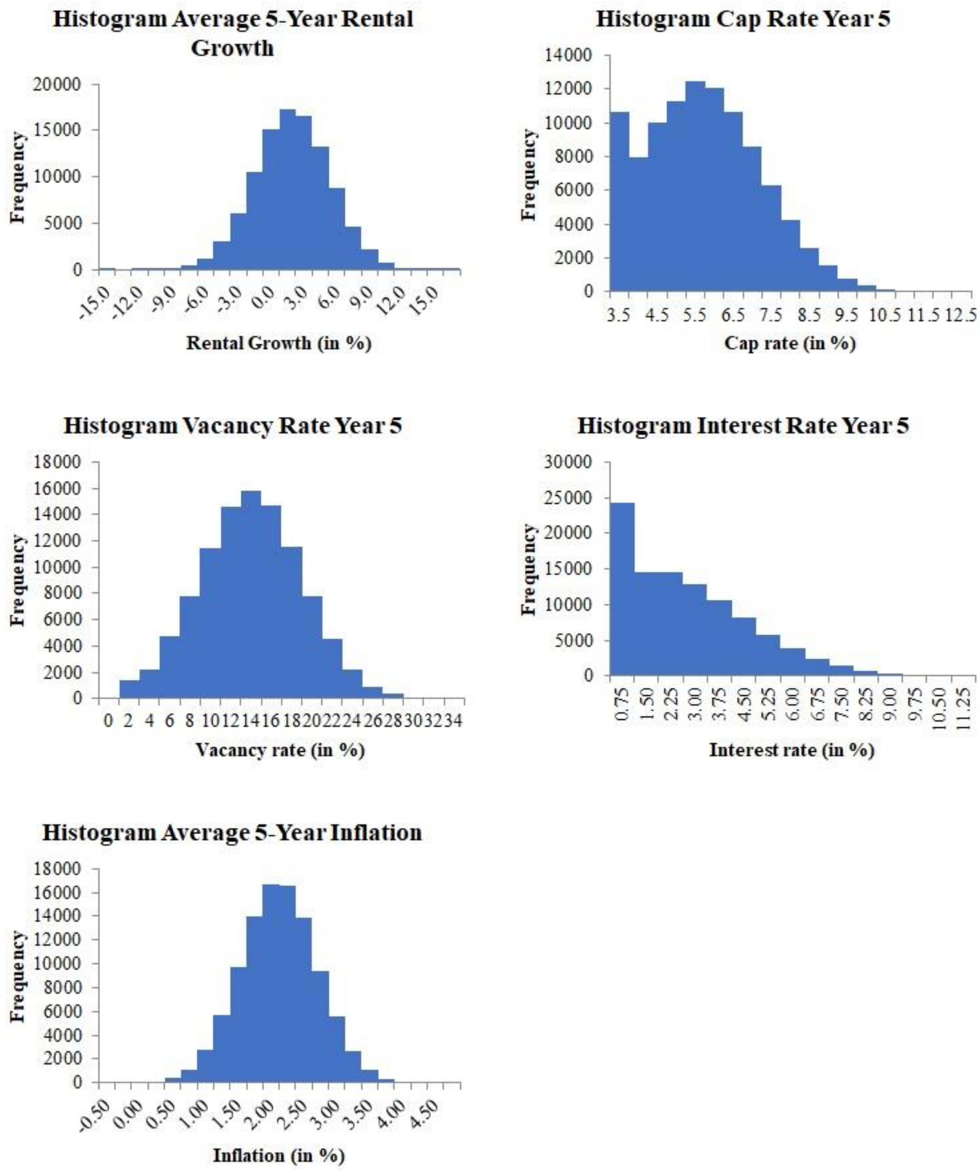
Given the results of this chapter, it would make sense to separate senior debt and the more junior debt, like mezzanine, into two distinct products when valuing or structuring real estate debt securities. Senior real estate debt should then be valued by or marketed to the investor's fixed income team, whereas mezzanine should be valued by or marketed to the real estate teams. Any product that combines these two forms of debt will be difficult to place in an investor's portfolio due to the way most are built up.

Appendix

Table 4.A.1: All assumption used for the cash-flow and simulation modeling

Assumptions US Office Real Estate Fund Cash-Flow Model		
1	Structure has 5 year holding period	
2	Set up costs are 20 basis points (bps) of Gross Asset Value (GAV)	
3	Annual fund costs are 10 bps of initial GAV and indexed with inflation yearly	
4	Management fee is 60 bps of GAV, acquisition fee is 50 bps and performance fee is 20% over a 9% hurdle, no catch-up	
5	Senior loan is fixed rate, mezzanine loan is floating rate	
6	Origination fee mezzanine loan is 1%	
Assumptions Market Variables		
1	US Treasury (UST) Rate is 1.65 at Q4 2014 and change in UST is normally distributed ~ N(0%, 1.2%), with a minimum of 0.5%	
2	Senior spread:	145 bps over UST at 50% LTV
		185 bps over UST at 60% LTV
		275 bps over UST at 70% LTV
		375 bps over UST at 80% LTV
		525 bps over UST at 90% LTV
3	Inflation is 0.8% at Q4 2014 and is normally distributed: Inflation ~N(2%, 1.3%)	
4	Vacancy is 13% at Q4 2014 and change in vacancy ~N(0%, 2.3%), with a minimum of 0%	
5	Rental growth is 7.4% at Q4 2014 and rental growth ~N(1.4%, 7.54%)	
4	Cap rate is 5.4% at Q4 2014 and change in cap rate ~N(0%, 0.81%), with a minimum cap rate of 3.5%	
5	Correlation (change in vacancy, rental growth) = -0.45	
6	All real estate standard deviations have been increased by 30% to proxy the effect of idiosyncratic risk of a relatively small not fully diversified portfolio	

Figure 4.A.1: Distribution of each of the market variables generated by 100,000 simulations



Chapter 5

The Impact of Leverage on Real Estate Loan Spreads[15]

5.1 Introduction

Given the impact leverage has on investment return, one should expect there to be a positive correlation between the amount of leverage and the interest rate a borrower pays on a mortgage. Banks should underwrite this risk and demand an additional spread over a government bond yield or risk-free rate. Nevertheless, the literature has not been very successful in analyzing and understanding this relationship. The main reason for this is the endogenous character of leverage. For example, high leverage is mainly possible for the least risky assets, resulting in a relatively low interest rate. Without incorporating the quality of the asset as an indicator, it is difficult to analyze this two- or even three-way relationship. This lack of a variable is one of the most commonly mentioned reasons within the literature for not being able to prove the link. In this chapter, I introduce just such an indicator and use it to explain the spread and loan-to-value (LTV) ratio. It is notable that most literature has used databases including all property types to explain the relationship and have only included a dummy to explain the difference between property types. The problem is that the origination process for each property type is substantially different, as the inherent risk of each type is different. For instance, Ambrose et al. (2015) showed that tenant diversification for retail properties has a significant influence in the mortgage spread. In addition, Freybote (2016) proved that REITs focusing on different property types demonstrate different dependencies to market variables and loan characteristics. These differences are too substantial to be controlled with just a dummy; therefore, this analysis will only focus on one property type: the United States office market.

[15] This chapter is based on: M. van der Spek (2017), The impact of Leverage on Real Estate Loan Spreads, *working paper*

The findings show that simple regression does not reveal any relationship between leverage and real estate loan spreads. On the other hand, there are a number of other variables that are significantly correlated. Size has a clear negative effect on spreads, which means that loans for larger office buildings are able to obtain lower spreads. A similar negative connection was found for the variables maturity, debt service coverage ratio, and loans originated by banks; these results were as expected. Variables that demonstrated a positive influence on spreads are the equity market risk indicator (measured by the CBOE Volatility Index, or VIX), a bond market volatility measure, and the credit spread. An increase in these risk indicators results in an increase in spread due to lenders being more cautious. Finally, the cap rate also showed a positive relationship with spreads. Higher cap rates are more common for office buildings with either lower quality or a lower growth outlook, so it makes sense that these buildings get loans with a higher spread. Leverage, on the other hand, showed hardly any correlation with spread, which is somewhat strange given that the risks involved are substantial. However, this is an endogeneity choice, whereas higher leverage is mainly obtained when the underlying property is of a high quality or has a low risk profile. To cope with this problem, I introduced an instrumental variable to reflect the quality of the underlying asset. Using a two-stage least squared regression model, leverage actually showed a strong relationship with the spread of the real estate loan. So, this chapter contributes to the existing literature by demonstrating the endogeneity of leverage and showing how to cope with it. This will help to better understand the relationship between spreads and leverage, which is required when modeling leveraged real estate.

The remainder of this chapter is structured as follows. Section 5.2 provides an overview of the existing literature, before the data is described in Section 5.3. Section 5.4 provides an overview of the regression model and Section 5.5 analyzes the results. Section 5.6 sets out the additional two-stage least squares regression model and the results of this model, and Section 5.7 offers some conclusions.

5.2 Literature

The literature on the impact of leverage on investment return is substantial and shows that this risk is often undervalued by investors, as was also exposed by the global financial crisis. Papers by Hoesli and Delfim (2016) and van der Spek and Hoorenman (2011) clearly showed that high levels of leverage disproportionally increased investment risk, but did not contribute to a higher return. Even though additional risks have been proven to be substantial, the literature has not always been able to demonstrate the expected positive relationship between leverage and the interest rate on mortgage loans.

One of the earlier papers on the subject, by Titman et al. (2005), analyzed the relationship between the spread and leverage. They found that this relation was relatively weak, but significant, and concluded that this is probably due to the endogeneity of the LTV choice. The standard way to cope with this endogeneity, according to them, is using an instrumental variable. However, they were not able to find a variable that met the requirements to influence LTV, and to be unrelated to spreads. Therefore, they used several techniques to cope with this endogeneity. They introduced LTV buckets and added a dummy for LTV equal or greater than 70 percent, which helped to improve the relationship. They also analyzed the effect of the originator in more detail and found that the average leverage per lender is a strong positive indicator for explaining mortgage spreads, and moreover they found that large investment banks and banks in general tend to have lower spreads. Finally, they encouraged further research on this endogeneity issue.

Ambrose et al. (2003) also found that bank originators have a different approach in assigning mortgage terms from nonbank originators. When underwriting mortgages, nonbank lenders are guided more by the LTV ratio than bank lenders are; consequently, a higher LTV ratio leads to nonbanks being less willing to fund than banks. Ciochetti et al. (2003) also focused on the impact of the originator on commercial mortgages. They showed that originator bias is important in estimating default probabilities and that smaller borrowers are less likely to default. They also showed a positive relationship between the probability of default and the LTV ratio. Interestingly, Ambrose and Sanders' (2003) analysis of a CMBS database covering all types of real estate found no statistical relationship between LTV and default. However, they did find relationships with the yield curve and credit spread and they found that mortgages with higher LTVs at origination are more likely to prepay. Titman and Tsyplakov (2008) also analyzed the impact of the originator on spreads based on conduit mortgages, which are repackaged mortgages sold as CMBS. They found that institutions with negative stock price performance prior to origination date have higher credit spreads and default more often than average, which is a clear sign of poor incentives for those institutions. Besides the originator, other market variables have been explored as explanatory factors. For instance, Marcato and Tira (2011) demonstrated that bond, mortgage, real-estate-related, and multinational characteristics helped to explain European CMBS spreads at issuance at different levels of significance. They also showed that the most important explanatory variables are related to the bond market and less to the real estate market. Dietrich and Wunderlin (2010) analyzed margins of mortgage loans and showed that economic variables, such as GDP growth and inflation, and the type of borrower have a significant impact on margins. Interestingly, they did not include LTV ratio in their analysis. Eichholtz et al. (2015) showed that environmentally certified buildings command significantly lower spreads than conventional but otherwise comparable buildings. They also found a positive (but not always significant) relation between LTV level and the spread. They also included a dummy indicating whether the commercial mortgage has an LTV level of 70 percent or higher, which is in line with Titman et al. (2005). They also found that this indicator appears to be significantly negative, suggesting that less-risky firms face lower spreads. However, they did not explore the LTV findings further.

Additional analysis with respect to the problem of endogeneity has been conducted by Chervachidze et al. (2015). They analyzed the spread of commercial real estate loans from a completely different perspective; they investigated the utility of using a hedonic model to construct an index of yield on commercial mortgage loans. Many indicators are used to determine this index, including the LTV ratio. Chervachidze et al. (2015) acknowledged that the LTV variable is likely endogenous, so they developed an instrumental value to proxy for LTV. They found hardly any difference between the two-stage least squared results with the instrumental value and the traditional OLS regression results. Therefore, they concluded that the bias is very small in practical applications, although finding a valid instrument was quite difficult. Nevertheless, the authors demonstrated a positive relation between LTV and interest rates in both models. Other significant variables included the type of rate (floating rate has lower rate), size (bigger loans have lower rates), type of lender (bank provides lower rates), property type (multifamily has the lowest rate, while hotels have the highest rate), and deal structure (bridge and construction loans are the most expensive). On the other hand, geographical characteristics and deal purpose type (such as acquisition or construction) are not significant. Ambrose et al. (2015) focused on the mortgage spread of retail property and also adjusted for endogeneity with the help of an instrumental variable. The aim was to analyze the impact of tenant diversification on this spread. Similar to Titman et al. (2005), Ambrose et al. (2015) used the LTV ratio, along with a dummy for mortgages with an LTV above or equal to 70 percent, as explanatory variables. They found similar results for the LTV ratio (significantly positive), but, unlike Titman et al., the dummy variable was not significant. Moreover, Ambrose et al. (2015) used a two-stage least square (2SLS) regression model to apply an instrumental variable approach for LTV, using the average LTV of all other loans from the same originator as instrument. This 2SLS model resulted in higher coefficients and indicated that adjusting for endogeneity makes it possible to better capture the economic impact of LTVs on spreads. They also demonstrated that there is a non-linear relationship between tenant diversification and the mortgage spread, which is a clear indication that there are specific issues that explain spreads for each property type. Another paper supporting the fact that each property type should be analyzed separately was that of Freybote (2016). She focused on the effect of institutional investor sentiment on REIT bond yields. Her analysis found the expected negative effect between sentiment and bond yields, but she also found large differences in the impact of leverage on yields between the different property types. The relationship was negative for apartment and diversified REITs, but positive for offices and hotels. Moreover, different variables appeared significant for each property type, demonstrating that spreads for each property type are set differently.

The literature shows that there is a relationship between real estate loan spreads and leverage, but one that it is relatively weak or difficult to reveal given the endogeneity of leverage. Literature also encourages further work on this endogeneity issues, while suggesting asset quality could be on option to look into. So far literature couldn't find the right metric as instrumental variable to test the endogeneity issue and therefore applied alternative approaches. Finally, the literature shows that the differences between property types can be substantial.

5.3 Data

The dataset in the present study is provided by Real Capital Analytics[16] (RCA) and contains 2053 real estate loans issued in the five largest and most liquid office markets in the United States. Loans missing either LTV or interest rate figures were excluded from the analysis, which is unfortunately the majority, slightly over 70 percent of the database. These loans are typically reported without specific information, because the borrower is unwilling to share this information. It is clear that there is still room for improving transparency. In addition, all variable rate loans were excluded, as the sample is rather small (only eight observations) and the loan structures could be different, which would influence the outcome disproportionately. The remaining dataset contains 561 loans, with a lot of additional data as shown in the data summary in Table 5.1.

The data can be split into two parts: the underlying real estate characteristics and the loan characteristics. Sixty percent of the mortgaged properties are located in New York. Other properties are in the cities of Chicago (15 percent), San Francisco (14 percent), Los Angeles (7 percent), and Atlanta (3 percent). The database consists of single-asset loans as well as portfolio loans (7 percent) and covers both stabilized (77 percent) and value-add (23 percent) properties. The average property value is over $300 million, with a maximum of $3.4 billion. The Local QScore is an indicator developed by RCA that specifies the quality

[16] RCA is a data and analytics firm that focuses exclusively on the investment market for commercial real estate and collects transactional information for current property sales and financings.

of the asset. This measure is derived from the individual cap rate relative to the market (relevant MSA) average cap rate. The higher the QScore, the higher the quality. The average QScore is 0.55, while the minimum is 0.01 and the maximum is 1.00. In the appendix the distribution of the Q Score is shown and it is pretty much evenly distributed across all qualities. The loan-specific characteristics demonstrate that 78 percent of the loans are issued by banks and 55 percent are subject to prepayment. Further, it is shown that the average maturity is about 10 years (118 months) with an average LTV of 56 percent. Because it is possible to have multiple loans on a single property, the average loan amount (slightly above $100 million) divided by the average property value does not equal the average LTV.

Table 5.1: Descriptive statistics of the real estate loan database provided by RCA. Property Value and Loan Amount are in million USD, Age in years, Loan Term in months and Cap Rate, Interest Rate, LTV and DSCR in percentage. The variables High-rise, Portfolio, Value Add, Bank and Prepayment are dummy variables and the standard deviations for these variables are, therefore, obviously not presented.

Statistic	N	Mean	St. Dev.	Min	Max
Property-specific statistics					
Age	561	24.75	26.99	1	122
Property Value	561	301.65	490.1	2.27	3,400.00
Cap Rate	453	5.59	1.42	1.15	13.40
QScore Local	490	0.55	0.27	0.01	1.00
High-rise	561	0.58		0	1
Portfolio	543	0.07		0	1
Value Add	544	0.23		0	1
Loan-specific statistics					
Loan Amount	561	103.96	174.35	0.81	1,425.00
Interest Rate	561	4.91	0.96	2.30	11.00
Loan Term	553	118.31	33.14	10	420
LTV	561	0.56	0.17	0.04	0.95
DSCR	465	1.83	0.88	0.61	10.48
Bank	546	0.78		0	1
Prepayment	561	0.55		0	1

The debt service coverage ratio (DSCR) is the amount of cash inflow divided by the interest payments and the average is 1.83. It is remarkable that a few loans originated with a DSCR below 1.00, indicating that there is insufficient cash flow to service the interest payments. The lender was apparently certain enough that additional income would be generated soon.

Finally, it is important to note that not all information is available. For instance, information about the borrower is only marginally available and not sufficient to include in the analysis. Dietrich and Wunderlin (2010) demonstrated that the type of borrower could have an impact on spreads, while creditworthiness of the borrower is another element that would be interesting to investigate. Unfortunately, the data is insufficient to analyze this relationship. In addition, some variables are incomplete; especially the DSCR (465 out of the 561), Cap Rate (453), and QScore Local (490) is not always available for each loan. These data fields are sometimes seen as sensitive information and are therefore not published or shared. As RCA is dependent on the transparency of the market, the database might be biased towards the more transparent part of the market, which could be the more public and successful deals. This bias could lead to a better representation of the institutional investment and mortgage market and be less representative for individual private investors.

The real estate loans originated between 2001 and 2015, but most were issued in the periods 2005-2007 and 2010-2016. The coverage in 2008 and 2009 was rather thin as a result of the global financial crisis. The average interest rate is 4.9 percent, although this number is not particularly relevant without any reference or benchmark. Figure 5.1 provides an overview of the average interest rate per quarter in the database relative to the 10-year government bond rate. It is clear that the interest rate of the loan is substantially higher than the bond rate. Also noticeable is the diminishing difference during the years before the crisis (2006 and 2007) and the high spreads during and after the crisis. The graph also shows the amount of deals per quarter and, therefore, also the lack of deals during the crisis years. It is well-known that the spread – that is, the difference between the interest rate and the government bond yield – reacts to the changing investment environment and risk attitude and it is therefore important to control for additional risk and market indicators.

Figure 5.1: Number of US office loans and the average interest rate per quarter compared to the 10-year government bond yield

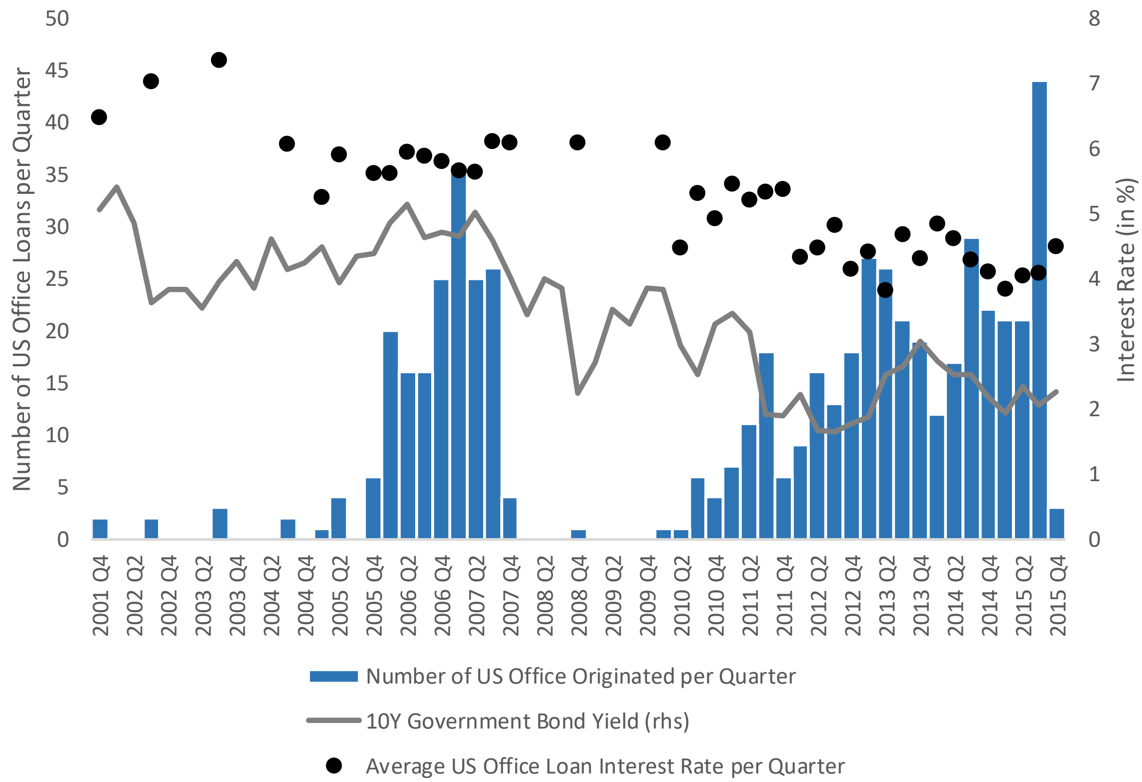
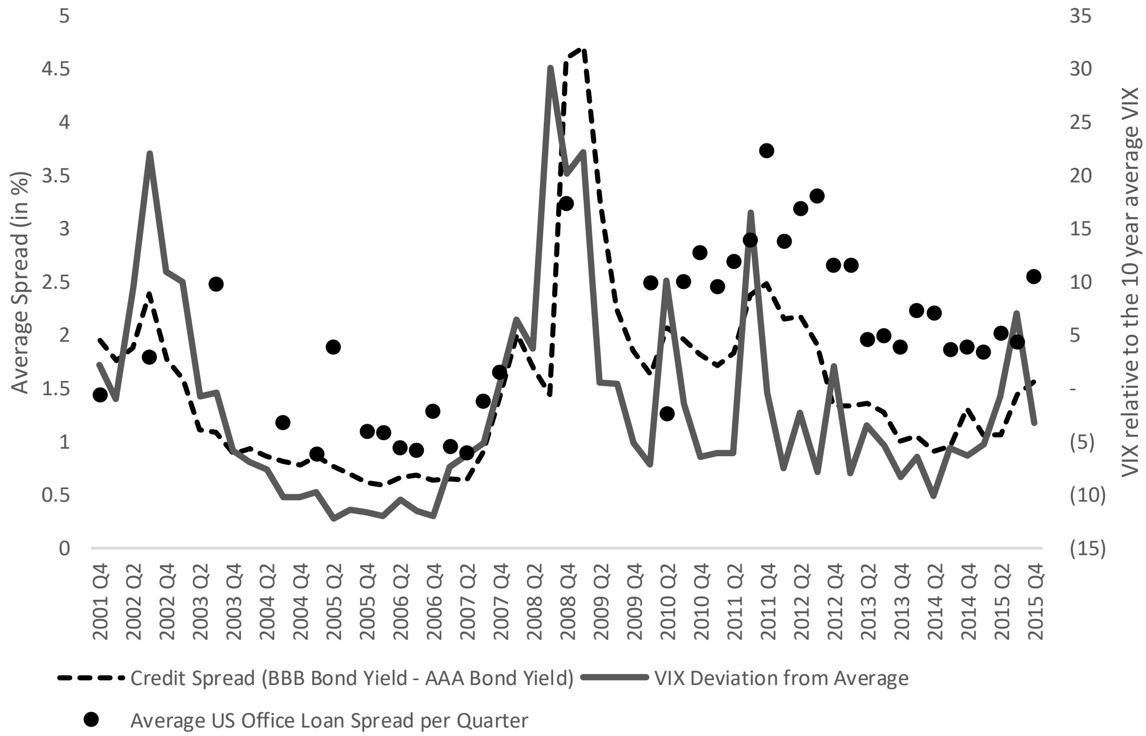


Figure 5.2 displays the relation between spread and two risk variables: the CBOE Volatility Index (VIX) and the spread between BofA Merrill Lynch US Corporate BBB and AAA bond yields (Credit Spread). It is clear that there is a correlation between the different risk variables and the office loan spread. Therefore, it is necessary to not only analyze the loan and property characteristics, but also the market movements in order to understand the interest rate on real estate loans.

Figure 5.2: Average US office loan spread (average interest rate on loan – same dated interest rate with similar maturity) per quarter compared to the credit spread (BBB bond yield – AAA bond yield) and the relative VIX (VIX – the average VIX over last 10 years).



5.4 Research Framework

In order to analyze the real estate loan spread, and to find out whether LTV has a significant impact on this spread, a number of regression models will be applied. The structure of these models will be in line with the existing literature and each regression model is structured as shown in Formula 5.1, below:

$$Spread = \alpha + \sum_{i=1}^{n} \beta_i \cdot Property_i + \sum_{j=1}^{m} \gamma_j \cdot Loan_j + \sum_{k=1}^{p} \delta_k \cdot Market_k + \varepsilon \tag{5.1}$$

, where $Spread$ is the difference between the interest rate on the loan and the risk-free rate with the same duration on the loan origination date. Three types of variables are used: property-specific characteristics, loan-specific characteristics, and market indicators.

These three types are further explained below, including all relevant variables used in the regression.

Property Factors

The property-specific factors used in the regression are all indicators that can be directly linked to the underlying office building. The model covering all property factors is as follows:

$$\sum_{i=1}^{n} \beta_i \cdot Property_i = \beta_1 \cdot Size + \beta_2 \cdot Age + \beta_3 \cdot HighRise + \beta_4 \cdot ValueAdd + \beta_5 \cdot Portfolio + \beta_6 \cdot CapRate + \beta_7 \cdot QScore \quad (5.2)$$

, where Size is the natural logarithm of the value of the underlying property. This factor captures the size effect and is likely to have a negative effect on spreads for a number of reasons. Economies of scale, for instance, should translate into a reduction of transaction fees of the loan, while borrowers owning larger properties may also be seen as more reliable. Age refers to the age of the property. Because it is unlikely that age affects spreads in a linear manner, age is transformed into four dummy variables (similar to Titman et al. [2005]): less or equal to 5 years, between 5 and 15 years, between 15 and 30 years and older than 30 years. The factor HighRise indicates whether the office building is a high-rise building. This dummy variable is 1 if the number of floors of the underlying office tower exceeds 12. [17] This factor could have a negative effect on spreads, as high-rise buildings are mostly located in dense areas, while the building itself is more likely to serve multiple tenants, reducing the risk and impact of vacancy. On the other hand, this factor could also be positively correlated with spreads, as construction of a high-rise building is more challenging and thus riskier than constructing lower-rise buildings. In addition, high-rise buildings are usually more expensive and might therefore be less liquid. The variable ValueAdd is a dummy variable that indicates whether value-add activities, like leasing up

[17] There is no official definition of high-rise, but a general rule among architects is that the term refers to a building with more than 12 floors.

or redevelopments, are taking place and should get a higher spread than a stabilized property. Therefore, this indicator should display a positive relationship. Portfolio is a dummy variable that indicates whether the underlying real estate is more than one office building (and thus a portfolio of offices). As portfolios are slightly more complex to underwrite than single-property loans, it is expected that portfolio loans will have higher spreads. On the other hand, the relation could also be negative because of diversification effects of a portfolio. The factor CapRate is the capitalization rate of a property. This capitalization rate is the net operating income divided by the value of the property and is expected to have a positive impact on spreads. A higher cap rate corresponds to more income generated to pay interest but also to a lower likelihood of additional income growth, which is the reason for higher cap rates. Furthermore, lower-quality property usually trades at higher cap rates, resulting in higher spreads on mortgages. Finally, the QScore variable is an indicator of the quality of the underlying asset. This indicator is created by RCA and is a derivative of the relative cap rate within the metropolitan area. The lower the cap rate compared with other assets in the MSA, the higher the quality of the asset and the higher the QScore. The QScore is normalized to a value between zero and one and should demonstrate a negative relationship, as higher-quality assets should get lower interest rates on mortgages.

Loan Factors

The loan-specific factors used in the regression are all indicators that can be directly linked to the loan or mortgage. The model covering all loan factors is presented as follows:

$$\sum_{j=1}^{m} \gamma_j \cdot Loan_j = \gamma_1 \cdot PrePay + \gamma_2 \cdot Bank + \gamma_3 \cdot Maturity + \gamma_4 \cdot DSCR + \gamma_5 \cdot LTV \qquad (5.3)$$

, where PrePay is a dummy variable that indicates whether the loan is subject to prepayment. Prepayment is a way for a lender to decrease the risk of the loan, as money comes back earlier, and the impact of this variable on the spread should therefore be negative. However, some will argue that prepayment is a risk to the lender, as it implies a more volatile and uncertain cash-flow. The Bank factor is a dummy with the value 1 if the originator is a bank and zero otherwise. This factor is expected to have a negative effect on spreads, as banks have different approaches to originating loans, which results in lower margins compared to nonbank competitors. This effect was well described and researched by Ambrose et al (2003). The Maturity factor measures the loan term. While Titman et al. (2005) showed that the effect is non-linear, others (such as Dietrich and Wunderlin [2010]) found significant negative linear relationships. Therefore, maturity will be tested with two types of variables. The linear variable is the number of years to maturity and the non-linear maturity variables are dummies for maturities less than 5 years, between 5 and 10 years and more than 10 years. In both cases, short maturities should result in the highest spreads, as risky loans are more likely to obtain short-term loans and then refinance when the asset is more mature or less risky in a few years. The DSCR is the debt service coverage ratio and represents how many times the debt payments are covered by the available cash flow. The higher the DSCR, the lower the spread is expected to be, as it is a clear indication of lower risks.

The final loan-specific variable is the LTV. The relationship between LTV and interest rate should clearly be positive, as higher LTV results in a higher risk. However, LTV is known to be an endogenous choice, as it is part of the negotiations between the borrower and lender and is dependent on the risk of the underlying asset. This situation makes it very difficult to assess the relationship. Because of this complexity, it is important to exclude as much noise as possible; to this end, it is necessary to focus on a single property type and a market that is as homogenous as possible. The US office market is probably the best laboratory to test this relationship, as it is quite homogenous and easy to understand. For instance, residential is a very different market and should not be mixed for such an analysis. LTV levels in the residential market are usually higher and lenders like Fannie May and Freddy Mac set interest rates substantially lower. To analyze the relationship between spreads and LTV, four models are tested. In the first model, the 'simple' variable LTV ratio is used. To cope with the non-linearity, a second variable is added in the second model, which is a dummy variable for loans with an LTV ratio over 70 percent (as suggested and successfully tested by Titman et al. [2005]). In the third model, different LTV buckets are used as dummy variables for the level of LTV. In the last model, an Instrumental Variable (IV) is developed to proxy for LTV to account for the underlying endogeneity. This model is further explained in Section 6.

Market Factors

The market-specific factors used in the regression are all indicators that can be directly linked to the real estate, equity, or bond markets. The model that covers these market factors is as follows:

$$\sum_{k=1}^{p} \delta_k \cdot Market_k = \delta_1 \cdot RECG + \delta_2 SPI + \delta_3 \cdot VIX + \delta_4 \cdot VOL10Y + \delta_5 \cdot TS + \delta_6 \cdot CS + \delta_7 \cdot PreCrisis \tag{5.4}$$

, where the RECG is the real estate capital growth and represents the value growth of the relevant office market over the previous year. For instance, a New York office building loan spread is compared to the value growth of last year's New York office market. This variable should have a negative effect on the spread, as positive value growth in the previous year indicates strong real estate fundamentals driving spreads down as the result of a tighter market and more willing lenders. The decision was made to use the value growth rather than the total return as the former better reflects the direction of the market. The variable SPI is the quarterly change in the S&P 500 index. When equity markets are falling, lenders might be more cautious about originating new loans and, as a result, spreads might rise. Therefore, one could expect that the relationship is negative. The VIX factor is the difference between the current volatility index and the average 10-year VIX and measures the relative volatility in the equity market. Higher VIX values indicate additional uncertainty in the market; consequently, it can be expected that originators will be more reluctant to provide new credit. As a result, a positive relationship is expected. The variable VOL10Y represents the volatility of the 10-year government bond yield. This indicator is also expected to have a positive impact on spreads, as higher volatility in the bond market indicates more uncertainty and lenders are less likely to provide loans. The factor TS stands for term structure and is the difference between the 10-year government bond yield and the three-month T-Bill rate. An increase in the term structure is a sign that inflation is increasing as a result of economic growth, leading to lenders being more competitive, resulting in decreasing spreads. In other words, the relationship between spreads and the term structure is likely to be negative. The market factor CS stands for credit spread and is the difference between the BBB and AAA corporate bond yields. This indicator represents the risk of the overall economy or the risk-averseness of the investors and should therefore have a positive correlation with the underlying loan spread. The final factor is the dummy PreCrisis, which indicates whether the loan is issued before the crisis. The date used for this dummy is the date that Lehman Brothers went bankrupt on September 15, 2008. The expectation is that this dummy will demonstrate a negative relationship, as margins and spreads were relatively low during the boom period before the global financial crisis.

5.5 Cross-Sectional Regression Results

The results of the regression model, as presented in Formula 5.1, are shown in Table 5.2. All four displayed models use the same variables, whereas the difference is how leverage is included. The coefficients are rather stable and consistent across models; in addition, the adjusted R^2s are around 78 percent, which is a clear indication that these variables explain most of the cross-sectional variation of the spread. Unfortunately, only 378 observations could be included in the regression due to the problem of missing data. There are techniques available to cope with missing data. However, applying those techniques did not result in better or different outcomes, so they are not further described and explored.[18]

[18] In this case, two techniques have been tested: Full Information Maximum Likelihood and Multivariate Imputation by Chained Equation

Table 5.2: Cross-sectional regression results. Dependent variable: Interest rate spread over government bond rate with similar maturity. Model 1 uses the LTV as the leverage independent variable, Model 2 adds an additional LTV dummy for loans with LTV above 70 percent, Model 3 uses LTV buckets instead of LTV and model 4 only uses two LTV buckets.

	Cross-sectional regression with loan spread as depended variable:							
Variable	Model 1		Model 2		Model 3		Model 4	
	Coefficient	*t-Statistic*	*Coefficient*	*t-Statistic*	*Coefficient*	*t-Statistic*	*Coefficient*	*t-Statistic*
Constant	2.003***	(7.251)	2.002***	(7.193)	1.743***	(3.788)	2.085***	(8.620)
Size	-0.059***	(-2.920)	-0.059***	(-2.916)	-0.059***	(-2.879)	-0.059***	(-2.941)
Age ≤ 5	0.026	(0.342)	0.026	(0.341)	0.017	(0.224)	0.011	(0.149)
5 < Age ≤ 15	0.021	(0.360)	0.021	(0.359)	0.016	(0.276)	0.017	(0.292)
15 < Age ≤ 30	-0.058	(-0.935)	-0.058	(-0.932)	-0.064	(-1.022)	-0.061	(-0.986)
HighRise	0.050	(0.903)	0.050	(0.902)	0.054	(0.966)	0.053	(0.957)
ValueAdd	0.052	(0.991)	0.052	(0.988)	0.038	(0.718)	0.045	(0.850)
Portfolio	0.101	(1.303)	0.101	(1.301)	0.117	(1.488)	0.098	(1.282)
CapRate	0.062***	(3.380)	0.062***	(3.375)	0.061***	(3.310)	0.059***	(3.302)
QScore	0.088	(1.089)	0.088	(1.075)	0.099	(1.210)	0.092	(1.129)
PrePay	-0.110*	(-1.764)	-0.110*	(-1.760)	-0.090	(-1.445)	-0.097	(-1.587)
Bank	-0.091*	(-1.740)	-0.091*	(-1.737)	-0.087*	(-1.665)	-0.089*	(-1.704)
Maturity	-0.087***	(-8.598)	-0.087***	(-8.579)	-0.089***	(-8.735)	-0.088***	(-8.697)
DSCR	-0.185***	(-5.045)	-0.185***	(-5.026)	-0.204***	(-5.444)	-0.188***	(-6.540)
LTV	0.026	(0.150)	0.027	(0.134)				
LTV > 70			-0.0003	(-0.005)			-0.018	(-0.312)
LTV ≤ 40					0.410	(1.016)		
40 < LTV ≤ 50					0.227	(0.562)	-0.148**	(-2.236)
50 < LTV ≤ 60					0.354	(0.881)		
60 < LTV ≤ 70					0.361	(0.898)		
70 < LTV ≤ 80					0.347	(0.860)		
RECG	-0.002	(-0.778)	-0.002	(-0.774)	-0.002	(-1.010)	-0.002	(-0.999)
SPI	0.260	(0.417)	0.260	(0.413)	0.174	(0.277)	0.146	(0.233)
VIX	0.016**	(2.187)	0.016**	(2.161)	0.016**	(2.206)	0.015**	(2.117)
VOL_10Y	0.891***	(3.034)	0.891***	(3.026)	0.846***	(2.890)	0.859***	(2.948)
TS	0.015	(0.353)	0.015	(0.352)	0.016	(0.378)	0.019	(0.463)
CS	0.811***	(9.327)	0.811***	(9.301)	0.801***	(9.203)	0.802***	(9.248)
PreCrisis	-0.351***	(-2.624)	-0.351***	(-2.619)	-0.362***	(-2.702)	-0.352***	(-2.687)
Observations	378		378		378		378	
R^2	0.788		0.788		0.792		0.791	
Adjusted R^2	0.775		0.775		0.777		0.778	

Notes: *Significant at the 10% level, **Significant at the 5% level, ***Significant at the 1% level.

A few of the property factors have a significant influence on spreads. The first significant factor is size, which has a negative impact as expected: the larger the asset, the lower the spread. The other coefficient that agrees with the theory and is significant is the cap rate. A one percent higher cap rate will lead to a 6.2 basis point increase in spread. All other property-specific variables do not influence spreads significantly. Property age, for instance, does not appear to have a substantial effect on spreads, although spreads for the newest buildings seem to be the highest. Alternative variables for the age dummies, like Age or Age^2 were tested, but did not improve the results. High-rise office buildings obtain higher spreads as expected, but the relation is also not significant. Adding a low- or mid-rise building dummy did not improve the regression result. It is remarkable that the quality of the asset has no significant effect on the spread. In fact, the relationship is even contrary to expectations; the higher the quality of the underlying building, the higher the spread. Dummy variables for each city are not included in the results, but they have been tested. These variables did not provide any significance or added value and were excluded from the table in order to improve the overview.

When looking at the loan-specific variables, most variables appear to be important. Prepayment has a negative effect on spreads, as expected. This feature reduces the risk of a loan and, consequently, spreads are lowered by 11 basis points on average. Banks on average demand lower spreads (9 basis points) for real estate loans, which is in line with the literature. Maturity has a significant negative relationship with spreads. If maturity increases by a year, spread will decline by almost 9 basis points, on average. As explained in the previous section, maturity buckets have also been tested. The differences with the presented results were limited, so only the linear approach is presented. The debt service coverage ratio has a clear and strong negative effect on spreads. Higher DSCRs will lead to lower spreads.

In the first model specifications, LTV ratio is used as a variable and does not appear to be significant. The coefficient is positive, which means that higher leverage will lead to a higher spread; this is in line with expectations and literature. However, the main issue is the endogeneity of the variable; only the lower-risk or higher-quality assets are able to obtain higher leverage, which could even suggest a negative relation. To cope with this, Titman et al. (2005) suggested adding an extra dummy indicating whether the loan has an LTV ratio higher than 70 percent. This variable is tested in the second model. The coefficient is negative and in line with the findings of Titman et al. (2005), but it is unfortunately highly insignificant with t-statistics close to zero and, therefore, does not explain the relationship well. The third model uses LTV buckets to test the non-linearity of the relationship. The results clearly indicate that the highest LTVs (over 80 percent) are the loans with the lowest spreads and that loans with an LTV between 40 and 50 percent are also somewhat lower than other LTV buckets. Still, none of the coefficients proved to be significant. In the last model specification, two buckets are included; namely, those loans with an LTV between 40 and 50 and the ones over 70 percent LTV. The only significant LTV variable appears to be the dummy for loans between 40 and 50 percent. These loans originated with a significantly lower spread than other loans. The dummy for loans with a leverage over 70 percent increased somewhat in significance, though they are still insignificant.

A number of market-specific variables appear to have a strong influence on spreads. The years before the crisis were characterized by cheap loans and this effect was as high as 35 basis points, and was also significant. In addition, both volatility measures show a positive impact on spreads. It is obvious that an increase in market volatility will lead to an increase in real estate loan spreads. The credit spread has a similar impact on spreads, while the term spread has no impact at all. The most remarkable outcome is the positive, but insignificant, coefficient for stock market return (SPI). An increase in SPI leads to an increase in spreads. This effect is contrary to expectations, but in line with the finding of Marcato and Tira (2011). The last market variable is the value growth in the real estate market. The effect it has on the spread is negative and according to expectations, but insignificant. Marcato and Tira (2011) also tested a quarter-lagged three-month T-Bill rate as one of the explanatory variables in their OLS regression, as an indicator for lending conditions, and showed it had a significant influence on spreads. However, inclusion in the regression models led to very strong signs of multicollinearity with a variance inflation factor (VIF) of over 15. Therefore, this variable was excluded from the analysis. Moreover, none of the other variables show signs of multicollinearity.

The presented research framework above could be viewed as a somewhat simple approach, given that it partly ignores the aspect of endogeneity. Nevertheless, it is important to understand these relatively simple linear regressions first, as doing so will set the scene and provides better understanding of the different relationships. Furthermore, some studies have even concluded that simple regression provides the best results (e.g., Chervachidze, 2015) or that there is no instrument that meets the criteria to cope with endogeneity (e.g., Titman et al. ,2003). In the next section, however, I present a more refined model to cope with the problem of endogeneity.

5.6 A solution for endogeneity: An instrumental variable approach

As mentioned earlier, it seems that lenders determine the spread and LTV ratio simultaneously. If the quality of the underlying asset is high, lenders will be more willing to increase the LTV ratio, while also accepting lower spreads. On the other hand, if the quality is low, lenders might limit the amount of LTV. To cope with the endogeneity of the LTV ratio, the method of Instrumental Variable (IV) is applied using a two-stage least squares regression. In the first stage, the LTV is estimated using a regression model, including an instrument, which is uncorrelated to the spread, but should explain the LTV ratio. The ideal instrument is the quality of the asset. To date, no variable has been able to give a good indication of the quality of a real estate asset. RCA recently developed the QScore variable to represent the quality of a property. The previous linear regression results showed that there was no significant relation between the spread and the QScore, the quality of the asset. The quality score actually showed an insignificant positive relation with the loan spread and therefore seems not an indicator for determining spreads. Quality should however have a substantial influence in the LTV ratio. As a result, this variable seems like a perfect independent instrumental variable for explaining the LTV ratio. From the lender's perspective, this means that first the LTV is determined, based on the characteristics and quality of the property and the underlying strength of the real estate market. Once the LTV has been set, the lender will determine the spread on the loan using the characteristics of the loan and the strength of the underlying capital market. To test this, first the LTV ratio is regressed on all property-specific variables, including the quality score and MSA dummies, as shown in Formula 5.5.

$$LTV = \alpha + \beta_1 \cdot Size + \beta_2 \cdot Age + \beta_3 \cdot HighRise + \beta_4 \cdot ValueAdd + \beta_5 \cdot Portfolio + \beta_6 \cdot CapRate + \beta_7 \cdot QScore + \beta_8 \cdot RECG + \beta_9 \cdot MSA + \varepsilon \quad (5.5)$$

It is expected that size will have a negative impact on the LTV ratio, as the absolute risk increases when deals are larger. It is easier to finance a $10 million office building with 90 percent leverage than it is to finance a $ 1 billion office tower. Age should demonstrate a negative relationship, as the risk is higher when buildings are old and lenders should therefore limit leverage with age. The variables HighRise and Portfolio are expected to demonstrate a positive correlation. High-rise buildings are more likely to be located in dense, more attractive areas, generating more liquidity and attracting more tenants. Portfolio deals benefit from cross-collateralization, which means that there is the benefit from diversification within the portfolio and, therefore, the lender could be expected to be more flexible on the terms. Value add is likely to have a positive impact on LTV, as most (re)developments are financed with short-term loans using more leverage.

All things being equal, cap rates should have a positive impact on leverage, as higher cap rates, given a certain quality, indicate a higher income with which to meet the interest rate payments. The quality (QScore) is the important element, as it should have a clear positive affect on the LTV ratio. High-quality building should be able to attract higher LTV ratios. Because the RECG showed no relationship with the spread and because it is a market indicator that covers the real estate part of the equation, it will be used in this first stage and not the second stage. The RECG reflects the value growth in the relevant office market over the past year and should have a positive impact, as higher value growth leads to more willingness to take risk, more competition, and therefore more availability of funding. The variable MSA is a control variable that controls for different levels of leverage per city.

The results are presented in the first columns of Table 5.3. It is notable that the youngest buildings have a lower leverage, which is the opposite of what was expected. This could be due to the fact that this category also includes new developments, which might require leverage to be somewhat lower. To control for this issue, a second model is introduced with an additional variable for all properties younger than five years and a value-add character. The results are displayed in the central columns. This new variable is significantly negative, meaning that new (re)developments are generally able to obtain less leverage. It is also notable that the relationship between age and leverage is normalized, albeit insignificant, with the highest leverage for the newer buildings and lower for the older ones. Size, the dummy variable Value Add, and the cap rate all show a significant relation with LTV and are all according to expectations. However, the most interesting variable is the QScore. This factor has a positive significant impact on leverage as projected. Properties with the highest quality scores are able to obtain over 6 percent more leverage than properties with the lowest quality. This difference might not be particularly high, but is still a substantial difference when trying to get the highest leverage possible.

The RECG variable also shows a positive significant relationship with leverage. It is clear that in times when the real estate market is booming, leverage levels also increase. For instance, when values increased by 10 percent last year, leverage increased by an average of 3 percent. This is a direct consequence of the increased competitiveness and the fact that lenders feel more confident that the market is moving in a safe direction. Finally, it is interesting to see that the average leverage is significantly higher in the cities of Atlanta (+ 14.6 percent) and Chicago (+ 8.8 percent). The adjusted R^2 is 22 percent, which is an indication that a substantial part of the variation is explained, although there is still plenty of room to improve. Data that could be helpful is the creditworthiness of the borrower, but unfortunately this is not available.

Table 5.3: Two Stage Least Squares (2SLS) regression results with LTV as dependent variable in the first stage and the interest rate spread over government bond rate with similar maturity as dependent variable in the second stage and the fitted LTV results from the first stage as one of the independent variables.

	Dependent variable:					
	Stage 1: LTV (1)		Stage 1: LTV (2)		Stage 2: Spread	
	Coefficient	*t-Statistic*	*Coefficient*	*t-Statistic*	*Coefficient*	*t-Statistic*
Constant	0.455***	(7.721)	0.432***	(7.376)	1.113***	(4.403)
Size	-0.028***	(-3.420)	-0.023***	(-2.897)		
Age ≤ 5	-0.032	(-1.180)	0.025	(0.793)		
5 < Age ≤ 15	0.014	(0.602)	0.015	(0.666)		
15 < Age ≤ 30	0.010	(0.434)	0.011	(0.479)		
Age≤5 * ValueAdd			-0.151***	(-3.437)		
HighRise	0.022	(0.961)	0.018	(0.822)		
ValueAdd	0.008	(0.411)	0.049**	(2.132)		
Portfolio	0.038	(1.205)	0.026	(0.830)		
CapRate	0.017**	(2.513)	0.018***	(2.664)		
QScore	0.080**	(2.396)	0.062*	(1.853)		
RECG	0.003***	(4.095)	0.003***	(4.428)		
MSA-ATL	0.142***	(3.020)	0.146***	(3.148)		
MSA-SF	0.036	(1.399)	0.041	(1.584)		
MSA-CHI	0.083***	(3.181)	0.088***	(3.384)		
MSA-LA	0.018	(0.552)	0.016	(0.483)		
PrePay					-0.129**	(-2.131)
Bank					-0.097*	(-1.854)
Maturity					-0.080***	(-7.881)
DSCR					-0.182***	(-6.627)
LTV-fitted					1.370***	(5.282)
SPI					-0.416	(-0.680)
VIX					0.007	(0.986)
VOL_10Y					1.069***	(3.725)
TS					0.057	(1.507)
CS					0.869***	(10.142)
PreCrisis					-0.324**	(-2.541)
Observations	419		419		378	
R^2	0.228		0.250		0.774	
Adjusted R^2	0.201		0.222		0.768	

Note: *Significant at the 10% level, **Significant at the 5% level, ***Significant at the 1% level.

In the second stage, the spread is regressed on the loan and market variables, as shown in Formula 5.6.

$$\begin{aligned} Spread = \; & \alpha + \gamma_1 \cdot PrePay + \gamma_2 \cdot Bank + \gamma_3 \cdot Maturity + \gamma_4 \cdot DSCR + \gamma_5 \cdot \widehat{LTV} \\ & + \delta_1 SPI + \delta_2 \cdot VIX + \delta_3 \cdot VOL10Y + \delta_4 \cdot TS + \delta_5 \cdot CS \\ & + \delta_6 \cdot PreCrisis + \varepsilon \end{aligned} \tag{5.6}$$

, where $\widehat{LTV}$ is the predicted LTV ratio calculated in the first stage. This new LTV should have a positive relationship with the spread. The results are shown in the last columns of Table 5.3. The adjusted R^2 is almost 77 percent, which clearly indicates that these variables explain most of the variation in the spread. The fitted LTV variable coefficient is positive and highly significant, given the t-statistic of over 5. Therefore, it can be concluded that spreads are influenced by the level of leverage and that lenders do price in the risk of leverage. Most of the other variables show similar coefficients as in the ordinary least squares regression model, which is a good sign. However, there are some exceptions. Based on the initial linear regressions, it seemed that the relation with SPI is positive, but this 2SLS regression model clearly shows that the relationship is negative, which is in line with what was expected. A strong equity market will result in lower spreads, although this relation is not significant. The VIX factor was significant in the linear model, but appears insignificant in the 2SLS regression. This effect seems to be compensated for by stronger results for the bond market volatility indicator and the term spread. Finally, the prepayment dummy is even more significant in the 2SLS regression model.

5.7 Conclusions

This chapter has sought to explain the relationship between leverage and the interest rate a borrower needs to pay on his real estate loan. The literature clearly shows that there is some connection, but also that this is very difficult to prove and that the main reason for this is the endogeneity of the LTV choice; leverage is set simultaneously with the interest rate and high-quality assets or borrowers are more likely to obtain high leverage and lower spreads. Therefore, the relationship is often shown to be weak or even negative, meaning that high leverage leads to low rates; this is counterintuitive given the substantial increase in risk linked to leverage. A 'naïve' approach using a simple regression model proved that leverage is positively correlated with spreads, though not significantly. Even when applying an additional dummy for high leverage loans or using LTV buckets, no significant relation was found.

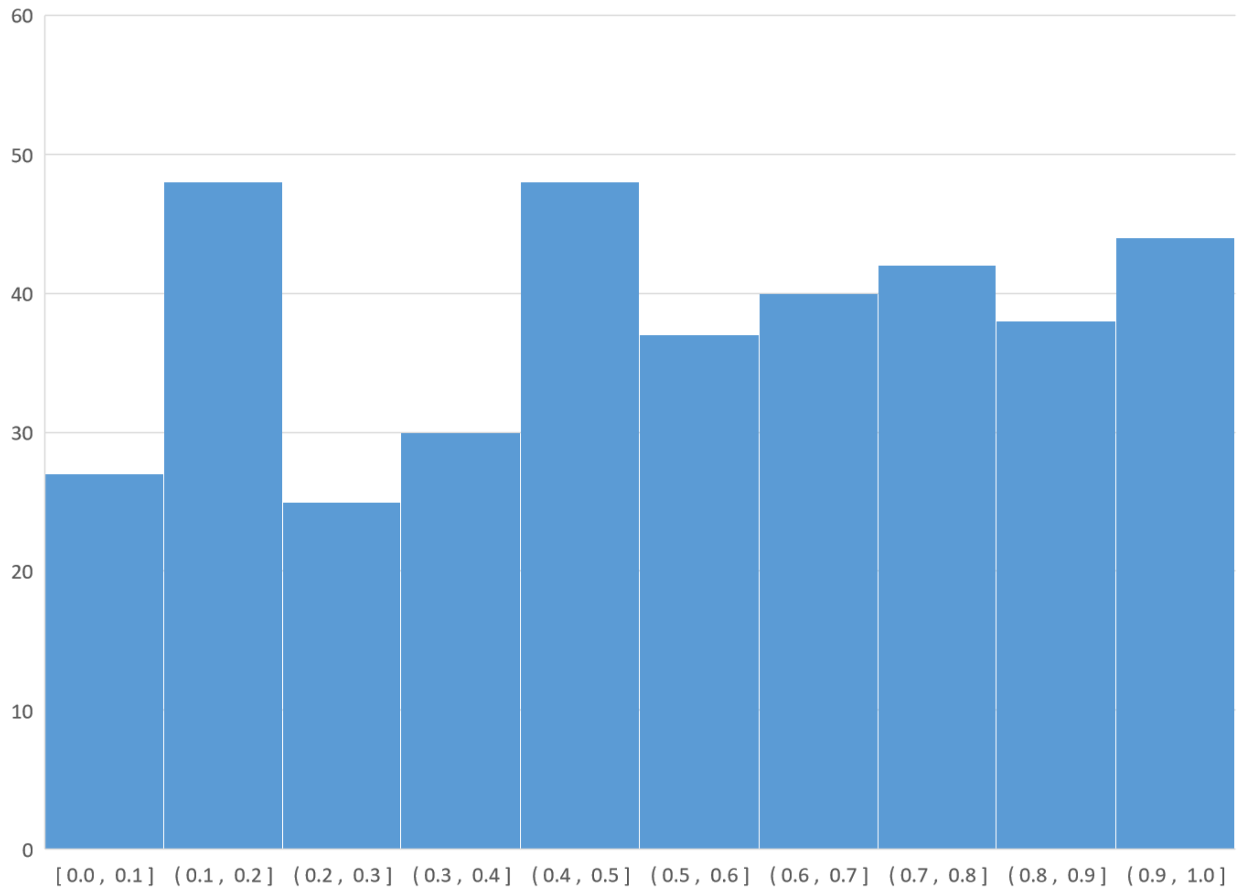
On the other hand, the regression showed a number of other variables to be very relevant, similar to the literature and to expectations. Size has a clear negative effect on spreads, which means that loans for larger office buildings have lower spreads. The maturity, debt service coverage ratio, prepayment, and loans originated by banks variables also showed a negative relation. Risky assets and (re)developments are mostly financed with short-term loans and therefore receive the highest spreads. Variables that demonstrated a positive influence on spreads were market risk indicators and the cap rate. Higher cap rates are more common for office buildings with either lower quality or a lower growth outlook, so it makes sense that these building get loans with a higher spread. The risk indicators are the volatility index for the equity market (VIX), the volatility of the bond market, and the credit spread. The higher the market risk, the more uncertainty the lender has and the higher the spread the lender requires. Equity and real estate market return, on the other hand, showed a lack of significance. Finally, spreads before the crisis were significantly lower than spreads after the crisis and the difference is as high as 35 basis points.

The problem with leverage is endogeneity; therefore, I used the instrumental variable method as suggested by several papers in the literature to be the most appropriate method. I used the quality of the underlying asset as an instrumental variable, as this metric was proven to be independent from the loan spread in the first regression analysis. This IV was then used to explain the amount of leverage obtained for the loan in this method. The analysis shows that the correlation is strong and positive, as higher-quality assets are generally more leveraged. It is also interesting that leverage is likely to increase in times when real estate values are growing. In the second stage of the two-stage least squares approach, the spread is then regressed on the estimated LTV and additional loan and market indicators. The results show that there is a strong relationship between leverage and the spread of a real estate loan, in addition to the other loan and market risk indicators that have already been found.

There are a number of suggestions for further research. First, it would be interesting to add variables measuring the quality of the borrower, as this could provide additional explanation to the amount of leverage and spread. It would also be interesting to further explore the endogenous relation by improving the information on the quality of the underlying property. The current quality indicator clearly has an impact, but there might be more to add. Finally, it would be interesting to analyze other property types and determine whether the relation is identical or different.

Appendix

Figure 5.A.1: Histogram of Q Score Local representing the quality of all office loans in New York, Chicago, San Francisco, Los Angeles and Atlanta. A Q Score of 1 is a property with the highest quality within the MSA (Source: RCA)



Chapter 6

Summary

The focus of this study is the non-listed real estate fund market. This market is a relatively new market, and a lack of data is one of the reasons why there is an insufficient amount of relevant academic literature. However, due to the enormous interest and investments by institutional investors over the last couple of years and the fact that a few industry bodies have created fund databases and indices and improved the standardization of reporting and performance measurement, transparency has improved; transparency is now good enough that the necessary additional academic literature can be written. This study covers a few of those topics that are relatively under-researched and should be useful for those who are involved with real estate investments.

6.1 Main conclusions

Institutional investors have been investing in real estate for centuries, but the interest in non-listed fund structures only really developed since the late nineties. The European non-listed real estate fund market has already developed to an industry with over €275 billion of assets, similar in size to the European listed real estate market. Due to the lack of history, this market is still in need of performance evaluation innovations.

One interesting angle is linking the performance to the Global Real Estate Sustainability Benchmark (GRESB), as discussed in Chapter 2. GRESB provides insights into how fund managers have set their sustainability policy and to what extend they have implemented and are measuring this policy. Besides sustainability, GRESB tells something about the governance and professionalism of these types of funds. The GRESB adoption process among INREV members has been analyzed, and the GRESB scores and sub scores have been tested as a means to enhance non-listed fund performance. As can be expected, large funds tend to adopt initiatives like GRESB first.

The interesting question, however, is whether this early adoption comes at a cost or with a benefit. Although a simple return comparison showed an above average return for early adopters, the return difference was zero if one controls for other fund characteristics. In other words, investors can learn from observing the adoption process of new rating processes, as large and strong performers tend to adopt sooner rather than later. In addition, lagged GRESB scores can be positively associated with higher fund returns. This result is important in a market in which information is harder to find. For instance, if fund leverage information is missing, the GRESB score premia are capable of incorporating these latent variations. Finally, it is important to emphasize that it cannot be concluded that a better sustainability score will lead to higher performance. To prove such a relationship requires longer time-series and more control variables. Nevertheless, a higher sustainability score appears to be a good indication of strong governance and the ability to deliver performance.

Chapter 3 tries to help investors by improving the transparency of the non-listed real estate investment fund market. The chapter focuses on the rather opaque world of private equity real estate fees. Whereas there is little finance literature about private equity fees, there is almost nothing about real estate fees. The importance of this topic has increased, as real estate returns are likely to be lower going forward, due to the very low interest rates, and hence fees will be a bigger portion of the gross return. Understanding fee structures will help investors understand alignment and negotiate fees, while it can help fund managers improve alignment.

The analysis is based on a unique investor's private equity real estate fund database containing ex-ante fee structures, as recorded in corresponding placing documents. Because non-listed fund structures are relatively standard, it is possible to model a typical fund, given a certain real estate market scenario. Based on the cash-flows of this fund, an IRR can be determined and therefore also the total fee load, which is a combination of management fees, performance fees, and one-off fees. If then multiple scenarios are simulated, it is possible to compute the distribution of the fee load. The average total fee load for a typical private equity real estate fund is shown to be 2.7 percent, of which almost

70 percent is management fees. The differences in management fees for the different styles are statistically insignificant, while Core and Value Add clearly charge lower performance fees compared to Opportunistic funds. According to expectation and in line with other financial studies, size matters. The impact is clear on the management fee, where larger funds charge substantially lower fees. Furthermore, it was shown that funds investing in industrial properties charge lower total fees, while retail focused funds tend to have lower performance fees. Funds investing in developing countries charge higher management fees. These are all signs that complexity translates into higher fees.

The three most important fee driving features are, however, commitment fees, catch-up clauses, and leverage. Paying commitment fees is rather common for higher risk closed-end fund, but it basically means that investors also pay for capital not yet invested. As a result, the average fee load increases by more than 45 basis points. Most funds charge performance fees after a certain hurdle. Above this hurdle, a catch-up clause, however, triggers an extra fee to compensate the fund manager also for the positive return below the hurdle, which is a charge that is more than 25 basis points per annum on average. In normal or somewhat more positive market scenarios, this effect can even be as high as 84 basis points. Private real estate fund investors should take this impact into consideration during negotiations, as it reduces the upside materially, while it doesn't limit any downside. The final fee-load-influencing feature is leverage. A 50 percent loan to value will, on average, lead to a 54 basis points higher fee load, but the impact even increases when markets are falling. For fund managers, it makes sense to use leverage, as it is an easy way to improve their profitability. For investors, however, it is important to understand this impact and limit the amount of leverage accordingly.

Funds requiring a lot of leverage often use mezzanine finance in combination with senior debt. As an investor, it is possible to invest in funds specializing in these forms of debt. Especially since the global financial crisis, a lot of non-listed real estate debt funds have been launched, partly because banks were and still are reluctant to (re-)finance all existing real estate loans. However, the problem most investors face is that they do not understand whether this type of investment is fixed income or real estate. The literature unfortunately does not help, as there is not much literature in this area.

Chapter 4 tries to answer the question of whether real estate debt should be viewed as real estate or fixed income. The method used for this analysis is simulation, which is very efficient when analyzing relative performance given a certain market scenario. Simulation demonstrates clearly that the risk of senior debt is very limited, as long as the senior tranche is below 70 percent of the capital stack of a reasonably diversified portfolio. The correlation with the underlying real estate portfolio is very low, and therefore it is safe to conclude that senior debt can be viewed as fixed income.

Mezzanine debt, the tranche senior to equity, but junior to any senior debt, has a rather different risk return profile. Correlations between mezzanine and the underlying real estate are substantial and somewhat higher than the correlation between mezzanine and the more junior equity, even though mezzanine is secured by equity. In addition, mezzanine typically provides a higher return and risk compared to the underlying real estate portfolio. The average return on equity is lower than the average return on mezzanine, whereas the median return is typically higher. This higher average return for mezzanine is caused by the severe impact of negative scenarios on the leveraged equity stake of the capital stack. In these scenarios, equity can be wiped out due to a fall in real estate values, and consequently, return on equity is very negative, while the mezzanine holder will take control of the equity position and will have the potential upside in case of a recovery. In scenarios when real estate risk is assumed to be higher or when the spread between the real estate yield and interest rate on the debt is assumed to be lower, these results will only be stronger.

Depending on the position of mezzanine in the capital stack, risk and return can be either lower or higher than the underlying real estate or the equity position. In the most extreme scenario, mezzanine can achieve a higher return than real estate, combined with a lower risk. This seems almost unrealistic, but this situation occurred after the financial crisis when there was hardly any liquidity and balance sheet valuations were extremely uncertain. The results of Chapter 4 imply that it would make sense to separate senior debt and the more junior debt, like mezzanine, into two distinct products when valuing or structuring real estate debt securities. Senior real estate debt should then be valued by or marketed to the investor's fixed income team, whereas mezzanine should be valued by or marketed to the real estate teams. Any product that combines these two forms of debt will be difficult to place in an investor's portfolio due to the way most portfolios are built up. In addition, both senior as well as mezzanine debt could be very attractive to investors. Senior should be able to deliver a very solid fixed income stream, as long as the amount of senior debt doesn't exceed 70 percent of the capital stack and the real estate portfolio is somewhat diversified. Mezzanine debt, on the other hand, could even provide a better risk return profile than the underlying real estate portfolio, depending on the risk of the real estate portfolio and the position of the mezzanine in the capital stack.

One of the important assumptions when analyzing capital stacks or leveraged structures is the fact that interest rates rise when leverage increases. Even though this relationship seems so trivial, the literature has difficulty proving this relation. Chapter 5 focuses on this problem and demonstrates that the relationship is very clear as long as one adjusts for the quality of the underlying real estate. The real estate finance literature is very clear that the main reason for the difficulty of proving the relationship is the endogeneity of the LTV choice; leverage is set simultaneously with the interest rate depending on the quality of the underlying assets. High-quality real estate or borrowers are more likely to obtain high leverage and lower spreads. As a result, the relationship is sometimes even shown to be negative, implying that high leverage leads to low rates, which is counterintuitive.

The analysis in Chapter 5 examines the relationship between real estate loan rates and the amount of leverage, by applying two changes compared to the literature. As differences between property types are substantial, it is better to focus on one property type, in this case, offices. Furthermore, to cope with the endogeneity of the LTV choice, a measure of quality of the underlying real estate is added to the analysis.

First, a simple regression is done to explain the real estate loan spreads, the interest rate on the loan minus the risk-free rate with similar duration. The regression demonstrates that spreads are dependent on a few property related characteristics (size and cap rate), but predominantly loan and market specific indicators. It is interesting that size is important in explaining spreads, as size was already shown to be an important driver in explaining returns and fees. So, larger real estate funds charge lower fees, while the performance is higher, which might be (partly) explained by the fact that larger funds can get cheaper financing. For real estate investors, size should therefore be one of the key factors when selecting funds. According to the literature, the quality of the relevant real estate is the factor that is usually missing in the equation to explain spreads. However, in the initial simple regression model, quality does not explain spreads, which is again likely a result of the endogeneity of the leverage choice.

Loan indicators that appeared to influence spreads are maturity, debt service coverage ratio, prepayment, and loans originated by banks. Leverage, however, did not appear to be significant, although it was positively correlated with spreads. Market indicators that are important to explain the relationship are the volatility index for the equity market (VIX), the volatility of the bond market, and the credit spread. All these risk factors have a positive influence; the higher the market risk, the higher the spread the lender requires. Lastly, spreads in the years before the global financial crisis, predominantly in '05 and '06, appear to have been significantly lower (35 basis points) than after the crisis, a clear sign that real estate lending before the global financial crisis was too relaxed.

By using an instrumental variable method, applying a two-stage least squares regression analysis, it is possible to cope with endogeneity. The first stage in this process is estimating the amount of leverage, given certain property characteristics and the quality of the property. In this stage, quality is shown to be an important and positive factor. In the second stage, the spread is regressed on the estimated loan to value and additional loan and market indicators. Besides the already proven relationships in the naïve approach, the most important finding was that this estimated amount of leverage was highly significant. This clearly confirms that leverage is set simultaneously with the interest rates, depending on the quality of the underlying real estate.

6.2 Further research

Investing in non-listed real estate funds is still an under-researched topic and still copes with a lack of transparency. Nevertheless, many initiatives to improve transparency have been taken, and several databases have been set up and are expanding rapidly. This dissertation covers some aspects of the topic, but more research is required.

The second chapter analyzed the relationship between the managers' sustainability efforts and the return of the vehicle. The correlation was positive, but time series are unfortunately still too short to test causality. It is, for instance, possible that better performing funds are better able to join GRESB, which explains the positive correlation. It is therefore important to update the analysis in a few years, once the time series is long enough to test this causality. Another, somewhat easier, extension to this research would be to expand the dataset to include REITs and other parts of the world.

The third chapter calculated and analyzed the average fee load of non-listed real estate funds. This topic is important, due to the huge lack of transparency, while the impact on net returns can be substantial. The main issue here is that the total fee load does not tell the full story, as fund expenses and other costs are excluded from this research. The reason for this exclusion is that these costs are not well documented in placing documents. More transparency is needed to include these costs and to determine and analyze the total expense ratio. Moreover, placing documents hold fee structures before negotiations, and hence (larger) investors, in reality, will have lower fee loads due to negotiations. It would be useful to analyze the impact of negotiations and see which investors are best positioned to achieve fee discounts.

Finally, further research should be done on actual return data to analyze these fee structures. This research used simulation to analyze fee loads under different market scenarios, as there is not enough data available to perform such an analysis on realized fund returns. With the expanding fund databases, it is a matter of time before sufficient data is available to perform such an analysis. Due to the low interest rate and return environment, fee structures will be a prominent topic on investors' agendas, and it is clear that more research is desirable.

The fourth chapter analyzed investing in real estate debt using a Monte Carlo simulation model. Again, it would be useful to verify the results using actual return data on senior and mezzanine debt in combination with the underlying real estate portfolio returns. The problem, however, is that there is hardly any structural and consistent evidence or data on the performance of mezzanine. There is some data on real estate senior debt returns, covered by the CMBS market. Further research could focus on finding actual performance data and testing the findings in this study. Especially for mezzanine debt, further testing is important, as this debt is clearly impacted by both fixed income as well as real estate fundamentals. Another element that could improve the current methodology is a more refined way to deal with defaults or testing different real-life default scenarios. In this study, the trigger to default was rather strict, depending on valuations, but in reality, there are different triggers and there is sometimes more flexibility at times of stress. It would be good to analyze the impact of different default scenarios on the results.

The final chapter researched the relationship between the amount of leverage and the interest rate of the real estate loan. It would be interesting to add variables measuring the quality of the borrower, as this could provide additional explanation to the amount of leverage and spread. It would also be interesting to further explore the endogenous relation by improving the information on the quality of the underlying property. The current quality indicator clearly has an impact, but there might be more to add or other factors to include. Finally, it would be interesting to analyze other property types or other countries and determine whether the relation is identical.

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Maarten van der Spek, born July 23rd 1976 in Amsterdam, studied business econometrics at the Vrije Universiteit of Amsterdam. After graduating in 1999, Maarten started working for ING Vastgoed, the real estate investment arm of ING. After graduating from the postgraduate course for Certified Financial and Investment Analyst (CEFA title), he became responsible for advising institutional clients within the research team of ING Real Estate Investment Management. In 2005 Maarten was appointed Managing Director of Research & Strategy Continental Europe within ING REIM. In 2009 Maarten joined PGGM Investments as strategist for the Private Real Estate team, responsible for the strategy of the private real estate portfolio. In this period, he was able to do all of the research necessary for this dissertation. His academic research has been published in the following international journals: *Journal of Real Estate Portfolio Management, ABACUS* and the *Journal of Real Estate Research*. Since August 2016 he started working for ADIA as a senior Strategist within the Strategy Unit.

Maarten van der Spek, geboren op 23 juli 1976 te Amsterdam, studeerde bedrijfseconometrie aan de Vrije Universiteit in Amsterdam. Na het behalen van het doctoraatdiploma in 1999 begon hij zijn loopbaan bij ING Vastgoed als kwantitatief analist. Na het behalen van de postdoctorale opleiding voor Financieel- en Beleggingsanalist in 2001, werd hij binnen ING Real Estate Investment Management verantwoordelijk voor het adviseren van de institutionele klanten vanuit zijn research rol. In 2005 werd hij verantwoordelijk voor de Research & Strategy afdeling voor Continentaal Europa. In 2009 ging Maarten werken voor PGGM Investments als vastgoedstrateeg, verantwoordelijk voor de strategie van de private vastgoedportefeuille. In deze periode bij PGGM heeft hij al het onderzoek gedaan voor zijn promotie. Zijn academisch onderzoek is inmiddels gepubliceerd in de volgende internationale vakbladen: *Journal of Real Estate Portfolio Management*, *ABACUS* en de *Journal of Real Estate Research*. Vanaf augustus 2016 is hij begonnen als senior strateeg voor ADIA binnen de afdeling Strategy.