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Cognitive and Emotional Bias in Real Estate Investment

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THÈSE DE DOCTORAT

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Cognitive and Emotional Bias in Real Estate Investment

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le 24 octobre 2018

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Résumé

L'objectif principal de cette thèse est d'analyser comment les biais cognitifs et émotionnels affectent les décisions des investisseurs lorsqu'ils achètent ou vendent des immeubles de bureaux. Pour atteindre cet objectif, cette recherche adopte, dans un premier temps, une démarche qualitative. Les entretiens semi-structurés permettent de détecter et d'analyser les biais les plus importants qui apparaissent au cours de la transaction. Parmi les différents biais décelés « l'oubli de la fréquence de base » a été sélectionné. Ce biais peut apparaître avant l'acquisition lorsque les investisseurs évaluent la performance attendue d'un immeuble. Une analyse quantitative suit pour développer une échelle qui mesure l'effet du biais. Les résultats ont montré que l'incertitude conduit certains investisseurs à supposer que le rendement qu'ils obtiendront à la fin de leur investissement sera égal à celui du rendement initial. En d'autres termes, certains investisseurs estiment que les conditions du marché resteront les mêmes qu'aujourd'hui.

Mots clés : Biais Cognitifs, Biais Emotionnels, Investissement Immobilier, Recherche Qualitative, Recherche Quantitative, Biais d'Oubli de la Fréquence de Base, Echelle de Mesure

Abstract

The main objective of this thesis is to analyse how cognitive and emotional biases affect investor decisions when buying or selling office buildings. To meet this aim, this research embarks on a qualitative research. Semi-structured interviews permit to detect and analyse the most important biases that appear in the transactions. Among the different biases discovered, the "base-rate fallacy" was selected. This bias may appear before the acquisition when investors evaluate the expected performance of a building. A quantitative analysis follows to develop a scale that tries to measure the effect of the bias. The results showed that uncertainty leads some investors to assume that the yield they will obtain at the end of their investment will be equal to that of the initial yield. In other words, some investors believe that market conditions will remain the same as today.

Keywords: Cognitive Bias, Emotional Bias, Real Estate Investment, Qualitative Research, Quantitative Research, Base-Rate Fallacy, Scale of Measurement

*«Il n'y a pas de maîtrise à
la fois plus grande et plus
humble que celle que l'on
exerce sur soi. »
Léonard de Vinci*

*"One can have no smaller
or greater mastery than
mastery of oneself."
Leonard da Vinci*

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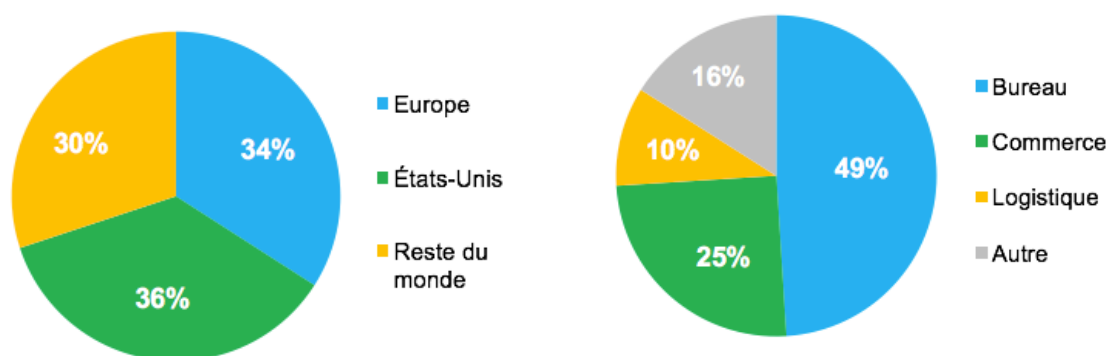
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Introduction

Le Marché des Bureaux : Chiffres Clés

Les marchés immobiliers européens sont importants et diversifiés. La taille totale des immeubles européens, détenus par les investisseurs institutionnels, est estimée à environ 2,2 billions d'euros à fin 2015, selon le MSCI. Ce chiffre est à peu près équivalent à celui de la taille du marché américain. Le marché européen est également très liquide. Au cours des dix 10 dernières années, les transactions immobilières européennes ont représenté en moyenne 34 % du chiffre d'affaires mondial, selon MSCI. Cela signifie que l'Europe offre un large éventail de possibilités, à la fois en termes de marché et de types de biens.



(a) Taille du Marché Immobilier Mondial

(b) Volumes Européens d'Investissement Commercial

Figure 1 – L'Europe est un grand marché où le bureau est le secteur le plus important

En Europe, les bureaux représentent le secteur le plus important et représentent plus de 40 % du marché immobilier européen, selon MSCI. Les actifs de bureaux sont également le type d'immobilier le plus vendu en Europe, avec 49 %¹²³. Le volume d'investissement moyen des bureaux au cours de cette période était de 776 milliards d'euros. Ce chiffre équivaut presque au niveau du PIB produit aux Pays-Bas en 2016, soit 697 milliards d'euros⁴. On peut donc affirmer que, globalement, les bureaux européens sont relativement liquides du point de vue de l'investisseur immobilier.

Le volume d'investissement notable sur les principaux marchés immobiliers européens en 2016 coïncide avec les rendements de bureau prime à des niveaux historiquement bas. Le

¹Source: Real Capital Analytics

²Les 49 % représentent le pourcentage de la moyenne du volume d'investissements de bureaux entre 2007 et 2016 par rapport à l'investissement immobilier total

³Comprend les transactions résidentielles mais exclut les transactions foncières

⁴Source: Eurostat

niveau bas des rendements des obligations d'État à 10 ans explique l'écart de rendement obtenu en 2016. Le Spread s'obtient avec la différence entre le taux de rendement prime des bureaux (2016) d'un marché et le taux de rendement des obligations d'État à 10 ans (2016).

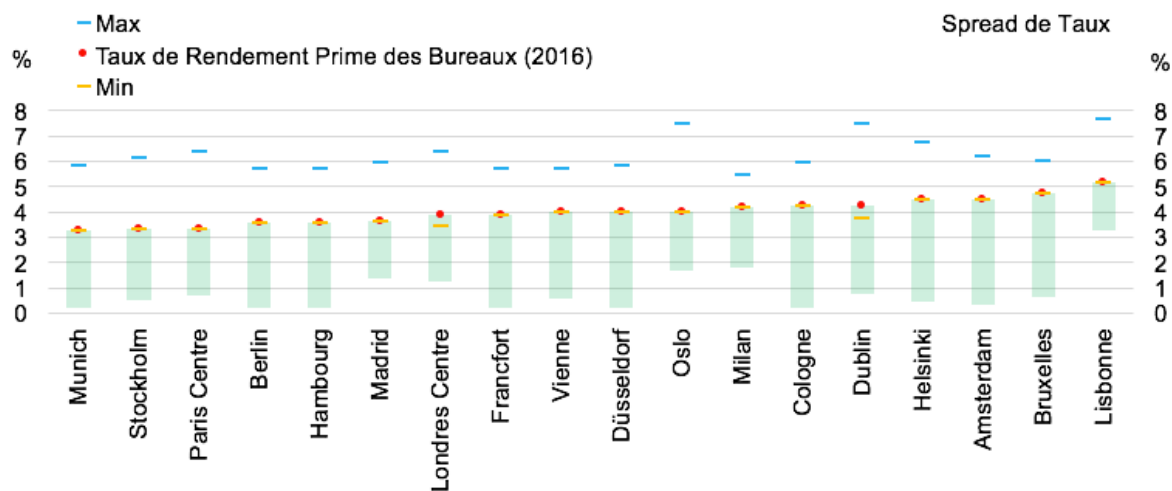


Figure 2 – Prime Office Yield and Spread vs: Bond Yields

Cette perspective permet de comprendre l'importance du secteur des bureaux dans l'immobilier commercial européen. Outre les chiffres, l'immobilier commercial repose sur les décisions d'investisseurs institutionnels qui recherchent un investissement sécurisé axé sur le revenu, complété par une possibilité d'appréciation du capital.

Questions Générales de Recherche

Comprendre la manière dont les investisseurs émettent des jugements, prennent des décisions et se comportent face aux aléas de l'investissement est essentiel pour évaluer les risques. Au cours du processus d'évaluation des risques, les investisseurs se concentrent sur les informations disponibles, qui peuvent parfois être très variées et de qualité diverse ; particulièrement lorsque les investisseurs prévoient d'acheter un immeuble de bureaux pour effectuer des détentions à long terme. Le revenu locatif et la croissance du capital attendus dépendent des conditions à priori inconnues du marché, ce qui accroît la complexité des décisions d'investissement.

Pour faire face aux risques et à l'incertitude, les investisseurs développent leurs propres modèles dérivés des raccourcis mentaux (également appelés schémas mentaux ou règles générales). Ces raccourcis sont construits au fil des années d'expérience de travail

dans leur propre domaine spécifique (voir Hardin, 1999). Ils sont utiles pour prendre des décisions plus rapidement et plus facilement. Ils fonctionnent aussi dans certaines circonstances pour atteindre leurs objectifs (voir Baron, 2007, p.5). Cependant, les schémas mentaux s'éloignent régulièrement des modèles normatifs, considérés par la majorité comme une norme rationnelle idéale. Le consensus considère les schémas mentaux éloignés des modèles normatifs comme des jugements médiocres. De ce fait, incompatibles avec une norme idéale, ils sont considérés comme des **biais**. Malgré les raisons qui ont amené certaines personnes à développer leurs propres schémas mentaux, les modèles normatifs considèrent que des jugements médiocres entraînent de mauvaises décisions et de mauvais comportements. Cela ne permet pas aux individus d'atteindre leurs objectifs. Ou alors, même si ces derniers sont atteints avec des schémas mentaux éloignés d'une norme idéale, le consensus considère que ces objectifs pourraient être atteints plus efficacement lorsqu'ils sont alignés sur des modèles normatifs.

Cette thèse observe comment les investisseurs immobiliers émettent des jugements, prennent des décisions et se comportent lorsqu'ils investissent dans un immeuble de bureaux. L'objectif est d'étudier les raisons qui conduisent les praticiens de l'immobilier à faire preuve de partialité. Pour ce faire, cette recherche va tenter de répondre à trois questions principales. La première question, *comment les investisseurs immobiliers font-ils des biais ?* Comme il est décrit dans les chapitres 3 et 4, de nombreux professionnels de l'immobilier sont impliqués dans chaque transaction. Chaque praticien a différents niveaux d'information et de jugement. Cette thèse suppose qu'à chaque fois qu'ils échangent des informations, il se produit un ajustement du processus qui amènera les investisseurs, selon le cas, à décider d'acheter, de détenir ou de vendre un immeuble de bureaux. L'échange d'informations ne pose aucun problème. En effet, il faut être informé avant de prendre des décisions d'investissement. Le problème se pose dans la manière dont ces informations sont présentées. Par exemple, un professionnel de l'immobilier signale un excès d'informations positives sur un marché et omet certains risques pertinents, pour n'importe quelle raison. L'excès d'informations positives affecte les jugements des investisseurs car ils peuvent sous-estimer le risque d'investir sur ce marché.

Lors de cet échange d'informations, les investisseurs commentent les hypothèses déterministes qu'ils utilisent pour déterminer la performance d'un actif immobilier. Pour estimer la performance d'un immeuble, la plupart des investisseurs utilisent le Taux de Rendement Interne (TRI). Dans ce modèle, les investisseurs doivent tenir compte d'un prix d'acquisition, des flux de trésorerie attendus et du prix de revente du bien à la fin de leur plan d'affaires. Le problème avec l'analyse TRI est qu'elle est réalisée sous des hypothèses déterministes. Tout résultat inattendu est susceptible d'apparaître pendant la période de

détention. Plus la période de détention est longue, plus la gamme de valeurs possibles pour le prix de revente théorique sera large. L'impossibilité d'estimer avec précision le prix de revente oblige certains investisseurs à suivre la règle suivante : ils supposent que le rendement de leur investissement sera égal au rendement initial. Cette règle générale conduit les investisseurs au biais de l'**oubli de la fréquence de base**⁵. Analyser ce biais dans l'immobilier est l'objectif principal de cette thèse, et la deuxième question de cette recherche : *pourquoi les investisseurs immobiliers font-ils le biais de l'oubli de la fréquence de base ?*

Le problème avec le biais de l'oubli de la fréquence de base est qu'il résulte d'un schéma psychologique. Ce schéma intervient dans l'esprit des investisseurs immobiliers. L'impossibilité d'observer ce qui se passe dans l'esprit des individus, lorsqu'ils évaluent un prix de revente théorique d'un bien immobilier, conduit à la troisième question, *quels aspects conduisent les investisseurs au biais de l'oubli de la fréquence de base ?* Connaître la relation entre les différents aspects nous aidera à comprendre comment les investisseurs pensent quand ils font face à ce problème et comment ils ont tendance à biaiser.

Objectifs de Recherche

Cette thèse est divisée en deux parties. La partie **I** couvre différents concepts de performance et de risque de la théorie de l'investissement immobilier. Les concepts décrits dans les chapitres **1** et **2** sont des modèles normatifs utilisés par les professionnels de l'immobilier pour prendre des décisions d'investissement et pour évaluer la valeur d'un bien immobilier. Le chapitre **1** présente les composantes du *rendement global de l'immobilier*, les notions de la *prime de risque immobilier*, la *Valeur Actuelle Nette* (VAN) et le *Taux de Rentabilité Interne* (TRI). Ce chapitre comprend également deux cas d'étude qui expliquent comment les investisseurs calculent le TRI d'un immeuble de bureaux et d'une propriété résidentielle.

Le chapitre **2** souligne la différence entre la prime de risque historique et la prime de risque attendue. Le premier cas d'étude analyse la *prime de risque historique* sur le marché des bureaux à Londres. Cette prime historique est définie comme la différence entre le rendement global de bureau (% en glissement annuel) et le rendement d'un actif sans risque (le rendement du Gilt Britannique à 10 ans (% de fin d'année)). La prime de risque historique a changé au fil du temps. Deux approches ont été utilisées

⁵Pour plus d'informations, voir les pages [177](#), [227](#) et suivantes, et le chapitre [5](#)

pour identifier les variables qui ont causé les changements de cette prime de risque. La première approche, (1) Le modèle économique, considère que les variations de la prime ont été provoquées par certaines variables économiques, financières et immobilières. (2) Le modèle financier considère que les variations de la prime ont été provoquées par des variables proxy des composantes du rendement global immobilier, le rendement locatif et de la croissance du capital. Le deuxième cas d'étude de ce chapitre définit la *prime de risque attendue sur immobilier* comme la différence entre le rendement cible (ou le taux de rendement minimal) des investisseurs et le rendement de l'actif sans risque. La prime de risque attendue sur l'immobilier est estimée en fonction du risque pays et des risques immobiliers. Le taux sans risque est ajouté à la prime de risque sur l'immobilier attendue pour former une moyenne du taux cible (ou requis) du rendement des investisseurs. Ensuite, ce rendement requis est comparé aux prévisions du marché pour déterminer quels marchés sont investissables ou non.

La prime de risque historique et la prime de risque sur l'immobilier peuvent être évaluées à l'aide de modèles économétriques plus sophistiqués⁶, bien que cela dépasse le cadre de cette étude. L'objectif de ce chapitre est de décrire les deux concepts et de fournir deux études de cas pour en faciliter la compréhension.

Les chapitres 1 et 2 constituent la première partie de cette thèse. La partie I décrit certains modèles normatifs qui définissent les règles théoriques que les praticiens immobiliers doivent suivre. La partie II décrit les pratiques sous-optimales suivies par les professionnels de l'immobilier lorsqu'ils investissent dans l'immobilier commercial. Le chapitre 3 analyse les *biais cognitifs* et *émotionnels* qui peuvent affecter les décisions des investisseurs lors de l'achat ou de la vente d'immeubles de bureaux. Pour atteindre cet objectif, le chapitre commence par présenter et classer les différents biais. Ensuite, il explique la méthodologie utilisée pour réaliser une recherche qualitative. La méthodologie est développée en sept étapes : (1) Thématisation, (2) Conception, (3) Entretiens, (4) Transcription, (5) Analyse, (6) Vérification et (7) Reporting. La dernière étape est traitée dans le chapitre 4. Ce chapitre décrit les principaux biais qui affectent les investisseurs lors de l'achat, de la détention ou de la vente d'immeubles de bureaux. La description des biais est faite à partir de deux perspectives. Une *analyse générale* décrit les biais causés par (1) l'interaction de différents professionnels de l'immobilier, également (2) la manière dont ils déterminent la valeur d'un immeuble de bureaux, et (3) les décisions d'investissement de ne pas investir, d'acheter, de détenir ou de vendre des actifs commerciaux. L'autre perspective est plus *spécifique* car elle décrit les biais les plus importants qui risquent d'apparaître au cours des différentes étapes d'une transaction d'investissement sur le

⁶Voir, par exemple, Naranjo and Ling (1997)

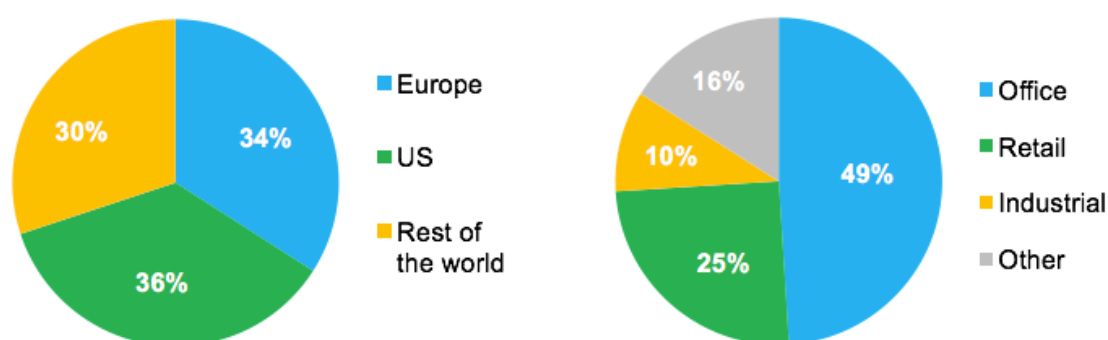
marché : la due diligence initiale, l'offre finale, la due diligence détaillée, la fermeture de la transaction, et la durée de détention.

Enfin, le chapitre 5 se concentre sur le biais de **l'oubli de la fréquence de base**. Il examine la validité de ce schéma psychologique qui mène les praticiens de l'immobilier vers ce biais. La validité de ce schéma est vérifiée avec une recherche quantitative qui développe une échelle pour le mesurer. Différents groupes de variables latentes forment des aspects représentant le biais de l'oubli de la fréquence de base. La relation entre les aspects considérés permet de mieux comprendre la façon dont les professionnels de l'immobilier réfléchissent lorsqu'ils évaluent le futur prix de revente d'un investissement immobilier ; Elle permet également d'expliquer leur tendance vers ce biais.

Introduction

The Office Market: Key Figures

European property markets are sizeable and diverse. The total size of European institutional-quality property is around €2.2 trillion at the end of 2015, according to the MSCI. This figure is roughly equivalent to the size of the US market. The European market is also very liquid. As a matter of fact, over the last 10 years, European real estate transactions average 34 % of global turnover, according to MSCI. This means that Europe provides a large set of opportunities, both in terms of market and property types.



(a) Size of the Global Property Market (b) European Commercial Investment Volumes

Figure 3 – Europe is a large market where office is the largest sector

In Europe, office is the largest sector and makes up more than 40 % of the institutional-quality European real estate market, according to MSCI. Office assets are also the most transacted type of real estate in Europe, with 49 %⁷⁸⁹. The average office investment volume within this period was €776 billion. This figure is almost equivalent to the level of GDP produced in the Netherlands in 2016, €697 billion¹⁰. As a result, it can be argued that, overall, European offices are relatively liquid from the perspective of the real estate investor.

The notable investment volume in the main European property markets in 2016 concurred with Prime Office yields at historical lows. The lower level of 10-year Government Bond Yields explained the high Yield Spread in 2016. The Spread is obtained with the difference between the Prime Office Yield (2016) of a market versus the 10-year Government Bond Yield (2016).

⁷Source: Real Capital Analytics

⁸The 49 % is obtained taking the average of the office investment volume between 2007 and 2016, and then divided respect to the total property investment

⁹It includes residential but excludes land transactions

¹⁰Source: Eurostat

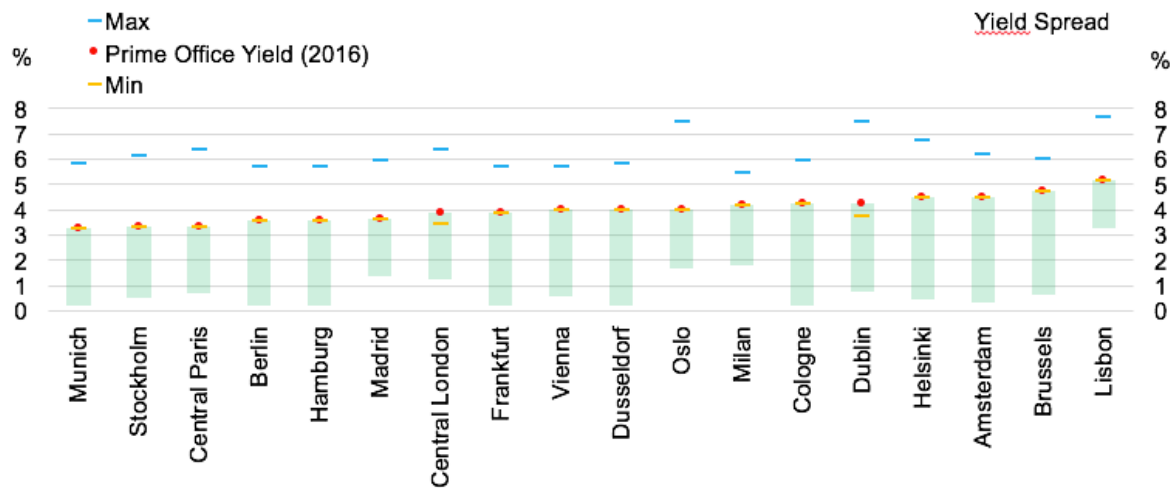


Figure 4 – Prime Office Yield and Spread vs: Bond Yields

This perspective helps to understand the importance of the office sector in the European Commercial Property. Aside numbers, commercial property is driven by decisions of institutional investors that look for a secured income-oriented investment, supplemented with the opportunity for capital appreciation.

General Research Questions

Understanding the way investors make judgments, take decisions, and behave in the face of the hazards of investment is crucial to evaluate risk. During the process of risk assessment, investors focus on the information available, which can sometimes be quite extensive and of diverse quality; specially when investors plan to buy an office building to do a long-term holds. The expected property income return and capital growth depend on unknown future market conditions, and this increases the complexity to make investment decisions.

To deal with risk and uncertainty, investors develop their own models that derive from mental shortcuts (also known as mental schemas or rules-of-thumb). Shortcuts are build up through years of experience working in their own specific domain (see Hardin, 1999). Their are helpful to make decisions more rapidly and with ease. They also work in some circumstances to achieve their goals (see Baron, 2007, p.5). However, regularly mental schemas distance from normative models, which are considered by the majority as an ideal rational standard. The consensus considers mental schemas that distance from normative models as poor judgments. And so, they are considered as **biases** because they are discrepant to an ideal standard. Despite the reason(s) that lead some individuals to

develop their own mental schemas, normative models consider that poor judgments result in poor decisions and behaviours. This unable individuals to achieve their goals. Or even when they attain their goals with mental schemas that distance from an ideal standard, the consensus considers that those goals could be accomplished more effectively when they are aligned with normative models.

This thesis observes how real estate investors make judgments, take decisions, and behave when they invest in an office building. The goal is to study the reasons that lead real estate practitioners to bias. To this aim, this research is going to answer three main questions. The first question, *how real estate investors bias?* As it is described in chapters 3 and 4, there are many real estate practitioners involved in each building transaction. Each practitioner has different levels of information and judgments. This thesis presumes that each time they exchange information there is an adjustment in the process that will lead investors to decide to buy, hold or sell an office building. There is no issue in exchanging information. Indeed, it's necessary to be informed before taking investment decisions. The problem arises in the way that information is presented. For example, a real estate practitioner reports an excess of positive information about a market and omits some relevant risks, for any reason. The excess of positive information affects investors' judgments as they may underestimate the risk of investing in that market.

In that exchange of information, investors comment on the deterministic assumptions they use to determine the performance of a property asset. To estimate the performance of a building most investors use the Internal Rate of Return (IRR). In this model, investors need to consider an acquisition price, the expected cash flows and the resale price of the property at the end of their business plan. The problem with the IRR analysis is that it's carried out under deterministic assumptions. Any unexpected outcome is likely to appear during the holding period. The longer the holding period is, the broader range of possible values the theoretical selling price will take. The impossibility to accurately estimate the resale price make some investors use the following rule-of-thumb: they assume the exit yield of their investment will equal the initial yield. This rule-of-thumb leads investors to the **base-rate fallacy bias**¹¹. To analyse this bias in real estate is the principal goal of this thesis, and the second question of this research: *why real estate investors do the base-rate fallacy bias?*

The issue about the base-rate fallacy bias is that it is a result of a psychological schema. This schema happens in the mind of property investors. The impossibility to observe what happens in individuals mind, when they assess a theoretical resale price of a property,

¹¹For more information, see pages 177, 227 and following, and Chapter 5

leads to the third question, *which aspects lead investors to the base-rate fallacy?*. Knowing the relationship between different aspects will help us to understand how investors think when they face this problem, and how they tend to bias.

Research Objectives

This thesis is divided into two parts. Part I covers various concepts of performance and risk of the property investment theory. The concepts described in chapters 1 and 2 are some normative models used by real estate practitioners to make investment decisions, and also to appraise the value of a property. Chapter 1 introduces the components of the *Property Total Return*, the notions of the *Property Risk Premium*, the *Net Present Value* (NPV), and the *Internal Rate of Return* (IRR). This chapter also includes two case studies that explain how investors calculate the IRR of an office building and a residential property.

Chapter 2 stresses the difference between the historical vs. the expected property risk premium. The first case study analyses the *historical property risk premium* in the London office market. This historical premium is defined as the difference between the Office Total Return (YoY %) and the return of a riskless asset (i.e. the 10-year UK Gilt yield (% End of Year)). The historical property risk premium has changed over time. Two approaches are used to unravel variables that caused changes in the historical property premium. The first approach, (1) The Economic model, considers that changes in the premium were caused by some economic, financial and property variables. The other approach, (2) the Financial model, considers that changes in the premium were caused by proxies of the main components of the property total return, the income return and the capital growth. The second case study of this chapter defines the *expected property risk premium* as the difference between investors' target return (or hurdle rate) and a riskless asset return. The expected property premium is estimated with country risk and property risks. A risk-free rate is added to the expected property premium to form an average of investors' target rate (or required) of return. Then, the required return is compared to market forecasts to see which markets are investable or not.

Both the historical and expected property risk premium can be appraised with more sophisticated econometric models¹², although this goes beyond the scope of this study. The goal of this chapter is to describe the two concepts and provide two case studies to

¹²See, for example, Naranjo and Ling (1997)

make them easier to understand.

Chapters 1 and 2 form the first part of this thesis. Part I describes some normative models that set the theoretical rules real estate practitioners should follow. Part II describes sub-optimal practices followed by real estate practitioners when they invest in commercial properties. Chapter 3 analyses the *cognitive* and *emotional biases* that can affect investors decisions when buying or selling office buildings. To meet this aim, the chapter starts by introducing and classifying different biases. Then it explains the methodology used to carry out a qualitative research. The methodology is developed in seven stages: (1) Thematizing, (2) Designing, (3) Interviewing, (4) Transcribing, (5) Analyzing, (6) Verifying, and (7) Reporting. The last stage is covered in chapter 4. This chapter describes the most important biases that affect investors when buying, holding or selling office buildings. The description of biases is made from two perspectives. A *general analysis* describes biases caused by (1) the interaction of different real estate practitioners, also by (2) the way they determine the value of an office building, and (3) the investment decisions of not investing, buying, holding, and selling commercial properties. The other perspective is more *specific* as it describes the most important biases that risk to appear across the different stages of any on-market investment transaction: the initial due diligence, final bid, detailed due diligence, closing the transaction, and investment hold.

Finally, chapter 5 focuses on the **base-rate fallacy**. It examines the validity of this psychological schema that leads real estate practitioners to this bias. The validity of this schema is carry out with a quantitative research which develops a scale to measure it. Different groups of latent variables form aspects that represent the base-rate fallacy. The relationship between the aspects considered not only helps to understand the way real estate practitioners think when they assess the future resale price of a property investment; They are also helpful to explain their tendency to this bias.

Part I

**Property Investment Theory.
Understanding the Grounds of How
Investors Think, Decide, and Behave**

CHAPTER 1

Some Important Facts about Property Investment

Investing in real estate is complex as many economic, finance, and property-specific variables need to be considered before making any investment decision. This chapter covers the most important facts and concepts used by investors to make investment decisions. These include the components of the Property Total Return, the notions of the Risk Premium, the Net Present Value (NPV), and the Internal Rate of Return (IRR). Besides, this chapter also includes two case studies to show how investors calculate the IRR of an office building and a residential property. Investors use these concepts of performance and risk to decide the price they have pay for investing in property.

Keywords. Real Estate Investment, Total Return, Risk Premium, Net Present Value, and Internal Rate of Return

1.1 Main concepts in the Commercial Investment Market

1.1.1 The Components of the Total Return

The total return (TR) is the most important performance measure used in any investment. It is the rate of return generated by an investment during a period of time (i.e. daily, monthly, yearly). The total return, or yield, encloses two different types of return: the income and capital growth:

$$TR_t = IR_t + CR_t \quad (1.1)$$

Where:

- The *Income Return*, IR_t , is the net income received in year t, divided by the asset value at the beginning of the year t
- The *Capital Return*, CR_t , is the increase in the asset value in year t, divided by the asset value at the beginning of the year t

The **yield** is expressed as a percentage. It is a scale-free measure, which easily compares investment performance across *different types of investment* (see Brown and Matysiak, 2000, p. 210). Let's define the concept of total return in shares, bonds, and commercial property.

- **Total Shareholder Return**, combines the dividend yield ¹, and the capital yield (i.e. the percentage change in share price). Both components are expressed as percentages.
- **Total Return of a Bond** usually refers to the *yield to maturity*, YTM. The YTM is the anticipated return that the investor will receive if the investor holds the bond until the end of its lifetime (i.e. the maturity date). The YTM is expressed as

¹The dividend yield is the ratio of dividends received by a shareholder over a year, divided by the stock price

an annual rate, and it accounts for all annual interest payments (i.e. coupons) the investor will receive in the future at their current value, plus the bond price paid by the bond holder to the bond issuer (e.g. a private company or public government). In case an investor sells a bond before maturity, the investor is going to receive more or less money than what he/she paid for it depending on how currently bond rates are respect to what they paid when he/she purchased it. If current bond rates have risen, the investor will get less money because its value (i.e. the price) has declined. On the contrary, if current bond rates have dropped, the investor will get more money because its value has increased.

- **The Real Estate Total Return, $RETR$** , is the sum of rental income and the change in property values (see Hoesli and MacGregor, 2000, p.33). For property, the income return is a ratio between the rent received over a year², respect to the office asset value at the beginning of the year. The capital return is the percentage change in the office asset or capital value over a year.

Let's breakdown the components of the Real Estate Total Return, $RETR$:

$$RETR_t = IR_t + CR_t \quad (1.2)$$

$$= \frac{NI_t}{CV_{t-1}} + \frac{CV_t - CV_{t-1}}{CV_{t-1}} \quad (1.3)$$

Where:

- NI_t : is the net income received in year t
- CV_{t-1} : is the capital value at the end of year t-1, or at the beginning of year t
- CV_t : is the capital value at the end of year t

The property total return is an incomplete measure of performance because it ignores the amount of risk taken to produce a level of return (see F. Modigliani and L. Modigliani, 1997). This is why investors compare returns obtained from different investments and their risks to get a better perspective of the risk-adjusted return. For example, two investments with the same performance but one is perceived to have a higher risk. The investment with the lowest risk will have a better risk-adjusted return. Let's now apply the concept of the risk premium in the commercial real estate.

²It is net of any commercial expenses

1.1.2 The Risk Premium

Risk is a particularly shapeless, subjective, and undefinable concept. Risk is perceived as a mix of danger and opportunity (see Damodaran, 2010, p.60). Also associated with uncertainty, risk arises from obtaining unexpected investment returns (Jorion, 2007). For example, when investors hold an investment asset, with the expectation of getting a return, the actual return they receive may differ from their expected return.

The concept of a *risk premium* derives from the relationship between risk and the investor's expected return. The expectations are linked to investors' risk perceptions. The higher the investor's risk perception is, the higher the required return to invest in an investment. The increase in the required return is to compensate for the increase in risk exposure. To measure the premium, investors take the return of an investment, which is perceived to have a low risk, and they set it as the minimum risk threshold. For example, top-rated government bonds rated by rating agencies. Despite their offer low and stable returns³, they are quite popular among investors due to their low risk. If investors want to invest in any another investment vehicle, the decision will imply a high-risk exposure, therefore, they will require a higher required return.

Property investments are generally perceived by investors to have more risk than top-rated government bonds. The revenue received from tenants is less secure and less predictable than any solvent government. For this reason, investors will require a higher expected return to invest in property rather a top-rated government bond. Top rated ten-year government bond yields serve as a comparative to the commercial property return. Both assets are held, on average, for a similar period (e.g. 5, 10 years, or more), and they also offer a fixed income (i.e. a coupon for bonds is akin to the rental income in property).

The required/target property return is subtracted from the redemption yield of a top rated ten-year bond yield to obtain the property risk premium. The difference in returns represents investors' willingness to increase their risk exposure in order to get a higher return. Let's examine this with the following equation:

$$RETR = RFR + RP \quad (1.4)$$

$$RP = RETR - RFR \quad (1.5)$$

³Generally the most secured asset available offers the lowest return. The high demand for this type of investment increase its price, and the yield offered by the issuer a decreases

Where:

- RP is the Property Risk Premium
- $RETR$ is the target or required total return, also referred to as the hurdle rate, for investing in an office building
- RFR is the return of a riskless investment (i.e. the redemption yield of a top rated ten-year bond yield)

The premium may be explained by various factors. Cochrane (2011) refers to the risk premium as a "Black Box," because factors that explain accurately the premium are still unknown. The premium is also different for every investor. Each investor has his/her own risk perceptions and requirements to invest in property. Section 2.1, on page 88, analyses the historical property premium in Central London. To measure it, the Office Total Return Index is subtracted from the redemption yield of the 10 year Gilt yield. To simplify, the property index is considered as the average investors' requirement to invest in property. This case study tries to unravel which factors explain the ex-post property premium. To attain this objective, this study uses two approaches: (1) the **Economic Approach**, which assumes the premium is explained by some economic, financial and property factors; (2) the **Financial Approach**, that assumes the premium is explained with proxy components of the office total return. The drawback of both approaches is that the assessment of the property premium is based on historical values. The past cannot be changed, and so *the historical (i.e. ex-post) property premium is the same for all investors*. The reason that leads this research to study this premium is that investors generally consider the historical premium to form their current investment requirements. This may not be a good guide to base future investor's requirements. Risk is attributable to time-varying conditions (see A. E. Baum and D. Hartzell, 2012, p.524). The variables considered in the two models may not serve to explain the property risk premium at another point in time.

As we refer above, the **property risk premium is based on expectations**. Investors build up their expectations and requirements with the information they manage today. Property investors will invest in a property as long as the expected property return meet investors' required total returns. Section 2.2, on page 123, considers different variables that explain the expected (ex-ante) property risk premium. The study compares the average investors' required return to forecasts of different property market returns. Investors will be more inclined to invest in markets that are expected to attain their required return.

1.1.3 The Net Present Value, and the Internal Rate of Return

Definition of the Net Present Value

Before investing in a property asset, it is of great importance for investors to understand how commercial buildings are valued. Some professional valuers are inclined to use a rental growth model, such as the Gordon model⁴, to produce accurate valuations. The base for this statement: the value of any commercial building today is determined by future income (rents and the expected sale price) and costs that are generated by a commercial building, all through the investment period (Hoesli and MacGregor, 2000). The reasons for using the rental growth model are the following: (1) to appraise the value of a commercial building, and (2) to determine whether a property is under- or overpriced (see Brown and Matysiak, 2000). This model aids in real estate valuations during the investment decision process.

The present value of the building can be represented in a single figure (in euros), using the following equation:

$$PV = \sum_{t=1}^T \frac{\text{Net Income}_t}{(1+i)^t} + \frac{\text{Sale Price}_T}{(1+i)^T} \quad (1.6)$$

Where:

- PV : the *Present Value* (in euros) of an investment, over the investment period. The present value give us an approximation about how much money an investor should offer to acquire the property
- Net Income_t is the expected *net office rent* (€/sq m) obtained by the property owner in year t . It considers the income received from property leases, and it subtracts any operating expense
- Sale Price_T is the estimated sale price (€) at the end of the investment period, in T . This value is uncertain and tough to estimate. Section 1.2 describes a case where a fund considers different scenarios and hypothesis to set different expected resale price of an office building
- t is a temporal variable, in years
- i is the discount rate ($i > 0$). Future income and costs occur in a different period.

⁴The Gordon model is described in detail in annex 1.4, on page 79

This disrupts the way investors assess the value of any commercial property. Inflows (i.e. income) and outflows (i.e. costs) are discounted, to bring them to present, by using a discount rate. The discount rate is the *opportunity cost of capital*. This means that investors who invest in an property, they won't be able to use that capital in another investment. A general rule to select a discount rate doesn't exist. Investors commonly use the return of a riskless asset return, also named the *risk free rate*, *RFR*, plus a risk premium. As a risk free rate investors generally used a secured Government Bond, plus a required risk premium to compensate for their risk exposure on investing in property. The risk premium will depend on each investor

- $\delta^t = \frac{1}{(1+i)^t}$ is the *discount factor*. Due to uncertainty about the future, individuals, in general, give more importance to the income and costs that are close to the present, than those that are more distant in time. The discount factor gives a constant and decreasing weight to rents and costs that are expected to appear over the investment period ($\delta < 1$). For instance, an investor bought a property in 2014. The investor expected that the building will generate a cash flow of €100 in 2015 and 2016. In case the investor considers a discount rate of 6.7 % in 2014, the €100 of 2015 and 2016 would have a value of €93.7 and €87.8, respectively, in 2014. Therefore, the money which is available in the present has more value for this investor because he/she can use it to make an investment decision

The **net present value**, **NPV** is obtained by subtracting, in equation 1.6, the acquisition price paid from the present value, PV:

$$NPV = -\text{Acquisition Price}_0 + \sum_{t=1}^T \frac{\text{Net Income}_t}{(1+i)^t} + \frac{\text{Sale Price}_T}{(1+i)^T} \quad (1.7)$$

Where:

- *NPV* the Net Present Value (in euros) of an investment
- *AcquisitionPrice*₀ is the price paid (in euros) for an office building, at the beginning of the investment period. To set the acquisition price, investors look first to property comparables (i.e. with similar characteristics), to set an asking price. The final or purchase price will depend on the negotiation process between the buyer and the seller

The NPV allows to represent in a single figure (in euros) different income and costs that occur throughout an investment period. The decision rule is to invest in the property with a positive NPV. In case an investor wants to buy a building, and considers different buildings with a positive NPV; the investor selects the building with higher NPV. It is also important to have in mind that both the expected net income, and the theoretical resale price, they affect directly to the value of the NPV, and so the investment decision⁵.

The NPV decision rule: *Investors will invest in properties that have a NPV greater or equal to zero because they are profitable. In case investors consider different property assets, they will invest in the asset with higher NPV.*

Definition of the Internal Rate of Return

The discount rate that makes the NPV equal to zero is known as the Internal Rate of Return, IRR. The IRR leads the property investment to the border of profitability. The IRR is the expected rate of return that equals the present income value to the present cost value. This means the building is correctly priced. To see this more in detail, let's take the equation 1.7, and let's equal the NPV to zero:

$$NPV = 0 \tag{1.8}$$

$$\text{Acquisition Price}_0 = \sum_{t=1}^T \frac{\text{Net Income}_t}{(1+i)^t} + \frac{\text{Sale Price}_T}{(1+i)^T} \tag{1.9}$$

The IRR is another indicator to select an investment. It is linked to the NPV. The more profitable a property investment is, the greater is IRR. The decision rule, in this case, is to invest in a property with a higher IRR. However, this requirement is not sufficient. To accept a property investment *the IRR should be greater than the required/target return.*

The IRR decision rule: *The IRR should be greater than the opportunity cost of capital to buy a property asset.*

Let's see with an example how to use the NPV and the IRR when an investor compares two potential building acquisitions.

⁵Please see example B on page 44

Example A. Two buildings with similar income streams



Figure 1.1 – Time profile of Building A and B

This figure shows the expected future cash flows of two buildings located in Central London⁶. Let's consider an investor who planned to buy an office building in 2014, and hold it for five years. The investor had two investment opportunities. He/she had to select one among the two. For this, the investor discounted the expected future cash flows and obtained the NPV and the IRR for both buildings.

As mentioned above, a general rule to select a discount rate doesn't exist. In this case, it is used a riskless alternative investment as a discount rate. Long-term Bonds are considered as an alternative investment to property. They provide a fixed annual income (the coupon), for a period of time. The coupon is for bonds what rent is for property. As the investor plans to hold the building for five years in Central London, the investor considers the *nominal redemption yield of the UK 5-year Gilt*, with 1.74 %⁷ in 2014. The resulting NPV of both buildings A and B, once cash flows are discounted, is €36,297,907 and €45,939,208, respectively. According to the NPV decision rule, building B is more profitable. At that level of discount rate, the investor is more inclined to building B.

So far, the investor obtained the NPV by using a single discount rate. Let's see how different discount rates affect the NPV of both buildings:

⁶The data used in this example is fictitious

⁷Data source: Datastream

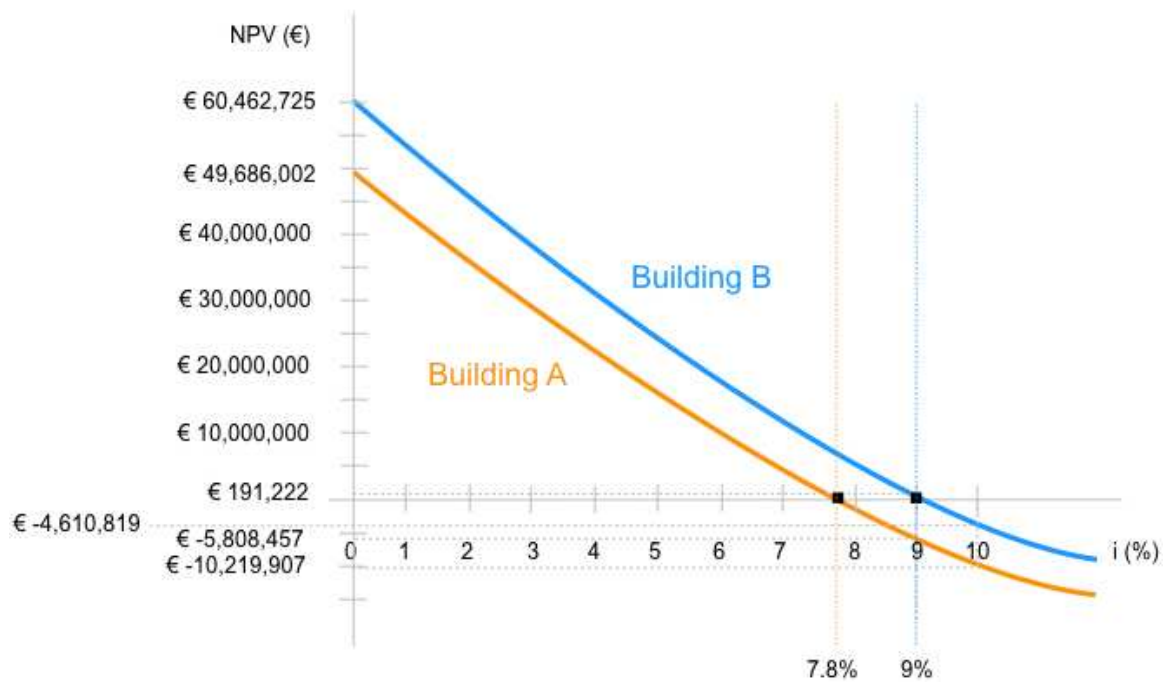


Figure 1.2 – The NPV as a function of the Discount Rate

Table 1.1 – The Net Present Value of Buildings A and B

%	NPV (€)	
	Building A	Building B
0	49,686,002	60,462,725
1	41,801,070	51,910,072
2	34,417,024	43,898,133
3	27,499,798	36,390,165
4	21,017,908	29,352,211
5	14,942,236	22,752,862
6	9,245,828	16,563,047
7	3,903,722	10,755,839
8	-1,107,219	5,306,280
9	-5,808,457	191,222
10	-10,219,907	-4,610,819

When the discount rate is equal to zero, the NPV for building B is €60,462,725⁸. A zero discount rate means that the opportunity cost of capital is zero, and so investors are indifferent between investing in the property in 2014, or postponing it for the future.

As long as the discount rate increases (i.e. the opportunity cost of capital increases) the NPV decreases. The higher the discount rate is, the more preference investors have for

⁸It is the discounted sum of the expected net income (i.e. inflows and outflows) less the initial price paid for the property, -165 million euros

the present. This is because they are losing the opportunity to dispose of his/her capital, and to invest it in the alternative investment. However, as long as the NPV is positive, the investment is still profitable, as the discounted income exceeds the discounted costs of the investment. When the NPV curve cuts the horizontal axis the NPV is zero. The discount rate that makes the NPV equal to zero is known as the Internal Rate of Return, IRR. The IRR equals the present income value to the present cost value. This means the investor has a potential return of 7.8 % and 9 % for building A and B respectively.

Figure 1.2, on page 42, shows that the investor has a potential IRR of 7.8 % and 9 % for investing in building A and B, respectively. Both IRR are higher than that of the required property return (i.e. the UK 5-year Gilt, 1.74 %). According to the IRR decision rule, it is more recommended that the investor buys building B. Far beyond the respective IRRs, both investments become unprofitable, as the income generated by the building cannot exceed the opportunity cost. Or to say it in another way, for instance, when the discount rate is higher than 9 % in building B, the NPV becomes negative, and the investment in building B becomes unprofitable, as the current cost value exceeds the current income value.

In the previous example, the income streams were very similar. Let's now evaluate two buildings with different income streams to see how this affects the profitability of both investments: the NPV and the IRR.

Example B. Two buildings with different income streams

The following figure shows the expected cash flows of two buildings located in Central London:



Figure 1.3 – Time profile of Building A and C

Building A has the same cash flow used in the previous example. Compare it with building C, the latter was 100 per cent vacant in 2014. Investing in building C implies a higher risk for two reasons. First, (1) it will take some time to find tenants to occupy the building⁹; And second, (2) the owner won't receive any income during that time. Let's assume the investor expects to rent the office space in two years time, and let's also consider different discount rates to see how that affects the NPV of both buildings:

⁹It would depend on its location, the transport connections, the state of the building, technical characteristics, etc. To simplify, this was not considered in the analysis of the NPV and IRR.

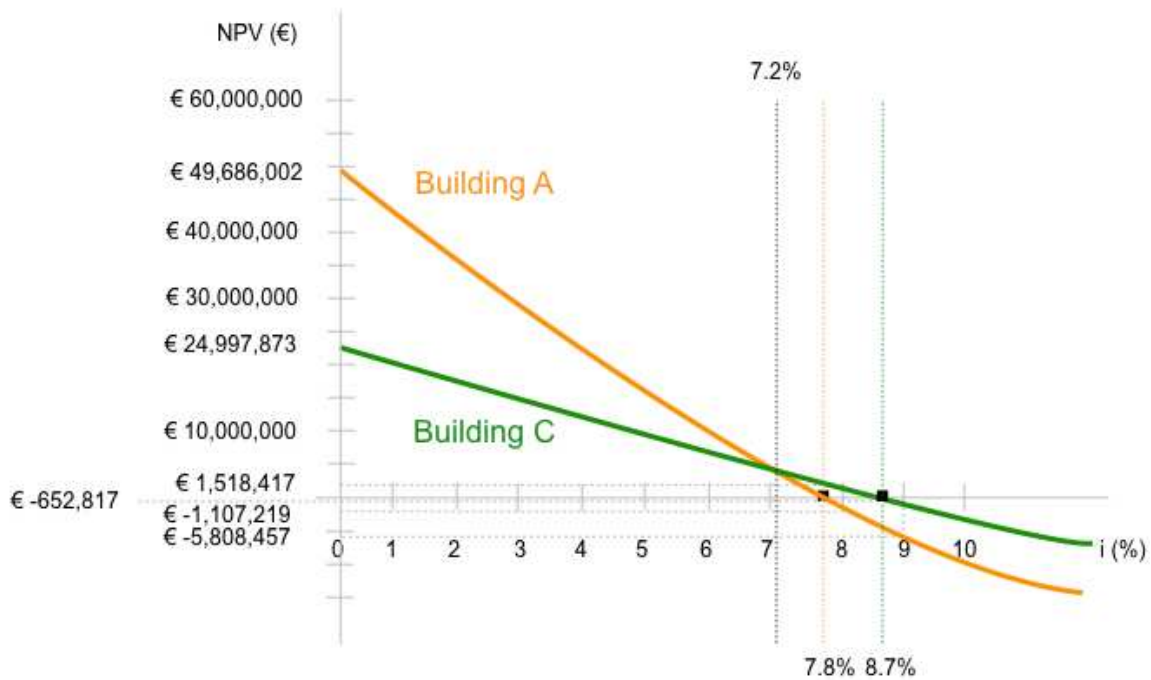


Figure 1.4 – The NPV as a function of the Discount Rate

Table 1.2 – The Net Present Value of Buildings A and C

%	NPV (€)	
	Building A	Building C
0	49,686,002	24,997,873
1	41,801,070	21,350,756
2	34,417,024	17,936,016
3	27,499,798	14,737,797
4	21,017,908	11,741,446
5	14,942,236	8,933,415
6	9,245,828	6,301,165
7	3,903,722	3,833,086
8	-1,107,219	1,518,417
9	-5,808,457	-652,817
10	-10,219,907	-2,689,874

As long as the discount rate increases, the NPV decreases. At discount rates below 7.2 %, building A generates more income than Building C. As a result, the NPV of building A is higher than the NPV of building C. At levels of discount rate below 7.2 %, and following the decision rule of the NPV, investing in Building A is more profitable than investing in building C. However, at 7.2 % of discount rate, the NPV generated by both buildings equalises. At that level of discount rate the investor would be indifferent to invest in Building A or C. Beyond 7.2 % building C exceeds the NPV of building A. At

7.2 % both NPVs are positive, which means that the two buildings are still profitable. The difference now is that building C generates a higher NPV. At 7.8 % of discount rate, the NPV of building A is equal to zero, and building C still has a positive NPV. The NPV of building C equals to zero at 8.7 % of discount rate.

In this example, both decision rules, the NPV and the IRR, give different investment recommendations. The goal of this example is to show investors that the NPV and the IRR are directly affected by the expected payoffs. The assumptions made on expected payoffs are based on information available today. For instance, an investor may assume that the expected future cash flows are secured, as tenants already signed their lease contracts. However, this assumption is unrealistic due to the uncertainty over future income and costs. It might happen a tenant suffers financial problems and don't pay the rent. Also due to poor property market conditions, the owner might sell the property at a lower price than expected. Depending on the level of uncertainty, investors are willing to pay a higher or lower price for a property. This depends on their perception of risk and the expectation of getting a fixed return. "Those expected returns only have meaning at the beginning of the holding period. At the end of the holding period the outcome may be completely different" (Brown and Matysiak, 2000, p.6). As time goes by, new information is released. Subsequent information will reveal whether investing in the property was, in fact, a right or wrong decision. The access to information, and also having a good strategy, are crucial to minimise the property risk.

At this stage the reader must not confuse the concepts of the *discount rate*¹⁰, and the *required property return*¹¹. The discount rate is a component of the required property return. The latter accounts for the additional risk of investing in property¹².

In this section, the 5-year UK Gilt yield is used as discount rate to calculate the NPV. By using the Gilt yield, investors assume that government bonds and commercial properties have an equivalent risk. However, investing in property implies a higher risk. The extra risk increases investor's required return, and it decreases the property value. Let's take the cash flow of Building B to show how this happens. The equation 1.6 is used to calculate the present value (PV) of building B. The 5-year UK Gilt discount rate had a value of $i = RFR = 1.74\%$ in 2014. This discount rate is applied to the expected cash flows of building B. At that level of discount rate, the present value of building B

¹⁰The discount rate is the opportunity cost of capital of investment. This thesis introduced it in equation 1.6, on page 38

¹¹It is the required return investors require to invest in property. The required property return has two components: the riskless return, RFR, and the risk premium, RP

¹²Please see section 1.1.2, on page 36, to read more about the property risk premium

was €200,344,828 in 2014. Let's calculate the PV of building B again, but now including an extra required return for investing in property. The new discount rate considers two components:

- *RFR*: the risk-free rate used before, 1.74 %¹³ in 2014
- *RP*: the property risk premium. It is assumed the expected property risk tends to its long-term average. For this reason it is used the *long term average of the historical UK Office Market Risk Premium*¹⁴, which is 5.5 %

The sum of both components resulted in a discount rate of 7.2 %. This discount rate is the required property return, $i = RFR + RP$, and it includes the extra risk to invest in property (i.e. risk premium). Let's use the new discount rate to calculate the present value, PV, of building B. The resulting PV was €157,308,918. Indeed, the extra risk increases investor's required return and it decreases the present value of the investment.

To end this section, let's summarize the main advantages and disadvantages of both methods:

- The Net Present Value, NPV:
 - Investors will invest in a commercial building if the NPV is greater than 0. In case the investor considers different buildings, the investor will select the building with higher NPV
 - The NPV depends on (1) the assumption of obtaining specific expected payoffs; and (2) the selection of the discount rate
- The Internal Rate of Return, IRR:
 - Investors will invest in a commercial building if IRR is higher than the opportunity cost of capital
 - The IRR is the classical measure of investment performance in real estate
 - "The IRR also have some problems, since there may be more than one value of discount rate than makes the NPV equal to zero. Moreover it is not always the highest IRR project than has the greatest NPV." (De Rus, 2010, p. 133)

¹³Data source: Datastream

¹⁴The UK Office Market Risk Premium is the historical long-term average (from 2000 to 2014) of the difference between the Nominal Office Market Total Return (source: MSCI/IPD), and the Nominal Redemption yield of the UK 5-year Gilt

1.1.4 The Yield Gap

Section 1.1.2 defines the property risk premium as the difference between the required/target total return and a riskless asset return (i.e. the redemption yield of a top rated ten-year bond yield). Nevertheless, some practitioners confuse the concept of property risk premium with the yield gap. This section aims to show that the two concepts are not identical.

By definition:

- The **initial property yield**, IY , is equal to:

$$IY_t = \frac{NI_t}{P_{t-1}} \quad (1.10)$$

Where:

- IY_t is the initial property yield at the end of year t
 - NI_t is the passing rent, or net operating income, obtained in year t
 - P_{-1} is the capital value of an office building in the previous period
- The **risk premium**, RP , is the equation 1.5 described on page 36:

$$RP_t = RETR_t - RFR_t \quad (1.11)$$

Where:

- RP_t is the risk premium in year t
 - $RETR_t$ is the expected target or required total return for investing in an office building
 - RFR_t is the redemption yield of a risk-free rate
- The **yield gap**, YG :

$$YG_t = IY_t - RFR_t \quad (1.12)$$

Where:

- YG_t is the yield gap in year t
- IY_t is initial property yield in year t
- RFR_t is the redemption yield of a risk free rate in year t

The yield gap is the difference between the initial property yield and a redemption yield of a risk-free rate. It should be stressed that neither variables is an expectation. They just measure the difference in performance between the property yield, and the riskless asset return. On the other hand, the property risk premium is based on investors' expectations. Based on their expectations, investors will require a higher or lower total return to invest in property. The difference between the required return and the riskless asset return determines the property risk premium.

In Annex 1.4, on page 79, it is explained the difference between the property risk premium and the yield gap. In this annex, this thesis demonstrates mathematically that the property yield gap is a component of the property risk premium. The property yield gap equals the property risk premium if, and only if, there is no property income growth, and/or there is no change in property yields.

1.2 Investing in an Office Building.

A Case Study: How do Investors Calculate Yields?

This case study explains how investors calculate the internal rate of return before the acquisition of an office building.

1.2.1 Introduction

The scarce of office buildings available in the market, along with the high cost of building management, limits investors' access to the real estate market. For these two main reasons generally investors take part in a listed property fund. This case study shows a general procedure followed by a fictitious fund to acquire an office building. This fund, named as the 'ABC fund,' is a non-listed Real Estate Investment Trust (REIT) fund that rose money from investors that bought shares of this fund. The fund is held by a private company, called "company Z". The company decided the fund will have 10-years lifetime. The fund is a closed-ended, and therefore shares are not redeemable from the fund before 10-years.

Table 1.3 – ABC Fund Overview

Launch date	Summer 2014
Sector	Core-Office
Area	Pan-European Fund
Duration	10 years (1)
Fund Size	€800 million
Investment Period	From 2014 to 2017
Raising Capital	From 2014 to 2016 (2)
Target Return	7 %
Yearly Distribution	>5 %
Loan To Value max.	40 %
Close date of the fund	Summer 2024
Notes	
(1)	Closed-End Fund
(2)	Fund Capital Raising Period

Strategy

Before any investment, investors need to think in terms of a strategy. This strategy should be able to attain investors' expected investment return. In case an investor doesn't have an investment strategy, he/she might contact a property fund which has a pre-defined strategy.

Fund managers first study the situation of different markets. This permit them to build up their own convictions in both the current market situation and future expectations. These are reflected into the fund strategy criteria. Let's see the main investment criteria of the ABC property fund:

- **The Core Office Sector**

A core office building is a high quality property, with good construction standards. At least 90 per cent of the building is leased, with long leases and different higher-credit tenants. Core property investments are expected to generate a total return between 8 to 10 per cent average, although this will depend on the situation of the property market. For instance, data from BNP Paribas Real estate show the levels of the Net Prime Initial (income) Yield of the main European are historically low (4 per cent). The high level of demand for this type of products limited number of core buildings available in the market. Core assets are overpriced. With the net prime yields at historical levels is unlikely that investors obtain a 10 per cent of total return.

The ABC fund is focused on *core office buildings*. The advantage to focus in a single sector, from an investment point of view, is that it will be easier to have a clear view about the expected total returns of during the investment period.

- **Buildings located in non CBD Central Market Locations**

To attain the 7% of total investment return, fund managers focus on central market locations. The advantage of central locations, compared to the CBD area¹⁵, is that rents are more accessible to tenants, although it increases the risk of depreciation in rental and capital values depending on market conditions. Potential risks perceived by investors will increase their required investment return.

¹⁵The CBD stands for the Central Business District, which is the most important business location in a city

- **Investment preferences**

Acquisition of a core asset building with an occupation of at least 70% and reduced letting risk (i.e. high-quality tenant, and rental levels are expected to increase). To minimize the vacancy risk the office building space must be rented to different tenants coming from different sectors, if possible. The building needs also to fulfill environmental sustainability certifications, and with almost or no need of refurbishment.

- **Lease contract**

A minimum 5-year lease contract. The longer the lease contract, the more stable and secured the income will be.

- **Yields Distribution**

The fund defines the annual distribution of the expected total return (cash-on-cash yield), at 5%. The final expected yield at the end of the investment (i.e. the IRR) is at 7%. The latter will depend on the sale asset price at the end of the investment period.

- **Exit strategy**

The fund started to run in 2014, and it has a 10-year lifetime. The sale of assets will depend on the duration of the lease contracts of each building, and on the expiration of the fund itself. Before the end of the fund's lifetime, in 2024, all properties must be sold. In case some properties are not sold in 2024, and investors want to close the fund immediately, the fund risks of selling the assets below their fair market value. It is also important to sell a property when market conditions sustain property values; otherwise, the likelihood of obtaining the total target return of the fund would be low. For this reason, it is also crucial to align the strategy of the fund with the property market cycle.

The limited number of office buildings transacted in the market explains why it is not always possible to find assets that fulfill all investment requirements defined in a fund strategy. When this happens, asset managers might decide to be more or less flexible with the investment requirements, without compromising the fund. Sometimes they can permit increased risk exposure on assets and markets that differ from the fund investment criteria. For example, the fund managers find a high quality building, located in a good location, with an eighty per cent occupancy rate, and with low rental values.

For buildings that have low rental values, it will be easier to rent space, although this will mainly depend on tenants' attraction to the area where the building is located. This may encourage the owner to offer leases with a lower duration.

For the moment, let's assume this building doesn't have any environmental sustainability certification. In this case, the building will need some refurbishment to obtain a sustainability certificate. With refurbishment the building will obtain the green certification, and this will increase the value of the property when the fund manager decides to sell the property.

1.2.2 Methodology

To Find a Building

Once the strategy has been defined, the fund looks for office buildings that meet the criteria of the investment strategy. Let's check the ABC fund's criteria:

Table 1.4 – Key Elements of the Fund Strategy

1.	Core office buildings located in European central market locations
2.	Building with almost no need of refurbishment
3.	At least 70 % of building occupancy rate
4.	To keep rental and capital values
5.	Tenants with a minimum of 5 year lease contract
6.	5 % of annual total return, 7 % of total investment return
7.	To minimize losses of the fund

Fund managers contact their brokers to send them the investment criteria. Then brokers start looking for office buildings that are available in the market and which fulfil those criteria. There are two principal ways to find office buildings:

- Transactions **On-market**

When a commercial property is for sale a call for bids is launched. Investors submit their best offer. The investor who makes the best offer acquires the property. The seller may also consider investor's reputation (i.e. the investor is a serious investor, with reputation, who has also done other transactions in the market, and who won't renegotiate the price at the end of the bid.)

- Transactions **Off-market**

Asymmetric information and lack of transparency in the property market allow agents to buy assets that were not initially marketable. Although it is less common to find out-of-market office buildings, contacts are key to know when a building is transacted off-market. Usually the price paid for this type of transactions is higher than fair prices paid for a marketable good.

In both cases, the relationship among investors, contacts with private and public organizations is crucial to have access to new information of buildings that are for sale.

Analysis of the Building

Let's assume that ten months after the creation of the ABC Fund (Summer 2014), brokers found an office building which is in line with most of the fund criteria:



Figure 1.5 – Pushed Slab Building
1-11 rue Brillat Savarin, 75013, Paris

This property is a high-quality building, located in a central location, and with no vacancy rate. Two solvent tenants occupy the building, and leases will expire in ten years. The fund expects to have an initial yield of 5 %. Before fund managers make an offer for this building, they initiate an initial due-diligence of the building to know more about its performance and risks. Let's see the main specification of the asset:

Table 1.5 – Pushed Lab Building. Key Information

Investment Type	Office Building
Asset Quality	Prime
Environmental Certification	Yes
Location	13th district (Central Location)
Asset Size	18,286 sq m
Occupancy Rate	Fully let (To two Insurance Companies)
Passing Rent	460 €/sq m/year
Market Rent	430 €/sq m/year
Seller	Banque Populaire Rives de Paris
Potential Buyer	ABC Fund (Full Ownership)
Suggested Bid Price	€161,1 million
Approx. Investment Volume	€164 million
Holding Strategy	10 years
Net Initial Yield (1)	5.00 %
Net Vendor	5.09 %
<hr/>	
Note	
(1)	Net Initial yield _t = $\frac{\text{Net Operating Income}_t}{\text{Price}_t}$
<hr/>	

1. *Building characteristics, location, and transport connections*

The building is located in the 13th district of Paris, concretely in the Boulevard des Maréchaux. This area, called ZAC, is a particular area which has been promoted in terms of office and residential developments. It is an area that is still in development. Another advantages of the building are the good transport connections to the center and the airport. Good transport connections attracts tenants, and this increases the chances to rent the office space and get rental income.

Building	
Total surface	18,286 sq m
Office space	16,364 sq m
Additional areas	602 sq m
Underground Parking	87 units
Developer	ICADE
Builder	EIFFAGE
Additional information	Nominated "Pierre d'Or" prize in 2015
Location	
Central Paris	13th district
Neighborhood	Boulevard des Maréchaux
Area of Development	ZAC de la Gare de Rungis offers housing, office buildings, student residence, public infrastructures and gardens
Transport Connections	
Metro station Maison Blanche - line 7	In front of the building
Suburban train (Cité U. - RER B)	500 m distance
Railway station	3 min by Tram 3
Bus (line 21 and 57)	In front of the building
Ring Road	500 m distance
Airport (Orly)	30 min by public transport
Airport (CDG)	45 min by public transport

2. Assessment of letting and tenant situation proceeds

The building has two tenants that are insurance companies: "Company A" and "Company B". The contract lease of both tenants will last ten years. The lease started in 01/03/2015 and ends in 29/02/2024. There is no lease break between these two dates. Nevertheless, there is a potential risk that the property is left vacant in 2024. An important metric used by investors to measure this risk is the **WALE**, which stands for *Weighted Average Lease to Expiry*. The WALE indicates the average years remaining before the expiration of different leases in a property. It considers all tenants' remaining lease, in years, and weights them by the tenant's occupied area.

In this building "Company A" occupies 72 % of the rentable area, and "Company

B" occupies 28 %. In both cases the lease expires in 8.9 years. The lease contract is more than five years, which is in line with fund requirements. Therefore the WALE for this property in: $(0.72 \times 8.9) + (0.28 \times 8.9) = 8.9$ years In this example, "Company A" occupies the major area of the building. This skew of the WALE measure upwards to the detriment of "Company B". However, as the lease period of both tenants coincides, the resulting WALE is the number of years of the remaining lease period of both properties (8.9 years). This WALE will be completely different in case the lease periods don't coincide. A WALE of five years or more indicates future income stream so that the owner is secured well, and the risk of tenants moving out of the building is low. Let's see this graphically.

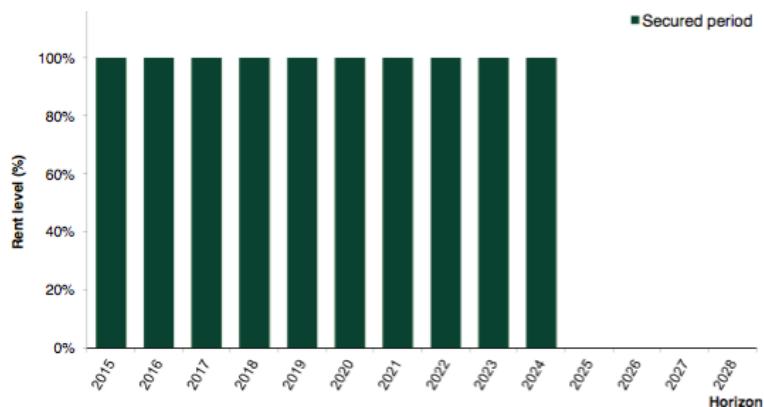


Figure 1.6 – Lease Expiry in sq m

This graph shows the potential risk profile of this building to be vacant in case both tenants move in 2024. If the fund bought the building in 2015, and decides to hold it till the end of the lifespan of the fund, the potential risk of vacancy in 2024 is very high.

3. Pricing of the building

Once the Fund manager has analysed the information about the building and tenants, the fund manager proceeds to compare the actual levels of rents, and the potential net initial yield of the building. The fund manager tries to assess two things: (1) if rents of the building are over or under-rented, respect to the rental market values; (2) the expected net initial yield. To assess rents and the yield, the fund manager compares the rents and yield of this building respect to other buildings transactions occurred in Paris recently. The comparables should be located in a similar area, and should have similar characteristics. From the analysis of comparables, the fund manager found that rents of the buildings are 460 euros/sq m/year. This level is slightly above to average market rents in the same

area (430 euros/sq m/year). From the side of yields, the fund manager observed some office buildings that were transacted between a range of 4.9 % and 6.5 %. As the building is located in an area of development, there is a potential of rental and capital growth. The manager expect to attain for this building a net initial yield of 5 %.

4. Let's describe the main points of the building in a *SWOT analysis*:

Strengths	<ol style="list-style-type: none"> 1. Excellent building quality, with an environmental Certification 2. 100 % rented to two solvent tenants 3. A long WALE
Weakness	<ol style="list-style-type: none"> 1. It is not located in an business area 2. High-rental values
Opportunity	<ol style="list-style-type: none"> 1. The estimated net initial yield is 5 %. There is an opportunity of yield compression 2. Area in development 3. Reduced stamp duties: 1.80 %
Threat	<ol style="list-style-type: none"> 1. Rental level is above the average market rental value

1.2.3 To Estimate the Internal Rate of Return of an Office Building

Section 1.1.3 refers that the value of a commercial building today is determined by the future rental income and costs. From cash flows investors are expected to obtain a return. One of the most used methods used in real estate to calculate the return of an office building is the Internal Rate of Return, IRR. The IRR is the expected rate of return that equals the discounted future income value to the discounted future cost value¹⁶.

In this example, the fund manager pretends to obtain a return of 7 % (see table 1.3) from the Pushed Slab building. To calculate the IRR the fund manager have information about current rents, the lease length, and future costs. However, the future is unknown. Fund manager needs to make the best estimate of the future cash flows with the information he/she has to determine the IRR of the investment. The fund manager will determine these cash flows in case the building is financed with both (1) equity and (2) 40 % leverage. Due to uncertainty the fund manager considers three scenarios, with different exit assumptions:

1. Base Scenario

The fund holds the building four years. In these years, the fund manager believes conditions of the property market will remain the same. The fund manager assumes rents will increase at 1.2 % of annual rate. In 2019, the fund estimates to sell the asset for €169,294,843. In one hand, the expected exit yield (i.e. the ratio between the net operating rent received in the last year of the investment and the sale price) is 5.9 %. On the other hand, in case the building is financed either with equity or with 40 % of leverage, the IRR are 4.7 % and 6.6 % respectively.

2. Optimistic Scenario

The fund holds the building four years. In these years, the fund manager believes conditions of the property market will get better. The fund manager assumes rents will increase at 1.2 % of annual rate. In 2019, the fund estimates to sell the asset for €183,733,636. The expected Exit yield is 4.69 %. This value is lower than the exit yield of the Base Scenario. In the optimistic scenario, the fund manager assumes there is an increase of the income return and capital growth. The sale price of the building is higher compared to the based scenario. In case the building

¹⁶The basics of the IRR are described in section 1.1.3

is financed either with equity or with 40 % of leverage, the IRR are 6.9 % and 8.9 % respectively. This is due to the increase in the expected income.

3. Pessimistic Scenario

The fund holds the building eight years. The fund manager believes conditions of the property market will get worse. The market will suffer a correction of rents and a depreciation of the capital values. To avoid strong losses, the manager will keep the asset for longer, and with the hope the market will get better. In 2023, the fund estimates to sell the asset for €158,070,162. The expected Exit yield is 5.34 %. The exit yield is higher than the exit yield of the two previous scenarios. The depreciation of capital values causes the decrease of the expected selling price. Although the manager assumes the market improves at the end of the investment, the manager also assumes that rents and capital values won't recover as fast as they will do in case the building was located in the CBD area. In case the building is financed either with equity or with 40 % of leverage, the IRR are 3.4 % and 4.2 % respectively. This is due to the decrease in the expected income.

Among the three scenarios mentioned above the leveraged IRR is higher than the unleveraged IRR. In case the fund manager acquires the property with 40 % debt, this will lead to a financial distress. This means the fund will reduce the amount of money invested in the building (the fund only invest 60 % of the total value of the asset). To achieve this, the manager has to make sure that the IRR is higher than the interest rate paid. Next table shows the main results obtained in the three scenarios:

Table 1.6 – Assumptions and results

Exit Assumptions	Base Case	Optimistic	Pessimistic
Holding Period	4 years	4 years	8 years
Exit Date	31/08/2019	31/08/2019	31/08/2023
Exit Yield	5.09 %	4.69 %	5.34 %
Sales Costs	1.00 %	1.00 %	1.00 %
Net Operating rent at Exit	€8,617,108	€8,617,108	€8,440,947
Rental Value Change, on average (1)	1.2 %	1.2 %	1.2 %
Estimated MRV at Exit	€8,031,766	€8,031,766	€8,440,947
Estimated MRV at Exit (euro/sq m/year)	452	452	475
Estimated MRV Change, on average	1.25 %	1.25 %	1.25 %
Sale Price	€169,294,843	€183,733,636	€158,070,162
IRR (Unleveraged)	4.7 %	6.9 %	3.4 %
IRR (Leveraged)	6.6 %	8.9 %	4.2 %
Note			
(1)	The rate of increase in rents are generally indexed to an index of construction. The ABC Fund directly assumes market rents increase constantly 1.2 % per year		

Next section explains how managers estimate the cash flows to obtain the Internal Rate of Return, IRR. As the process is the same for the three scenarios (the only differences are the assumptions), this case study focuses in the *Base Scenario* case. In this scenario, the IRR is calculated taking into account that the building will be financed with (1) 60 % equity and (2) 40 % leverage.

IRR. Base Scenario. Unleveraged Case

The manager expects to buy the building in August 2015. The manager pays a *gross asset value* (GAV) of €-161,088,153. There are some transactions costs from the acquisition: the (1) *stamp duties* (1.8 % of the GAV), which is a tax placed on legal documents. Other costs to be considered are the (2) *due diligence* (0.124 % of GAV), which is an investigation process to guarantee the property is conveyed. The sum of the GAV minus the sum of the two transaction costs yield to the *acquisition price* of the property, €-164,187,740. This is the amount the fund expected to pay in equity for the building in August 2015. Aside from the acquisition price, other incomes and expenses appeared in 2015. The building had a potential rent of €8,199,387 in 2015. From the purchase of the building, it only remained six months to finish the year. At the end of 2015 the fund received a *rental income* of €4,099,694 (i.e. €8,199,387 x 6 months/ 12 months).

In 2015, there were two expenses. The *acquisition fees*, that are expenses the fund is involved in acquiring the building (e.g. research analysis). The manager estimates the acquisition fees in one per cent of the GAV. The other expense is the *asset management fees*, which involves any expense related to the administration of the building. The manager estimates a fixed annual management cost of 0.45 % from the GAV. The asset management fees are paid every quarter. As it only remains one quarter to finish the year, the asset management fees were €-181,224 (i.e. €-161,088,153 x 0.45 % x 3 months / 12 months). The sum between the (1) Acquisition Price, the (2) Net Operating Income, and the (3) Asset Management Fees lead a negative total cash flow of €-161,880,152 in 2015.

From 2016 to 2019 there are only net operating income and fixed asset management fees. The fund assumes the *net operating income*, NOI, increases at a fixed rate of 1.25 % every year. For example, in 2016 the NOI was €8,301,879 (i.e. 8,199,387 x (1 + 1.25 %)). The *asset management fees*, are fixed every year. The management fees were €-724,897 (i.e. €-161,088,153 x 0.45 %) in 2016. The sum of (1) the acquisition price, (2) the NOI, and (3) the asset management fees is the resulted annual cash flow from 2016 to 2018.

The fund manager expects to sell the property in August 2019. During this year, the fund expects to receive half of the potential NOI planned for 2019 (i.e. 4,308,554 = €8,617,107 / 2). The fund manager include 9 months of property management fees €-543,672 (i.e. €-161,088,153 x 0.45 % x 9 months / 12 months). The sale price, or *gross net sale* (GNS), of the building is expected to be €169,294,843. Two more expenses stem

from selling the property: (1) Brokers will get a commission (i.e. the *Brokers fees*) of 1 % of the GNS. (2) The fund manager will also receive a commission (i.e. the *cost of disposal*) of 0.3 % of the GNS. The sum of (1) the NOI, (2) the asset management fees, (3) the gross net sale, (4) broker fees, and (5) the cost of disposal lead a positive total cash flow of €169,165,945 in 2019.

The unleveraged IRR obtained with equation 1.9 is 4.7 %. The Initial yield and the Exit yield are the same, 5.09 %. Both yields are obtained dividing the potential rent respect to the GAV and the GNS. Results are shown below:

Table 1.7 – Base Case: Unleveraged IRR of an Office Building

In euros	Observations	2015	2016	2017	2018	2019
Purchase Price (GAV: Gross Asset Value)	GAV	-161,088,153				
Stamp Duties	1.8 % of GAV	-2,899,587				
Due Diligence	0.124 % of GAV	-200,000				
Acquisition Price	100 % Equity	-164,187,740	-	-	-	-
Net Operating Income (NOI)		4,099,694	8,301,879	8,405,653	8,510,723	4,308,554
Potential Rent		8,199,387	8,301,879	8,405,653	8,617,108	8,617,107
Indexation Rent	1.25 %					
Asset Management Fees		-1,792,106	-724,897	-724,897	-724,897	-543,672
Acquisition fees	1.0 % of GAV	-1,610,881				
Management fees	0.45 % of GAV	-181,224	-724,897	-724,897	-724,897	-543,672
Gross Net Sale (GNS)	GNS					169,294,843
Broker fees	1.0 % of GNS					-1,692,948
Net Sale Price						167,601,895
Cost of Disposal	0.3 % of GNS					-507,884
Unleveraged Cash Flow		-161,880,152	7,576,983	7,680,756	7,785,827	169,165,945
Unleveraged IRR		4.7 %				
Initial Yield	Potential Rent (2015) / GAV	5.09 %				
Exit Yield	Potential Rent (2019) / GNS					5.09 %

IRR. Base Scenario. Leveraged Case

In this case the fund manager estimates an IRR assuming that the fund acquires the property with 40 % of leverage. The manager plans to buy the building in August 2015. The building has a *gross asset value* (GAV) of €-161,088,153. The 40 % of the GAV (i.e. €64,435,261) is financed with *debt*. The rest (i.e. €96,652,892) is paid with equity. Different costs derived from debt: the (1) *mortgage fee*, €-257,741 (= 0.4 % x Debt), (2) *financing fees* €-386,611 (= 0.6 % x Debt). The rest of the transaction costs are the same as the unleveraged case: the (3) *stamp duties* (1.8 % of the GAV), and the (4) *due diligence* (0.124 % of GAV). The GAV minus the net debt plus the sum of the two transaction costs (i.e. stamp duties and due diligence) lead to an *acquisition price* of €-100,396,831 (= -161,088,153 + Net Debt - Stamp Duties - Due Diligence). This is the amount the fund expected to pay in equity for the building in August 2015.

Aside from the acquisition price, other incomes and expenses appeared in 2015. The same as in the unleveraged case, at the end of 2015 the fund received a *rental income* (i.e. NOI) of €4,099,694 (i.e. €8,199,387 x 6 months / 12 months). The fund had three expenses in 2015. (1) The *acquisition fees* (i.e. 1 % of the GAV), (2) the *asset management fees* (i.e. 0.45 % of the GAV x 3 months / 12 months), and (3) the *interest rates*. Interests rates paid in 2015 is obtained by multiplying the fixed interest rate of 1.5 % respect to the debt: €-241,632 (i.e. 1.5 % x Debt x 3 months / 12 months). The sum between (1) the acquisition price, (2) the NOI, (3) the asset management fees, and (4) the interest rates lead a negative total cash flow of €-98,330,876 in 2015.

From 2016 to 2019, the fund expects the *Net Operating Income*, NOI, to increase at a fixed rate of 1.2%, every year. For example, in 2016 the NOI was €8,301,879 (= 8,199,387 x (1 + 1.2 %)). The fund also expect to have every year two fixed costs: The Asset Management fees and the interest rate. In 2016, the *asset management fees* were €-724,897 (i.e. €-161,088,153 x 0.45 %). The same year, the fund pays an interest rate of 1.5 % for the Debt. The sum of (1) the NOI, (2) the asset management fees, and (3) the interest rates is the resulted annual cash flow from 2016 to 2018.

The fund manager expects to sell the property in August 2019. As for the unleveraged case, the fund hopes to receive half of the potential NOI planned for 2019 (i.e. 4,308,554 = €8,617,107 / 2). Expected fixed costs in 2019 are the asset management fees, €-543,672 (i.e. €-161,088,153 x 0.45 % x 9 months / 12 months), and interest rates of -724,897 (i.e. 1.5 % x Debt x 9 months / 12 months). The theoretical sale price, or *gross net sale* (GNS), of the building is expected to be €169,294,843. *Brokers fees* (1 %

of the GNS), and the *Cost of Disposal* (0.3 % of the GNS) are subtracted from the sale price. The sum between (1) the NOI, (2) the asset management fees, (3) pay the interest rate, (4) pay back the debt, (5) the net sale price, (6) and the expenses of Broker fees, and the (7) Cost of Disposal lead a positive total cash flow of €104,005,787 in 2019.

The leveraged IRR obtained with equation 1.9 is 6.6 %. As we refer before, to finance the property with debt will lead the fund to reduce the amount of money invested, and this will increase the IRR. In this case, the fund will attain the expected target return of the building of 7 % described in table 1.3. In the following table, we show the results obtained from the analysis.

Table 1.8 – Base Case: Leveraged IRR of an Office Building

In euros	Observations	2015	2016	2017	2018	2019
Purchase Price (GAV: Gross Asset Value)	GAV	-161,088,153				
Debt (LTV)	40 % of GAV	64,435,261				
Mortgage fee	0.4 % x Debt	-257,741				
Financing fee	0.6 % x Debt	-386,611				
Net Debt		63,790,909				
Stamp Duties	1.8 % of GAV	-2,899,587				
Due Diligence	0.124 % of GAV	-200,000				
Total Equity		-100,396,831				
Acquisition Price		-100,396,831	-	-	-	-
Net Operating Income (NOI)	NOI	4,099,694	8,301,879	8,405,653	8,510,723	4,308,554
Potential Rent		8,199,387	8,301,879	8,405,653	8,510,723	8,617,107
Indexation Rent	1.25%					
Asset Management Fees (AMF)	AMF	-1,792,106	-724,897	-724,897	-724,897	-543,672
Acquisition fees	1.0 % of GAV	-1,610,881				
Management fees	0.45 % of GAV	-181,224	-724,897	-724,897	-724,897	-543,672
Debt Interest rate	1.5 x Debt %	-241,632	-966,529	-966,529	-966,529	-724,897
Loan Repayment						-64,435,261
Gross Net Sale (GNS)	GNS					169,294,843
Broker fees	1.0 % of GNS					-1,692,948
Net Sale Price						167,601,895
Cost of Disposal	0.3 % of GNS					-507,884
Leveraged Cash Flow		-98,330,876	6,610,454	6,714,227	6,819,298	104,005,787
Leveraged IRR		6.6 %				
Initial Yield	Potential Rent (2015) / GAV	5.09%				
Exit Yield	Potential Rent (2019) / GNS					5.09 %

1.2.4 Summary

Any property investor or fund needs to consider plenty of factors before acquiring an office building. In this case, the study analysed different factors and assumptions a fund took into account fund before the acquisition of a commercial property. To proceed with the purchase, the Fund manager needs to be convinced that the office building fulfils the main objectives of the strategy. I also must attain both the year-on-year yield and the total investment return (i.e. IRR). In this case, when the purchased is financed with 40 % of debt (LTV ratio) the IRR increases by 190 bp, a substantial increase of performance for a core office building.

The scarcity of good-quality office buildings in the market and the high number of property investors look for the same asset explains why in most cases the chances of buying an asset at a fair price remain low. It is vital to have good contacts in the industry, dispose of a good tracking record in real estate, and offer pertinent asking price in the bid process.

1.3 Investing in a Residential Property.

A Case Study: How do Investors Calculate Yields?

The last case study first of this chapter introduces the residential market in Paris. It describes the main drivers that lead the residential sector: demography, economy, mortgage rates, residential supply, and legislation. This case ends by explaining how a private investor calculates the internal rate of return to evaluate their required return of investing in a residential property.

1.3.1 Introduction

The residential market is explained by the increase of **demography**. For example, birth rates have dropped in most of Europe since the global financial crisis, France's birth rate has instead climbed to the highest in Europe. As a result, the population of France is expected to grow by almost 3 million over the next 10 years, along with residential transactions. Stronger demography normally traduces into higher demand for housing.

Another factor that affects the market is the health of the **economy**. Broadly speaking indicators such as the income and unemployment are important for house demand. The lower the unemployment, the higher housing demand. Higher income growth is also positive for housing demand.

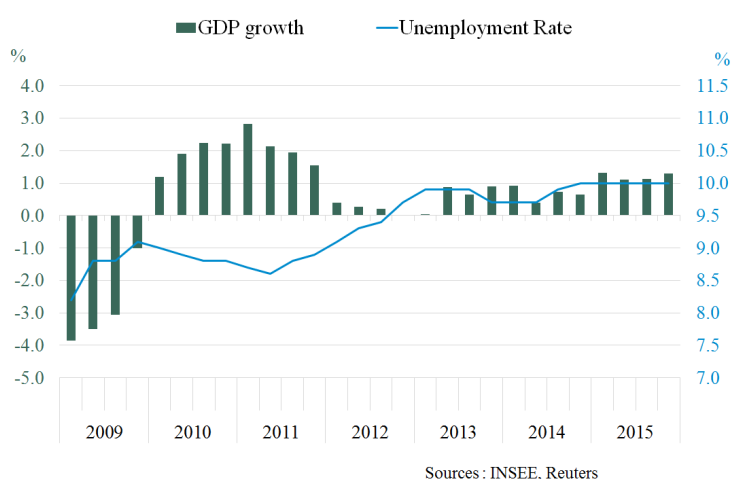


Figure 1.7 – Macroeconomic Data

For private investors, **mortgage rates** are one of the main indicators to invest in residential properties. The lower the interest rates, the lower is the cost of money, and private

investors have more incentives to engage in a long-term investment. The following graph shows how credit rates have decreased since 2009. The decrease in credit rates increase the number of housing loans in France (The index is inversed).

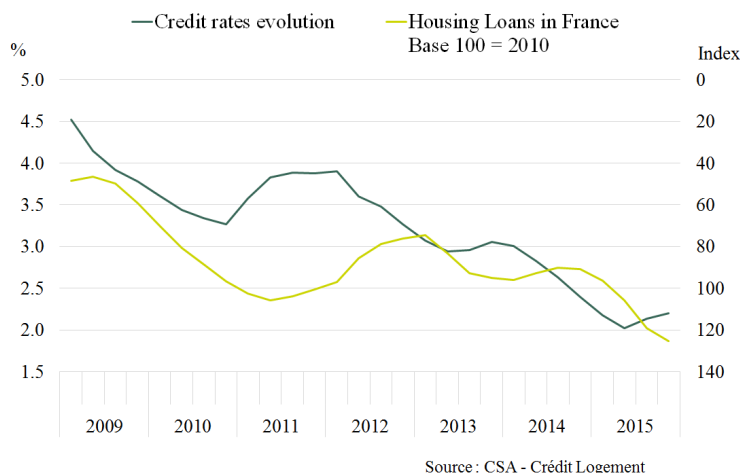
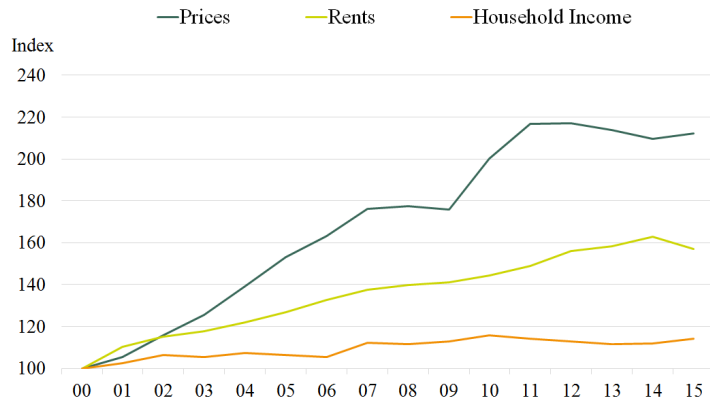


Figure 1.8 – Real Estate Financing

Since 2012 credit rates in France continued to decrease. In Q4 2015 they reached a historical low of 1.97 %. This stimulate investors to increase the demand for residential properties in Paris. This increase of demand restrains the number of properties available in the market, and explains why Paris suffers from a lack of supply. The increase of demand is also explained by the number of people that inflows into the city. The *population* is growing steadily in Paris, generating a need for dwellings which remains unsatisfied. Added to this, an increasing divorce rate creates additional **demand**. *The gap between demand and supply is actually widening.*

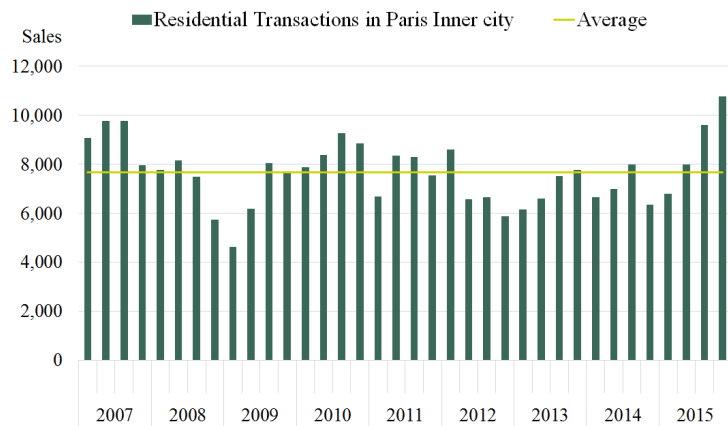
Legislation is also important in the residential market. Tax credits, deductions are ways the government can affect demand for housing, rents and prices. For example, rents in France are constrained by the *loi Alur*. This law was created by the French Government in 2014. The loi Alur affects the owners of residential properties. Roughly, it fixes a maximum chargeable rent paid by tenants. Due to the large number of institutional investors in the market, this type of **political regulation** affects the investment strategy of any institutional fund that decide to invest in the Parisian Residential Market.



Source : INSEE, Clameur, Orxford Economics

Figure 1.9 – Price vs: Rents and Household Income

In 2015, the **residential** total **sales** volume in Paris was 34,250 units, i.e. an increase by 20 % compared to 2014. This was quite remarkable, following the stagnation in activity of the last years. The increase of demand for this type of asset caused **residential prices** rose again in Q4 2015. In the fourth quarter of 2015, apartments' prices rose by an average +0.4 % over a year. The average price was €7,980/sq. m. at the end of 2015.



Source : INSEE and Chamber of Notaries of Paris - Île-de-France

Figure 1.10 – Residential Transactions in Paris

As it happened in the past, the effect of the increase of residential prices for Paris in 2015 is stronger than the rest of France. French and foreigners are moving to the Paris looking forward to have better job opportunities. The increase of demography increases the house demand, and restrains the available residential supply. This turn on an increase of house prices in the Parisian residential property market.

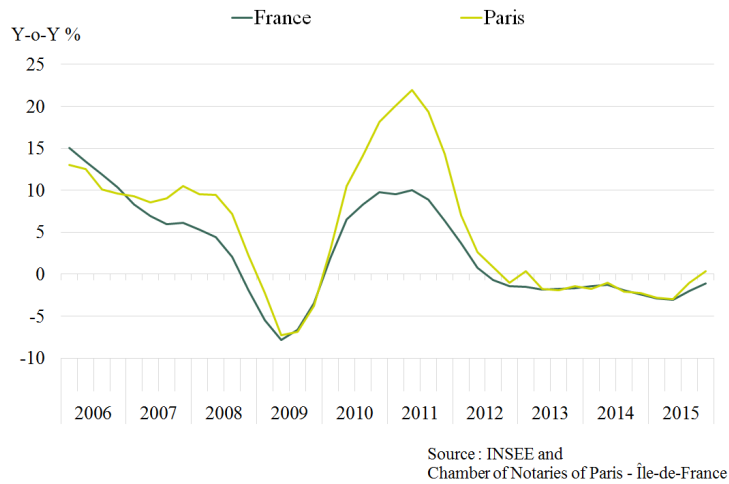


Figure 1.11 – Residential Price Changes

Most *private investors* prefer to think only in prices per square metre (€/sq m). This measure is useful to compare the price between different residential properties. They never look at yield they will obtain from investing in a residential property. They are only focus on either owning or letting the apartment, without any complex strategy. For instance, to create a real estate portfolio, and combining it with bond, and stock. On the other hand, *institutional investors* tend to think more in terms of yields. As described in section 1.1.1, on page 34, yields are easily comparable across different investment assets: bonds, real estate, stock. Prices, in monetary units, cannot compare prices across different investments. Yields give us the idea of pricing, although it is also need to consider the level of rent.

Let's continue by explaining how investors calculate their required yield (i.e. the Internal Rate of Return) to invest in a residential property.

1.3.2 Methodology

This section explains how to calculate the **Internal Rate of Return** (IRR) of a residential investment. For the analysis, let's consider a *private investor*, that in 2015 wanted to invest in a prime residential property in Paris. The investor didn't have any strategy, and so the investor decided to contact a property fund. The fund proposes different buildings and strategies. Finally the investor selects a residential building located in the 16th district of Paris.

Analysis of the Building

The building, let's called it building Alpha, has an overall surface of 3,415.6 sq meters, with a level of vacancy of 20 % at the end of 2015. It has three retail shops at street level, 23 apartments, and some attic rooms. The fund proposed the investor to buy the entire building, and hold it for a period of twelve years.

The fund proposes the investor a business plan to estimate the *IRR*. This return is going to be determined by the value paid for the property, and the future estimated cash flows of the building. To estimate the value of the the building the fund considers not only the building itself. The fund has valued each apartment, attic rooms, and shops separately. The first goal is to have a completely view about the building with the aim to be in position of making a good asking price. The second goal is to obtain the most precisely value of the expected Internal Rate of Return, IRR, to optimize the performance of the asset.

Table 1.9 – Residential Building. Summary

	Surface (sq m)	Vacancy (%)
Total area	3415.6	20
Residential		
23 Existing Dwellings	2576	15
Attics	297	100
Retail		
Shop A	326	
Shop B	33	
Shop C	184	

This section continues explaining how the fund manager estimates the cash flows to obtain the Internal Rate of Return, IRR. The objective of the investor is to attain a target return around 6 %.

1.3.3 To Estimate the Internal Rate of Return of a Residential Building

In the business plan, the fund manager proposed to hold the asset for 12 years, and he/she establishes some expectations based on different hypothesis. Those hypothesis are included in the estimated future cash flows. Let's describe how the fund estimates the Internal Rate of Return, IRR, for this investment.

The fund manager expected to buy the residential building in December 2015. The manager estimates that the 23 *apartments* are valued €21,603,448, and the 3 *retail shops* have a value of €7,228,723. Once the investor acquires the property, he/she would need to pay the *registration duties*, which the fund manager estimates to be €1,787,595. The sum of these three values formed the acquisition price, or Gross Asset Value (GAV).

The residential building has 80 % of occupancy, the investor will receive *rental income* from 2016. There are some apartments that are empty. The fund assumes it will take nine months to rent them. Rents are known before the acquisition, so the fund approximates about what the future income will be. The manager assumes residential rents will grow every year according to the Housing Rent Reference Index or, in french, indice de référence des loyers (IRL). The actual level of rents are conditioned by the law Alur. This law unable to set residential rents above a certain rental level, for instance 7 euro per square meter. This rental level is determined by a public organism called "Observatoire du Loyer de Paris". This rental level cannot be trespassed. In five years, the fund assumes some will be released. In 2019, as long as the are occupied, the rents paid by tenants will be adapted to the market rental levels.

Attic rooms were empty in 2015. They need a complete refurbishment. The fund assumes it will take three years to start renting them. Shops, located on the ground floor, are fully occupied, and also have very long leases. The fund expects to obtain a regular income, and rents will increase every year, as they are indexed to the Construction Cost Index (CCI) or, in french, indice du coût de la construction des immeubles à usage d'habitation (ICC). By adding the annual rental income obtained from the apartments, attic rooms, and shops the fund obtains the **Gross Rent**. The expected Gross Rent is €904,020 for 2016.

Aside from rental income, the fund also expects different **total works**. These are costs that include refurbishments of dwellings, building structure and expulsion fees. To estimate the cost of refurbishment of dwellings or apartments, the fund took into account

the current level of rent, and the condition of each facility. For instance, in case the apartment is empty, or in case the facilities needed some works. For those apartments that are occupied, the fund estimates higher costs for the apartments where tenants have been living since more than twenty years ago. For the apartments that are occupied since five years ago, the cost will be lower.

Attic rooms were empty, and they need a complete refurbishment. The fund assumes it will take three years to start renting them. Also, some attics were occupied by illegal tenants. The fund estimates some costs to put those tenants out.

The fund also includes as **total expenses** the costs of property management, refurbishments and capital expenditure, or CAPEX. The refurbishments include the cost to repair building's facade, the roof, and the complete refurbishment of the attic rooms. There are also some unrecoverable costs. These costs are the cost from tenants that do not pay their rents. For these cases the fund assumes it will take between one year or one year and a half to put them out. The fund also assumed that 12 % of tenants leave every year. This will also imply other costs.

Three years before the lifetime of the investment, the fund propose the investor to sale the building in units, not in block. This means to sale some apartments in year 2025, and others in 2026 and 2027. The three retail shops are sold in 2027. From each sale the fund include taxes for the gains in capital values obtained from the sale of apartments and shops. The fund also include a commission for sale that is paid to brokers. The disposal tax and broker fees form the **disposal proceeds**.

The **Unleveraged Cash Flow** is the sum of the (1) GAV, the (2) Gross Rent, (3) Total Works, (4) Total expenses, and (5) Disposal proceeds. The **IRR** obtained with equation 1.9 is 6.08 %. The investor expects that the fund attains an expected level of Internal Rate of Return. Results are shown in the following table:

Table 1.10 – The IRR of a Residential Building

	2015	2016	2017	2018	2019	2020	2021
Residential Apartments	-21,603,448						
Retail Shops	-7,228,723						
Registration duties	-1,787,595						
Acquisition Price (GAV)	-30,619,766						
Dwellings Rent		617,373	709,833	722,255	736,917	800,452	813,579
Attics Rent		0	0	0	90,388	92,106	93,616
Retail Rent		286,646	290,258	296,697	302,397	307,658	314,363
IRL	0.3	0.73	1.45	1.75	2.03	1.9	1.64
ICC	0.15	0.5	1.26	1.51	1.15	0.9	1.26
Gross Rent		904,020	1,000,091	1,018,953	1,129,703	1,200,216	1,221,559
Dwelling refurbishment		-185,789	-185,789	-185,789	-185,789	-185,789	0
Other refurbishments (lift, etc.)		0	-669,222	-669,222	0	0	0
Expulsion fees		0	-20,000	0	0	0	0
Total Works		-185,789	-875,011	-855,011	-185,789	-185,789	0
Property Management Fees		-5,160	-5,225	-5,341	-5,443	-5,538	-5,659
Roof renovation		0	-224,007	-224,007	0	0	0
Facade		0	-172,877	-172,877	0	0	0
Other capex		0	-35,695	-35,695	0	0	0
Annual CAPEX		0	0	0	0	0	-48,862
Unrecoverable expenses		-46,847	-48,253	-49,700	-51,192	-52,727	-54,309
CRL		-19,017	-21,374	-21,765	-24,463	-26,160	-26,609
Total expenses		-132,565	-576,385	-579,547	-160,673	-169,891	-288,497
Residential disposal							
Retail disposal							
Broker fees							
Disposal proceeds							
Unleveraged Cash Flow	-30,619,766	585,665	-451,305	-415,605	783,241	844,535	933,062
IRR	6.08 %						

	2022	2023	2024	2025	2026	2027
Residential Apartments						
Retail Shops						
Registration duties						
Acquisition Price (GAV)						
Dwellings Rent	825,376	836,106	846,808	857,647	549,215	288,763
Attics Rent	94,974	96,208	97,440	98,687	99,950	101,230
Retail Rent	322,745	332,716	339,437	346,294	353,289	360,425
IRL	1.45	1.3	1.28	1.28	1.28	1.28
ICC	1.66	1.99	2.02	2.02	2.02	2.02
Gross Rent	1,243,095	1,265,030	1,283,685	1,302,628	1,002,454	750,417
Dwelling refurbishment	0	0	0	0	0	0
Other refurbishments (lift, etc.)	0	0	0	0	0	0
Expulsion fees	0	0	0	0	0	0
Total Works	0	0	0	0	0	0
Property Management Fees	-5,809	-5,989	-6,110	-6,233	-6,359	-6,488
Roof renovation	0	0	0	0	0	0
Facade	0	0	0	0	0	0
Other capex	0	0	0	0	0	0
Annual CAPEX	-49,724	-50,601	-51,347	-52,105	-40,098	-30,017
Unrecoverable expenses	-55,938	-57,616	-59,345	-61,125	-62,959	-64,848
CRL	-27,043	-27,467	-27,849	-28,237	-20,645	-14,255
Total expenses	-293,791	-298,969	-303,960	-309,049	-236,182	-178,538
Residential disposal				13,534,824	11,690,935	16,904,848
Retail disposal				0	0	9,386,788
Broker fees				-406,045	-350,728	-554,079
Disposal proceeds				13,128,779	11,340,207	25,737,556
Unleveraged Cash Flow	949,303	966,062	979,725	14,122,358	12,106,479	26,309,435

IRR

1.3.4 Summary

This case study explained the main drivers of the residential property market. The increase in demography normally translates into higher demand for housing. The demand for housing will depend on the economic growth. The level of employment sustains part of the economic growth. Higher levels of income and unemployment will also increase the housing demand. Of course, the cost of money will affect the housing demand. Lower interest rates rise the number of housing loans and the demand for residential properties. As long as housing demand increases, the number of residential properties restrains, and this causes an increase in residential prices. Political regulations are used by public organisms to control housing demand, rents and prices. Every regulation concerns investors because regulations affect investment strategies of any institutional fund. The case study ends with an example of a fund that elaborates for an investor an investment plan to buy a residential property, and it shows how the fund calculates the Internal Rate of Return (IRR).

1.4 Annex: The Gordon Growth Model Applied to Property Market

The Gordon growth model¹⁷ is used in finance to determine the price of a financial asset. According to this model, the price of an asset is determined by the expected income the asset will generate in the future. If this concept is applied to real estate, the value of a property today is determined by the expected rental income the property will generate. Let's assume the rental income grows every year, to infinity, at a constant percentage rate, g .

$$PV = \sum_{t=1}^{\infty} \frac{NI_t}{(1+i)^t} \quad (1.13)$$

$$= \frac{NI_1}{(1+i)} + \frac{NI_2}{(1+i)^2} + \dots \quad (1.14)$$

- $PV = P_0$ is the present value, the commercial building
- NI_t is the net operating income received for the lease at the end of period t
- i is the discount rate, also defined as the opportunity cost of capital

Although commercial rents don't grow at a constant rate up to infinite. The works of Sivitanidou and Sivitanides (1999), Case, Goetzmann, and Rouwenhorst (2000) and Sivitanides et al. (2001) describe the cycle behaviour of rents. For instance, after an expansion period office rents revert to its long term average. The behaviour of office rents is affected by factors as indexation (e.g. a consumer price index; except for U.K.), vacancy rate, and lease length. A general solution for this equation does not exist as rents do not grow to infinite. However, property valuers apply to this equation some restrictions to be able to price property values. Let's see some assumptions to explain the difference between the property risk premium and the yield gap:

1. Net Income and Income Return grow at a constant rate, in **one period**, $T = 1$ year
2. Net Income and Income Return grow at a constant rate, in **four years**, $T = 4$ years
3. Net Income and Income Return grow at a constant rate, **up to infinite**, $T \rightarrow \infty$

¹⁷For more information, please go to section 1.1.3, on page 38

1.4.1 Net Income and Income return grow at a constant rate, in one period, $T = 1$

Let's suppose an investor wants to buy an office building. Let's assume there are no transaction costs, and the time horizon for the investment is only one year. After one year the investor sells the building at price, $E[P_1]$. The present value of this building is represented in the following equation:

$$P_0 = \frac{NI_1}{(1+i)} + \frac{E[P_1]}{(1+i)} \quad (1.15)$$

$$(1+i)xP_0 = NI_0x(1+g) + E[P_1] \quad (1.16)$$

$$ixP_0 = NI_1 + E[P_1] - P_0 \quad (1.17)$$

$$i = \frac{NI_1}{P_0} + \frac{E[P_1] - P_0}{P_0} \quad (1.18)$$

- NI_t is the actual net operating income received for the lease at period t. For instance, at the end of year 1 the net income is NI_1 . At the initial investment period, the net income was NI_0 . Between period 0 and 1, it is assumed that rental income grows at a constant rate, g. So $NI_1 = NI_0x(1+g)$. In case the building is empty, and so there are no leases, the net operating income would be zero
- Then $E[P_{t+1}]$ is the expected selling price one year later
- i is the discount rate

Let's now incorporate the following assumptions into equation 1.18:

- The property is sell in one year, and the investor is expected to obtain a value of $E[P_{t+1}] = P_1$
- As office rents are indexed to a consumer price index, in one period (i.e. period 1), the rent is expected to grow at a rate of "g" per cent. The net operating income expected by the investor will be:
 - In period 0: $NI_1 = NI_0(1+g)$
- At the end of period 1 the rent is expected to continue to grow a rate of "g" per cent:

- In year 1: $NI_2 = NI_1(1 + g)$
- When the investor purchased the property he paid a price of P_0 . In one period he expects to obtain a net operating income of NI_1 . Therefore, when the investor bought the property he obtained a Net Initial Yield of:

$$\text{- period 0: } IY_0 = \frac{NI_1}{P_0}$$

- In one period, the investor pretends to sell the property for P_1 . In one year the expected net operating income will be NI_2 . As the initial yield is the ratio of the expected net operating income in one period respect to the value of the property, when the investor sells the property he/she expects to obtain a net initial (exit) yield of:

$$\text{- period 1: } IY_1 = \frac{NI_2}{P_1} \rightarrow P_1 = \frac{NI_2}{IY_1} = \frac{NI_1(1+g)}{IY_1}$$

- The Net Initial Yield has grew at a constant rate of " θ " between period 1 and period 0:

$$\text{- period 1: } IY_1 = IY_0(1 + \theta)$$

Let's introduce assumptions above into equation [1.18](#)

$$i = \frac{NI_1}{P_0} + \frac{P_1 - P_0}{P_0} \tag{1.19}$$

$$i = \frac{NI_1}{P_0} + \frac{P_1}{P_0} - 1 \tag{1.20}$$

$$i = \frac{NI_1}{P_0} + \frac{\frac{NI_1x(1+g)}{IY_1}}{P_0} - 1 \tag{1.21}$$

$$i = \frac{NI_1}{P_0} + \frac{NI_1x(1+g)}{IY_1xP_0} - 1 \tag{1.22}$$

$$i = IY_0 + \frac{NI_1x(1+g)}{IY_0x(1+\theta)xP_0} - 1 \rightarrow IY_0 = \frac{NI_1}{P_0} \tag{1.23}$$

$$i = IY_0 + \frac{(1+g)}{(1+\theta)} - 1 \tag{1.24}$$

At the end of section [1.1.3](#) is explained the difference between the discount rate and the required property return. The required property return is the following equation:

$$RFR_0 + RP_0 = IY_0 + \frac{(1+g)}{(1+\theta)} - 1 \quad (1.25)$$

$$RP_0 = IY_0 - RFR_0 + \frac{(1+g)}{(1+\theta)} - 1 \quad (1.26)$$

$$RP_0 = YG_0 + \frac{(1+g)}{(1+\theta)} - 1 \quad (1.27)$$

Where:

- $i = RFR_0 + RP_0$ the discount rate, or the required/target property return, $RETR_0$
 - RFR_0 is a risk-free asset return at the beginning of the investment.
 - RP_0 is the property risk premium in year zero
- IY_0 is the initial yield. Van Wouwe, Berkhout, and Tansens (2008, p.241) already stated that the office initial yield "includes the implicit future expectations regarding real estate." For example, when a real estate market is expanding above historical levels, Office Net Initial yields are low and rents continue to grow. Due to the widely believe that real estate markets are mean-reversion, despite the initial yield is low, real estate practitioners may form expectations about the possibility that yields and rents increase or decrease respectively in the future
- YG_0 is the yield gap, in year zero: $YG_0 = IY_0 - RFR_0$
- g is the rate that increases the net operating income
- θ is the year-on-year change of the initial yield. In the assumptions mentioned above, θ is the change between the initial yield obtained, when the investor bought the property, and the initial yield the investor obtained from the sell of the property

It is possible to see here that the property yield gap is a component of the property risk premium. The yield gap equals the property risk premium if, and only if, there is no rental growth, and no change in property yields. Only when office rents and yields grow, the concepts of yield gap and the risk premium are not the same.

1.4.2 Net Income and Income Return grow at a constant rate, for certain period, $T = 4$

Let's now suppose the investor wants to hold the asset for 4 years. Let's represent this with the following equation:

$$P_0 = \frac{NI_1}{(1+i)} + \frac{NI_2}{(1+i)^2} + \frac{NI_3}{(1+i)^3} + \frac{NI_4}{(1+i)^4} + \frac{E[P_4]}{(1+i)^4} \quad (1.28)$$

$$P_0 = \frac{NI_0(1+g)}{(1+i)} + \frac{NI_0(1+g)^2}{(1+i)^2} + \frac{NI_0(1+g)^3}{(1+i)^3} + \frac{NI_0(1+g)^4}{(1+i)^4} + \frac{E[P_4]}{(1+i)^4} \quad (1.29)$$

- NI_t is the actual net operating income received for the lease at period t. It is also assumed here the rent income grows at a constant rate, g
- Then $E[P_{t+4}]$ is the expected selling price in year 4
- i is the discount rate

It is tedious to take out the discount rate from a quadratic polynomial equation. It is not possible to resolve the equation, and unable to see the difference between the property risk premium and the yield gap.

1.4.3 Net Income and Income Return grow at a constant rate, up to infinite, $T \rightarrow \infty$

In this case, it is assumed that the net income and the income return increase at a constant rate up to infinite.

$$P_0 = \frac{NI_0(1+g)}{(1+i)} + \frac{NI_0(1+g)^2}{(1+i)^2} + \dots + \frac{NI_0(1+g)^T}{(1+i)^T} \quad (1.30)$$

- NI_t is the net operating income received for the lease at period t
- i is the discount rate

In mathematics, a geometric series is the sum of successive constant ratios up to infinity. In the previous equation, the common constant ratio is $A = \frac{(1+g)}{(1+i)}$. Let's multiply the previous equation by the constant ratio, which it's defined as A :

$$AxP_0 = \frac{NI_0(1+g)^2}{(1+i)^2} + \frac{NI_0(1+g)^3}{(1+i)^3} + \dots + \frac{NI_0(1+g)^{T+1}}{(1+i)^{T+1}} \quad (1.31)$$

This new equation is almost exactly the same as the original geometric series. It is only missing the first term. Let's now subtract this new equation to the original equation:

$$P_0 - AxP_0 = \frac{NI_0(1+g)}{(1+i)} + \frac{NI_0(1+g)^{T+1}}{(1+i)^{T+1}} \quad (1.32)$$

$$(1-A)xP_0 = \frac{NI_0(1+g)}{(1+i)} \left(1 + \frac{NI_0(1+g)^T}{(1+i)^T} \right) \quad (1.33)$$

$$P_0 = \frac{\frac{NI_0(1+g)}{(1+i)} \left(1 + \frac{NI_0(1+g)^T}{(1+i)^T} \right)}{1 - \frac{(1+g)}{(1+i)}} \quad (1.34)$$

$$P_0 = \frac{\frac{NI_0(1+g)}{(1+i)} \left(1 + \frac{NI_0(1+g)^T}{(1+i)^T} \right)}{\frac{1+i-1-g}{(1+i)}} \quad (1.35)$$

$$P_0 = \frac{NI_0(1+g)x \left(1 + \frac{NI_0(1+g)^T}{(1+i)^T} \right)}{i-g} \quad (1.36)$$

If $T \rightarrow \infty$

$$P_0 = \frac{NI_0(1+g)}{i-g} \quad (1.37)$$

$$i-g = \frac{NI_0(1+g)}{P_0} \quad (1.38)$$

$$i = IY_0 + g \quad (1.39)$$

The discount rate, or the required property return, taking into account the higher risk exposure, is:

$$RFR_0 + RP_0 = IY_0 + g \quad (1.40)$$

$$RP_0 = IY_0 - RFR_0 + g \quad (1.41)$$

$$RP_0 = YG_0 + g \quad (1.42)$$

Where:

- $i = RFR_0 + RP_0$ the discount rate, or the required or target property return, $RETR_0$
 - RFR_0 is a risk-free asset return at the beginning of the investment
 - RP_0 is the property risk premium
- YG_0 is the yield gap in year zero
- g is the rate the net operating income increases

The property yield gap is a component of the property risk premium. The property yield gap equals the property risk premium if there is no property income growth. As office rents grow at a rate, g , the concepts of yield gap and the risk premium are not the same.

CHAPTER 2

Historical vs. Expected Property Risk Premium

This chapter presents two case studies. The first study uses two approaches (i.e. the economic and financial models) to explain the historical property risk premium in the Central London Office Market. The second study considers country risk and property risks to estimate an expected property risk premia. A risk-free rate is going to add to the expected premia to form an average of investors' required property return. Then, the required return is compared to market forecasts. Investors will invest in markets where the expected property return exceeds investors' required return.

Keywords. Historical Property Risk Premium, Expected Property Risk, Real Estate Target Return, Real Estate Expected Return

2.1 Historical (Ex-Post) Property Risk Premium. Two Case Studies: Economic or Financial Approach?

This section tries to explain the historical premium in the Central London office market with two approaches. The first approach uses elements based on economic drivers, real estate fundamentals, and financial data. The other approach, inspired by the Gordon growth model, focuses on proxies for the components of the total return: the income return, and the capital growth.

2.1.1 Introduction

Section 1.1.2 refers to the property premium as the investor's requirements to invest in property. To simplify, this section considers the Property Index as the average investors' requirements to invest in real estate. Investors' requirements are made today based on future expectations. However, in this section the historical premium is analysed based on past performances. The reason to analyse the historical risk premium is that investment requirements are based on investors' expectations. Their expectations are generally formed keeping an eye on past and current property returns and bond yields.

To analyse the historical property risk premium, this research uses the Central London office market because it's a very transparent and liquid market. The goal is to extend the analysis made by the academic literature, and to unravel what determined the historical risk premium in real estate.

Based on equation 1.5, the historical property premium is the difference between the Office Total Return, and the return of a riskless asset. This study used the Office Total Return (YoY %) in the Central London Total Return¹, and the 10-year UK Gilt yield (% End of Year)². Both are on a quarterly basis, and in nominal terms. Figure 2.1 displays both series from Q1 2001 to Q1 2014. The third series is difference between both series, and it's the historical property risk premium in the Central London office market. The premium seems to be that of the total return, and the reason is that the performance of the Gilt is very low compared to that of the Central London office market.

¹Source: MSCI/IPD

²Source: Datastream

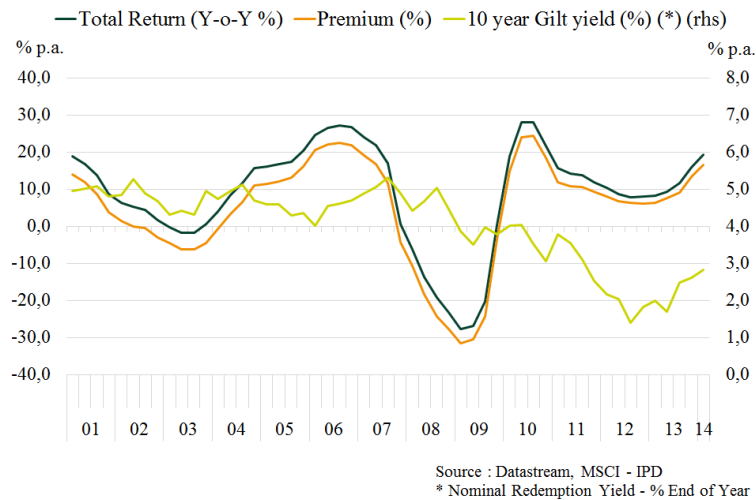


Figure 2.1 – Property Total Return vs. 10-year Gilt yield

The historical commercial risk premium is on average 5.03 %. This number is important because it helps investors to understand what is the long-term risk premium is in real estate. Investors ask: do large variances from the long-term average of the property risk premium represent signals to buy or sell an office building? To answer this question it is useful to compare the property risk premium with the AREFF³ net flows⁴:

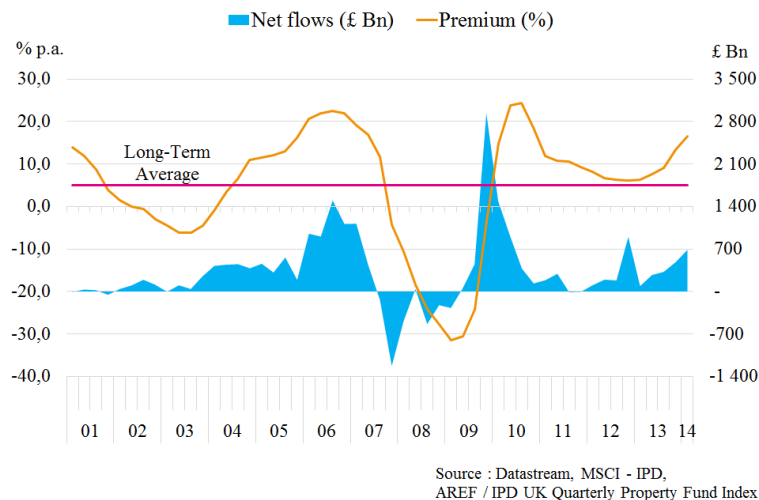


Figure 2.2 – The Historical Property Risk Premium vs. AREF Net Flows

England had an expansion of its economic cycle from Q3 2003 to Q1 2007. Investors were inclined to move up the risk curve. They tended to release investments that offer low

³AREF is the Association of Real Estate Funds and collects information from U.K. property funds that are members of this association. In December 2014, the Net Asset Value of properties under management was £58 bn. Along with MSCI/IPD, they construct a property fund index to analyse the performance of property funds

⁴The Net flows series is the difference between property values sold and property values bought by U.K. property funds

returns (e.g. UK government bonds), and they looked for alternative investments that provided higher yields. The easing of UK economic activity increase the need for office space, and rents in the Central London market rose as long as the available commercial space started to lessen. Some investors decided to invest in commercial properties who seek for income growth potential. This is reflected in the positive net flows of the AREF series. The value of properties U.K. property funds sold was higher than the value properties they bought.

Both the increase of demand for commercial properties, and the scare of office buildings available in the market caused an increase of commercial property values and this increased its total returns. As a result, the historical property risk premium rose in that period. Indeed, even though the UK gilt yield also increased⁵, this was not so steady compared to that of the total property return. In figure 2.1 it is possible to observe how UK gilt yields increased from Q1 2006 up to Q3 2007. When gap between the historical property risk premium and its long-term average increases, this is a sign that the commercial market was getting perilous. The ex-post property risk premium reached its maximum in Q4 2006. Office rents were too high for tenants, and the price paid for the office buildings was exorbitant. The risk of devaluation of rents and property values was too high.

Economic and property activity slowed down sharply early in 2007. It was the beginning of the subprime mortgage crisis. The excess of mortgage loans with low guarantees caused foreclosures in residential properties. This also affected to the London office market. The slowdown in economic activity caused tenants to release office space. Property rents decreased, and property funds started selling office buildings⁶, as they observed property values and property total returns started to decline. The level of uncertainty spread out across the global economy. Due to the increase of turmoil in world economies, investors increased their demand for safe investments, such as long-term UK gilts. This rise in demand for bonds increased their price, and it reduced the yield paid by the government. The reduction in both the property Total Return and the 10 year Gilt yield reduced the historical property risk premium. By late 2009, the UK commercial market entered a period with negative property risk premium. The devaluation of properties was so strong at that time that commercial total returns became negative⁷.

In Q3 2009 the UK economy, as well as the commercial rents and capital values, started

⁵When investors sell bonds, the price of government bonds decrease, and this raises the bond yield

⁶Please note in figure 2.2 that Net flows of AREF series declined in the early 2007

⁷The property capital value is the most volatile component of the total return, as it depends on the value of properties

to gain momentum. Property funds took advantage of the low commercial values, and rapidly invested in office buildings. The rebound of the property risk premium occurred very fast as the long-term gilt yield continued to decrease. After a slight slowdown of the economy between 2011 and 2012, the UK economy continued its steady growth. The increase in office rents and capital values increased total property returns. Property funds started to sell U.K. bonds, and they shifted capital into real estate. The Property risk premium continued to climb as the increase in total returns was higher than the increase in gilt yields.

The historical property risk premium changes over time. This thesis assumes that changes in the premium is caused by variables that affect it. The analysis of the premium is tackled by using two case studies: (1) The Economic Approach, and (2) the Financial Approach. Each approach deems variables (also referred to as sources or risk) that explain changes in the historical property risk premium. The first approach estimates the premium through economic, financial and property variables. The second approach, inspired by the Gordon growth model, uses proxies of the main components of the property total return.

2.1.2 The Economic Approach

This approach considers economical, financial factors, and some real estate fundamentals, to explain the changes in the historical property premium. Let's first review some academic articles.

Literature review

Brooks and Tsolacos (1999) identify some macroeconomic and financial variables that have an impact on the **FTSE Property Total Return Index**. They use a *VAR model* with some lags. The variables they consider: **rate of unemployment**, **nominal short-term interest rate**, **interest spread**, **unanticipated inflation**, and **dividend yield**. All variables are on a monthly basis. Results show that most of the changes in the total property return are due to the lagged values of the real estate variables. Even though the impact of unexpected inflation and interest rate term spread in the total property return is not that strong, there is evidence that both series have a contemporaneous effect on property returns.

Chan, Hendershott, and Sanders (1990) evaluate risk-adjusted returns of different REITs that are traded on the main stock exchanges (NYSE, AMEX and NSDAQ). For this they use a multifactor Arbitrage Pricing Model. The dependent variable is the equally-weighted equity REIT return series less the one-month bill rate. In a sample of 30 equally weighted returns, during the period 1973-87, they regress the excess of return with *cross-section* on five macroeconomic factors: (1) **industrial production**, the (2) change in **expected inflation**, (3) **unexpected inflation**, the (4) **difference in returns of low-grade corporate bonds and long-term Treasury bonds**, and the (5) **difference in the returns between the long-term Treasury bonds and the one-month T-bill rate**. Results show that unexpected inflation, and changes between a low-grade corporate bond and long-term Treasury bonds, drive equity REIT returns.

Chen, Hsieh, and Jordan (1997) compare the Factor Loading Model, FLM, and the Macroeconomic Variable Model, MVM, to explain the property returns. The REITs equity return is used as a proxy for the property return. Both models are implementations of the Arbitrage Pricing Theory, and the only difference between the two is the factors considered. The FLM uses factors derived from portfolio securities traded on the NYSE. The MVM considers five macroeconomic variables as factors: (1) the **unanticipated inflation rate**, (2) the change in **expected inflation**; (3) the **difference in return**

between the long-term government bonds and the U.S. Treasury bills; (4) the unanticipated change in risk premium (i.e. **yield spread between high and low rated industrial bonds**); the (5) unanticipated change in the **growth rate of industrial production**. Using a 6-year sample of monthly equity REIT returns, both models are estimated using the *Ordinary Least Squares*. Although both models lead to similar results, the MVM model reveals more explanatory power to explain the behaviour of the REITs equity return.

The study of Naranjo and Ling (1997) consider four real estate portfolio groups. Each group has one of the following total property return: (1) the equity REITs return (Source: CRSP⁸); (2) the appraisal-based return by geographical division (Source: NCREIF); (3) the appraisal-based return by region and property type (Source: NCREIF); (4) a combination of the appraisal-based return by region (Source: NCREIF) and region capitalization rate (source: ACLI⁹). From each property return, they reduced the three-month Treasury bills (Source: CRSP) to obtain four property risk premium. They use *cross-section* to regress each premium respect to different factors. The factors that systematically affect the property returns are: the (1) **growth rate in real per capital consumption**; (2) the **real T-bill rate**; and (3) the **spread between long and short-term interest rate bonds**.

Brooks and Tsolacos (2001) assume a financial spread, also called yield curve, contains information that explains the property returns. The yield curve is defined as the *difference between the long-term and short-term interest rates*¹⁰. The authors use this spread to forecast the **UK Property Index return**. They use an unrestricted reduced-form *vector autoregressive model* with different lags to capture the interdependence between two financial variables: the (1) **spread between the 20-year government bond and the three-month Treasury bill**, and the (2) **gilt-equity yield ratio**¹¹. Their results show that financial spreads help in forecasting property returns in a short forecasting horizon. However, as the forecasting horizon expands the capacity of financial spreads reduces its explanatory power.

McGough, Tsolacos, and Olkkonen (2000) forecast property returns in the CBD area of the Helsinki office market. For this they use two specifications: the short-run and the long-run. They assume that the variation in office property is caused by economic,

⁸CRSP: The Center for Research in Security Prices

⁹ACLI: the American Council of Life Insurance Companies

¹⁰When the *yield slope moves upwards*, the return in long-term investment return is higher than short-term investment return. This scenario generally appears in an expanding economy

¹¹This is the ratio of the yield on 20-year government bonds and the dividend yield on the FTSE100

monetary, and financial components. Using *ordinary least squares* they regress the office total returns with respect to (1) the **gross domestic product**; (2) all **stock return index** adjusted for inflation, and (3) the **long-term interest rates** as a proxy return on government bonds. Results show that the gross domestic product, a proxy for demand for office space, is the exogenous variable that drives most changes in the office property market return in Helsinki. This relationship is positive.

De Wit and Van Dijk (2003) use different macroeconomic and real estate variables to examine the determinants of the direct office total returns. They analyse the determinants in major office markets in Asia (13), Europe (24), and the United States (9) on a quarterly basis. They use the *generalized method of moments* and they build up a panel-data model. They find that **gross domestic product, inflation, unemployment, vacancy rate**, and the **available stock** have an effect on the total office returns.

Sivitanidou and Sivitanides (1999) first assume and define a short-run partial equilibrium of the listed *office capitalization rates*¹². The deviation of the office capitalization rate is caused by exogenous factors that affect the **discount rate**, reflecting the risk, the opportunity cost of capital; and the **expectations in income growth**. The authors consider different local-fixed office market characteristics, and both time-variant characteristics of the office and the capital market that affect the capitalization rate. They also find the persistence across markets of different factors over time. To tackle this they use a non-linear seemingly unrelated regression, that accounts for the *cross-section* of correlated errors of specific metropolitan areas. The average capitalization rates for 17 office markets is obtained from the NREI¹³ on a quarterly basis. The remaining variables are obtained from different sources. The results unravel the decisive role of local-fixed (such as location, diversity of demand from tenants, and government tenant mix) and time-variant office market features (such as the **net absorption, vacancy rates, office employment, rental income growth**) in shaping the capitalization rate. They also highlight the secondary role of national capital market characteristics impact on the capitalization rate¹⁴.

Two years later Sivitanides et al. (2001) analysed the average of listed capitalization

¹²The equilibrium capitalization rate depends on the discount rate and the expected income growth rate

¹³NREI stands for the National Real Estate Index. This database includes equity REITs, and others.

¹⁴The authors consider the stock exchange as an opportunity cost of capital for real estate. If stock returns are performing well, that will induce property investors divert capital out of the real estate market into the stock market. Therefore, an increase of the stock market returns will induce investors to demand a higher required total return to invest in property

rates of different property sectors ¹⁵, across 14 metropolitan areas. They used the same equation for each sector. They regressed the *capitalization rate* with respect to different local and national factors: (1) the **real rent index**, (2) the **annual percentage change of the real rent index**, (3) the **10-year Treasury rate**, (4) the **annual percentage change of the Consumer Price Index**. In the regression they use a *time-series cross section model*. The data of the capitalization rates comes from the NCREIF, and it is on a quarterly basis. They find that local factors are significant in explaining changes in property capitalization rates. The effect of these factors differs across markets, due to specific market characteristics. They also find that the capitalization rates obtained from the NCREIF database form expectations about future income growth that look backward instead of forward. For instance, when office market rents are high with respect to the long-term average, "capitalization rates are low rather than being high in anticipation of the mean reversion" (Sivitanides et al., 2001, p.27).

¹⁵The property sectors are: office, industrial, retail, and residential

Table 2.1 – The Economic Approach. Synthesis of Literature Review

Authors	Title	Endogenous Variable	Location	Sector	Model	Explanatory Variables
Brooks and Tsolacos (1999)	The impact of Economic and Financial Factors on UK Property performance	FTSE Property Total Return Index	UK	REITs	VAR	(1) Unemployment rate (2) Nominal Short-term Interest rate (3) Interest spread (4) Unanticipated inflation (5) Dividend yield
Chan, Hendershott and Sanders (1990)	Risk and Return on Real Estate: Evidence from Equity REITs	Equity return less one-month bill rate	NYSE, AMEX, NSDAQ	REITs	Cross-Section	(1) Industrial production (2) Change in expected inflation (3) Unexpected inflation (4) Difference in returns between the low-grade corp. bond and Long-term Treasury bonds (5) Difference in returns between the long-term Treasury bonds and one-month T-bill rate

Authors	Title	Endogenous Variable	Location	Sector	Model	Explanatory Variables
Chen Hsieh, and Jordan (1997)	Real Estate and the Arbitrage Pricing Theory: Macrovariables vs. Derived Factors	Equity return	NYSE	REITs	Ordinary Least Squares	(1) Unanticipated inflation rate (2) Change in expected inflation (3) Yield spread between the long-term government bonds and the U.S. Treasury bills (4) Yield spread between high and low rated industrial bonds (5) Unanticipated change in the growth rate of industrial production
Ling and Naranjo (1997)	Economic Risk Factors and Commercial Real Estate Returns	Equity return less three-month Treasury Bill	CRSP NYSE AMEX NASDAQ NCREIF	REITs	Cross- Section	(1) Growth rate in real per capita consumption (2) The real T-bill rate (3) Yield spread between 10y Treasury bond and the 3-month Treasury bill (4) Unexpected Inflation
Brooks and Tsolacos (2001)	Forecasting Real Estate Returns using Financial Spreads	Property Total Return	UK	REITs	VAR	(1) spread between the 20-year government bond and the three-month Treasury bill (2) Gilt-equity yield ratio

Authors	Title	Endogenous Variable	Location	Sector	Model	Explanatory Variables
McGough and Tsolacos (2000)	The Predictability of Office Property Returns in Helsinki	Total Return	Helsinki, Finland	Office	Ordinary Least Squares	(1) Gross Domestic Product (2) Stock Return Index (3) Long-term interest rate
De Wit and Van Dijk (2003)	The Global Determinants of Direct Office Real Estate Returns	Total Return	Asia Europe USA	Office	Generalized Method of Moments	(1) Gross Domestic Product (2) Inflation (3) Unemployment (4) Vacancy rate (5) Available stock
Sivitanidou and Sivitanides (1999)	Office Capitalization Rates: Real Estate and Capital Market Influences	Capitalization Rate	NREI	Office	Cross-Section	(1) Net Absorption (2) Vacancy rate (3) Office employment (4) Rental income growth
Sivitanides, Southard, Torto, and Wheaton (2001)	The Determinants of Appraisal-Based Capitalization Rates	Capitalization Rate	NREI	Office, Industrial, Retail, Residential	Cross-Section	(1) Real rent index (2) The change of real rent index (3) 10y Treasury rate (4) The change of the Consumer price index

Description of Variables

Twenty-five variables were initially selected to describe the property premium. Most of them are based on the articles mentioned above. However, there is a risk to include more variables in a model than needed. Some variables may be irrelevant to explain the premium. But it also exists the risk to exclude significant variables. To help on this decision, this thesis uses the **Principal Component Analysis** (PCA) technique to reduce the number of variables. Roughly, this method uses correlations between variables to explain components that capture the maximum variance (i.e. information) in the data. From results obtained in the PCA (see Annex 2.4, on page 150), this research uses 5 variables to explain the changes in the historical property risk premium: (1) the UK employment (UK EMP), (2) the Vacancy Rate (VAC), (3) the Net Additions (NAD), (4) the Financial Stock Exchange (FTSE100), and (5) the Yield Curve (TERM). Let's look at the variables more in detail:

Table 2.2 – Economic Approach. Factors affecting the Historical Property Premium

Variable	Description	Source
Endogenous		
Π_t	The Historical Property Risk Premium (%) in the Central London Office Market	(1)
Exogenous		
Economy		
UK EMP _t	UK Employment (YoY %)	Datastream
Office Market		
VAC _t	Vacancy rate (%)	BNP Paribas Real Estate
NAD _t	Net Addition (YoY %)	BNP Paribas Real Estate
Financial Market		
FTSE100 _t	FTSE 100 UK Total Return (YoY %)	Datastream
TERM _t	The Yield Curve (2)	Datastream
Notes		
(1)	It is the difference between the Office Total Return (YoY %) (Source: MSCI), and the 10-year UK Gilt yield (YoY %) (Source: Datastream)	
(2)	It is the difference between the 10-year UK Gilt yield (% End-of-Year) and the 3-month Libor (%) (source: Datastream)	

The data of the five variables is on a quarterly basis, with a sample that goes from Q2 2001 to Q1 2014, and 52 observations.

The Economic Model

This thesis assumes that there is a linear relationship between the historical property risk premium and the explanatory variables:

$$\begin{aligned}\Pi_t = & \beta_0 + \beta_1 UK EMP_t + \beta_2 VAC_t + \beta_3 NAD_t + \beta_4 FTSE100_t + \\ & + \beta_5 TERM_t + \varepsilon_t\end{aligned}$$

In this model, an increase of (1) the UK employment (UK EMP), (2) the Financial Stock Exchange (FTSE100), and the (3) Yield Curve (TERM)¹⁶ is expected to cause a **positive** impact on the property premium, caused by . On the other hand, a **negative** impact is expected for the (4) Vacancy Rate (VAC). The sign for (5) net additions (NAD) is undetermined. Let's describe how each variable affects the premium:

- **UK employment**

As long as economic activity increases, employment and production levels rise. The need for space induces private companies to relocate their activities. In case there are no new office developments, the office rents rise due to the increase in demand for space. Both rents and property values increase, but generally the increase in capital values is superior. Then, the capital growth offsets the decrease in the income return and the property total return increases. In case the riskless return remains constant, the historical property risk premium also increases.

- **Vacancy Rate**

An expansion of the economic property cycle creates jobs and the need for office space. If there aren't new office deliveries, the buildings available in the market scarce due to the high demand. Rents and commercial property values rise. The high increase of property values over the decrease in the income return increases the office total return increases, and so the historical premium.

- **Net Additions**

An increase in demand for office space, with no new deliveries, induce rents to grow. The rise of rents encourages developers to build up new commercial prop-

¹⁶This is the difference between the long and short-term interest rates

erties. If this happens, as long as new office space is introduced in the market, rents will rise or decrease depending if new office space is absorbed by the market or not. If the new office space is occupied by tenants, rents will increase due to the strong demand. Then, the vacant space decreases, and rents and property values rise. The large positive effect of the capital growth offsets the decrease of the income return. Then, the property total return increases, and so the historical property risk premium. On the other way, if the new office space is not occupied by tenants, this space is added to the existent office space available in the market. Then, the vacant space rises, and rents and property values decrease. The large negative effect of capital growth offsets the increase of the income return. The property total return decreases and the historical property risk premium drops. Therefore, the effect of new office space may either increase or decrease the historical property risk premium.

- **The Financial Stock Exchange**

Finance is London's largest sector. This induces to think that the rest of London's sectors will be affected somehow if there is any financial shock. The ease economic conditions increase the "current and expected corporate profitability, [and] property returns increase" (McGough, Tsolacos, and Olkkonen, 2000, p. 575). Real estate is appealing for investors when property returns are high compared to financial asset returns. Property rents and values increase as more investors invest in real estate. The increase in property values increases the property total return. If the riskless asset return held constant, the increase in property returns increases the historical property premium.

- **The Yield Curve**

Authors as Brooks and Tsolacos (2001) and Naranjo and Ling (1997), among others, describe the importance of financial spreads. They argue the predictive power of the yield curve to explain the state of the economy in the short-term. They use this concept to explain the REITs property returns. However, it is not evident to explain the relationship between the yield curve and the property risk premium. Let's try to explain it with a general case. In an expanding economy, the increase in consumption increase prices because it takes some time to adjust the level of production. Central banks restrict their monetary policies, and so they increase interest rates to reduce inflation. Inflation reduces the nominal income, and investors will look for investments that protect them from the erosion of capital.

The long-term bonds are not indexed to inflation. In case investors acquire bonds they won't be protected against inflation. The weak demand for long-term bonds, reduce bond prices, and Governments increase the long-term bond yields to attract investors.

On the other hand, real estate protects from inflation, as rents are indexed to inflation. In the U.K., for example, commercial property rents are compared to the market trend every five years. Leases are adjusted only upwards, so if rentals are below the market rent, they are always revised upwards. Property rents and prices increase when there is economic growth, and it reduces the vacant space. Both the protection against inflation and the increase in rental income appeals to investors to invest in real estate. The increase in property values decreases the income return and increases the capital growth. Then the property total return increases. The historical property risk premium will also increase as long as the increase in property total return offsets the increase of (1) the long-term bond yield and (2) the increase of the 3-month Libor¹⁷.

The **ordinary least square** (OLS) method is used to estimate the Economic model. To obtain accurate estimates all variables need to be stationary. If variables are not stationary there is a risk to have a spurious regression. A spurious regression appears when the model includes two or more variables that are not related to each other. But there is another variable not considered in the model which is correlated with the variables examined. This will bias the results of the model, and our estimates won't be consistent.

Two **stationary tests** are followed to analyse the stationary of variables: The Augmented Dickey-Fuller, and the Philips-Perron. Both test must lead to the same results to be consistent. Tables 2.17 and 2.18 displayed in annex 2.3 show that the *Property Premium* and *FSE100* are stationary at 5 %. However, the *UK Employment*, *Vacancy Rate*, *Net Additions*, and *TERM* are **not stationary**. Therefore, a first differences is applied to make them stationary. Both stationary tests were repeated again and results showed that these variables are stationary. Let's proceed to estimate the Economic model with the OLS method.

¹⁷In this model, the analysis is made in nominal terms. The reason is that if the inflation is introduced in both sides of the equation, the inflation cancels out, and the effect its the same

Results

Table 2.3 – The Economic Approach Model. OLS Estimations

Dependent Variable: PREMIUM				
Method: Least Squares				
Sample: 2001Q2 2014Q1				
Included observations: 52				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
$D(\text{UK EMP}, 1)^*$	5.72	3.01	1.90	0.06
$D(\text{VAC}, 1)^*$	-9.70	2.66	-3.64	0.00
$D(\text{NAD}, 1)^*$	-3.94	1.39	-2.84	0.01
FTSE100	0.18	0.10	1.79	0.08
$D(\text{TERM}, 1)^*$	-3.84	2.14	-1.79	0.08
C	3.74	1.45	2.57	0.01
R-squared	0.63	Mean dependent var		4.58
Adjusted R-squared	0.58	S.D. dependent var		14.13
S.E. of regression	9.10	Akaike info criterion		7.36
Sum squared resid	3811.26	Schwarz criterion		7.59
Log likelihood	-185.44	Hannan-Quinn criter.		7.45
F-statistic	15.37	Durbin-Watson stat		0.88
Prob(F-statistic)	0.00			
Note				
(*)	The variable enclosed with a D() means that a first-difference was applied to make it stationary, and to avoid a spurious regression			

The t-tests show that all coefficients are significant (at a 10 % level of significance) to explain the Historical Property Risk Premium. The coefficients of the UK Employment (UK EMP), Vacancy Rate (VAC), and FTSE100 are as expected. The negative sign of the Net Additions (NAD) meant that the market absorbed the added office space, and rents and property values rise. The increase in property values offsets the decrease of income return. As a result, it increases the property Total Return and the historical property risk premium.

The negative sign for the difference between the long and short-term rates wasn't expected. An explanation to this might be in the belief that property factors do not react simultaneously to different economic and financial shocks. This argument was tested by introducing some lags in the Economic model. Nevertheless, the difference between the long and short-term rates coefficient became non-significant.

The adjusted R-square shows that the explanatory variables used in this model explain 58 % of the changes of the property risk premium, which is a reasonable figure.

The following figure compares the historical risk premium series (the green line) with the historical risk premium series estimated with the Economic model (the red line). The Economic model doesn't fit the premium perfectly. However, it follows the main trend. The deviation between both series is reflected in the residual series (the line in blue). Although most of the residuals of the model lie in the interval -10 and +10 %, there are some outliers. This means some observations deviate more from the real series.



Figure 2.3 – The Economic Approach Model. Actual, Fitted and Residual

To be consistent, this model requires that its residuals need to be stationary. This means that the residuals need to be uncorrelated across time. The stationarity of residuals is tested with two statistical tests¹⁸: (1) the Dickey-Fuller, and (2) the Phillips-Perron. In case residuals are uncorrelated¹⁹, the residuals are stationary. Let's check the results of both tests.

¹⁸Both tests consider autocorrelation of the residuals in the null hypothesis of both tests, H_0 : The residuals have a unit root

¹⁹The null hypothesis cannot be accepted

Table 2.4 – The Economic Approach Model. Residual Autocorrelation Test: Dickey-Fuller

Null Hypothesis: Residual, ε_t , has a unit root				
Exogenous: None				
Lag Length: 0 (Automatic - based on SIC, maxlag=10)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.94	0.00
Test critical values:	1% level		-2.61	
	5% level		-1.95	
	10% level		-1.61	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: $D(\varepsilon_t)$				
Method: Least Squares				
Sample (adjusted): 2001Q3 2014Q1				
Included observations: 51 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\varepsilon_t(-1)$	-0.47	0.12	-3.94	0.00
R-squared	0.24	Mean dependent var		-0.04
Adjusted R-squared	0.24	S.D. dependent var		8.20
S.E. of regression	7.16	Akaike info criterion		6.79
Sum squared resid	2563.33	Schwarz criterion		6.83
Log likelihood	-172.26	Hannan-Quinn criter.		6.81
Durbin-Watson stat	2.11			

The t-Statistic of the augmented Dickey-Fuller test is -3.94. This value is larger than the three critical values (1%, 5%, and 10%), and so the null hypothesis cannot be accepted. Therefore, residuals are not autocorrelated. Let's now compare it with the Phillips-Perron autocorrelation test.

Table 2.5 – The Economic Approach Model. Residual Autocorrelation Test: Phillips-Perron

Null Hypothesis: Residual, ε_t , has a unit root				
Exogenous: None				
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-3.94	0.00
Test critical values:	1% level		-2.61	
	5% level		-1.95	
	10% level		-1.61	
*MacKinnon (1996) one-sided p-values				
Residual variance (no correction)				50.26146
HAC corrected variance (Bartlett kernel)				50.26146
Phillips-Perron Test Equation				
Dependent Variable: $D(\varepsilon_t)$				
Method: Least Squares				
Sample (adjusted): 2001Q3 2014Q1				
Included observations: 51 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\varepsilon_t(-1)$	-0.47	0.118441	-3.941086	0.00
R-squared	0.24	Mean dependent var		-0.04
Adjusted R-squared	0.24	S.D. dependent var		8.20
S.E. of regression	7.16	Akaike info criterion		6.79
Sum squared resid	2563.33	Schwarz criterion		6.83
Log likelihood	-172.26	Hannan-Quinn criter.		6.81
Durbin-Watson stat	2.11			

The t-Statistic obtained in the Philips-Perron is -3.94. This value is larger than the three critical values (1%, 5%, and 10%), and the null hypothesis cannot be accepted. Therefore, residuals are not autocorrelated.

Both tests are in accordance, as they lead to the same results. It is then possible to conclude that residuals are not correlated. Table 2.6 displays that residuals are neither correlated with the regressors (i.e. the explanatory variables), and so the model is consistent.

Table 2.6 – The Economic Approach Model. Correlation between Residual and the Explanatory Variables

	RESIDUAL
<i>D(UKEMP)</i>	0,00
<i>D(VAC)</i>	0,00
<i>D(NAD)</i>	0,00
<i>FTSE</i>	0,00
<i>D(TERM)</i>	0,00

2.1.3 The Financial Approach

This second approach analyses the historical property risk premium by focusing on the components of the total office return: the income return and the capital growth. Let's review some academic articles to find proxies of these two variables.

Literature Review

McGough and Tsolacos (2001) try to modelise the UK office total return at the national level. They first describe the Gordon growth model, and suggest that office total return is a function of the (1) **rental growth rate**, (2) the **required return or discount rate**, or (3) the **time where rental leases are reviewed**. The authors model the office yields by using three models: a *vector error correction*²⁰, an *ARIMA*²¹, and the *ordinary least squares*²². Data on office yields, and rental growth are obtained from IPD (i.e. MSCI), and discount rates²³ from Primark Datastream. They also tested the capacity of models to forecast property yields. Results show that no single model performs best for more than two sample periods. They also were not able to capture the decrease in property yields that occurred in 2000.

Karakozova (2004) studies the office annual total returns in the CBD area of Helsinki. The author considers that most changes in the total returns in the CBD are explained by changes in capital growth, "which is the most volatile component" (Karakozova, 2004, p.52). They first define property capital values, and she was inspired by the *discounted cash flow model*, DCF. The capital value depends on (1) **expected net operating income**, and (2) the **required rate of return or discount rate**²⁴. The author also considers other potential components that are considered in the existing literature: (3) **gross domestic product**, (4) **service sector employment**, the (5) **output from financial and business services**, and the (6) **net additions to stock**. Once the components are defined, the author tries to explain the capital value growth using these components. For this she uses three models: the (1) *ordinary least squares*, OLS; an (2) *error correction model*, ECM; and the (3) *autoregressive-moving average model*, ARIMAX.

²⁰It examines the long relationship between current yields with historical yield values

²¹It considers that **historical yield values** and **past random shocks** have an impact on the current office yield

²²It finds that current yields are explained by **historical yields** and **historical rental values**

²³The authors say it can be proxied through a short-term interest rate, government bonds, or corporate bonds

²⁴The author considers two proxies for the discount rate: the (2.1) 5-year Finnish government bond yield, and the (2.1) volatility of Helsinki Stock Exchange market total returns index

They compare the out-of-sample forecast capability of different models. These results reveal that the components are pertinent to explain changes in capital growth. Among the three models, the ARIMAX model best described the changes in capital growth. The author ends the study by using estimated values of income return, and capital growth to estimate the office total return.

Hendershott and MacGregor (2005) try to forecast both the real rental growth and the capitalization rates. The analysis focuses on the UK office and retail sectors. They consider 162 and 459 prime locations, respectively. The authors examine proxies for the expected future real rental growth: (1) the **log deviation of the real office rent from its trend** (mean); (2) the **four-quarter moving average of the real rental growth**. To regress the capitalization rates they use an *error correction model* against the proxy variables. The data is on a quarterly basis. Results show, in both sectors, that (1) high rental peaks, or high deviation of current rent to their trend, causes high capitalization rates, or overvalued properties. It is expected that current rent will revert to the trend, and this rise in risk implies an increase in the capitalization rate. In case of (2) high current rental growth, expectations of rents to continue to grow "will be extrapolated forward, lowering the cap rate" (Hendershott and MacGregor, 2005, p.307).

Van Wouwe, Berkhout, and Tansens (2008) first investigate the correlation and patterns over time of the initial yield across different European markets, in both the prime office and retail sectors. The various European office markets they consider are: the four largest cities in the Netherlands (i.e. Amsterdam, Rotterdam, the Hague, and Utrecht), Brussels, London, and Frankfurt. The annual data comes from DTZ Research. They next define the net property risk premium as the excess between the net initial yield and the 10-year treasury bonds. Two methodologies follow. The first one is an univariate linear regression. Using the *ordinary least square*, they try to explain the net property risk premium with changes in **real interest rate**. They analyse different effects across the different markets. The second methodology is a multivariate linear regression. Using the *ordinary least square*, they try to explain the net property risk premium with (1) **nominal interest rate**, (2) **inflation**. They use dummy variables to compare it across the different sectors and markets. Concerning the net initial yield, the study finds substantial differences across sectors and markets, and also an existent association in some retail and office markets. Concerning the property risk premium, the study finds that real and nominal interest rates, and also inflation are significant factors to explain the risk premium in real estate.

Table 2.7 – The Financial Approach. Synthesis of Literature Review

Authors	Title	Endogenous Variable	Location	Sector	Model	Explanatory Variables
McGough and Tsolacos (2001)	Do Yields Reflect Property Market Fundamentals	Property yield	UK	Office	ECM, ARIMA, and OLS	(1) Rental Growth (2) Discount Rate (3) Rental Lease Review
Karakozova (2004)	Modelling and Forecasting Office Returns in Helsinki Area	Total Returns	Helsinki, Finland	Office	OLS, ECM, ARIMAX	(1) Expected Net Operating Income (2) 5y Finnish Bond (3) Gross Domestic Product (4) Service Sector Employment (5) Output from Financial and Business services (6) Net additions to stock
Hendershott and, MacGregor (2005)	Investor Rationality: Evidence from U.K. Property Capitalization Rates	Capitalization Rate	UK	Office, Retail	Error Correction	(1) The log deviation of the real office rent from its trend (2) MA(4) of the rental growth
Van Wouwe, Berkhout, and Tansens (2008)	Risk Premium in Cap Rates of Investment Property	Capitalization Rate	Europe	Office	Ordinary Least Squares	(1) Nominal interest rate (2) Inflation

Description of Variables

Although some articles referred above focused on the estimation of the office total return, figure 2.1, on page 89, shows that the historical property risk premium is very similar to the office total return. For this reason, this thesis decided to use proxies of the total return to estimate the historical property risk premium. In annex 1.4, equation 1.27 shows the expected property risk premium is a function of the initial yield, a 10-year Bond Yield, and the ratio between the growth rate of rental income and the initial yield. Based on this equation, to explain the historical property risk premium, this approach uses (1) the initial yield, as a proxy of the income return, (2) the rental value growth rate, as a proxy of the income return, and (3) the change in the AREF Net Flows, as a proxy of the capital growth. As the historical property risk premium is the difference between the Office Total Return and a riskless asset return, (4) the 10-year Yield Gilt is also included in the model. Let's look at the variables more in detail:

Table 2.8 – Financial Approach. Factors affecting the Historical Property Premium

Variable	Description	Source
Endogenous		
Π_t	The Historical Property Risk Premium (%) in the Central London Office Market	(1)
Exogenous		
Proxies for the Income Return		
IY_t	Office Net Initial Yield (%) (2)	MSCI
RG_t	Nominal Average Rental Value Growth (YoY %)	MSCI/IPD
Proxies for the Capital Growth		
$FLOW_{t-1}$	Net Flows (YoY %) (3)	AREF (4)
Financial Market		
10y Gilt _t	10-year UK Gilt yield (YoY %)	Datastream
Notes		
(1)	It is the difference between the Office Total Return (YoY %) (Source: MSCI), and the 10-year UK Gilt yield (YoY %) (Source: Datastream)	
(2)	The Net Initial yield is the ratio between office rents received in year t, and the Price paid for an office building in the previous year, t-1	
(3)	The Net flows series is the difference between the property values sold and property values bought by U.K. property funds which are part of the AREF	
(4)	AREF stands for The Association of Real Estate Funds	

The data of the four variables is on a quarterly basis, with a sample from Q2 2001 to Q1 2014, and 52 observations.

The Financial Model

This thesis assumes that there is a linear relationship between the historical property risk premium and the explanatory variables:

$$\Pi_t = \beta_1 IY_t + \beta_2 10\text{yr Gilt}_t + \beta_3 RG_t + \beta_4 FLOWS_t + \varepsilon_t$$

In this model, an increase in the initial yield (IY) and/or the 10-year UK Gilt yield (10y Gilt) would have a **negative** impact in the premium. On the other hand, an increase of (1) the Rental Value Growth (RG) and the AREF Net Flows (FLOWS) is expected to cause a **positive** impact on the property risk premium. Let's describe how each variable affects the premium:

- **Net Initial Yield**

In an expanding office property cycle, rents rise due to the increase in demand for office space and the scarce of space available. An increase of rents tends to increase the Net Initial Yield. However, the effect on the yield also depends on property values. The price paid to acquire an office building is also determined by the number of office buildings available in the market, and the number of investors that search to buy a building. As long as rent increases, the increase of rental income attracts investors to invest in property. As long as buildings available in the market scarce, investors are willing to pay a high price to acquire an asset. The increase in prices reduces the net initial yield. The increase in rents and capital values reduces the income return and increases the capital growth respectively. Karakozova (2004) explains that the growth in property values (i.e. the capital growth) is the most volatile component of the total return. As a result, the effect of property prices is much stronger than the increase in rents. Subsequently, the office total return climbs. If the UK Gilt remains constant, the ex-post property risk premium would increase.

- **10y Gilt Yield**

The 10-year Gilt yield is an exogenous factor of the property risk premium. This variable is needed to estimate the risk premium. To reckon, the property risk premium is defined as the difference between the nominal office total return

and the return nominal 10-year Gilt Yield. Both returns are independent of each other; The office total returns are independent of the level of bond yields offered by Governments to finance their level of debt. To explain a possible relation between both variables exceeds the purpose of this research. To simplify, this case study focuses only in the explanation of the difference between both returns. The equation 1.27 of the Gordon model shows (on page 82) that the coefficient of the risk-less asset, the 10-year Gilt yield, is negative respect to the property premium. For this reason, the 10-year Gilt is expected to have a negative coefficient.

- **Rental value growth**

A growing economy creates employment, and the need for space increases office rents. The increase in rental income attracts investors to the real estate. As the number of buildings available in the market decreases, investors tend to pay a higher price for an office building. Therefore, property values also increase. The increase in property values is more significant than the rise in rents. This causes a decrease in the income return, but it is offset by the increase in the capital growth. So then, the total return increases. If the UK Gilt yield remains constant, the ex-post property risk premium would also increase.

- **AREF Net Flows**

The increase in capital growth is linked to the amount of liquidity that investors used to acquire office buildings. Figure 2.2, on page 89, describes the historical Net Flows of the AREF fund in the UK. The Net Flows of the AREF fund rose when the historical property risk premium increases. The increase in capital growth increases the office total return. If the 10-year Gilt yield remains constant, the historical property return would increase.

The **ordinary least square** (OLS) method is used to estimate the Financial model. Following the same steps used in the Economic model, stationarity of variables must be checked before estimate the Financial model. Two *stationary test* were tested: The Augmented Dickey-Fuller, and the Philips-Perron. Annex 2.3 found that the *Rental Value Growth* and *AREF Net Flows* are stationary at 5 %, and therefore there was no need to apply first differences. However, the *Average Net Initial yield* and the *10y UK Gilt yield* were not stationary. For these variables, we applied first differences to make them stationary. Let's proceed to estimate the model with the OLS method.

Results

Table 2.9 – The Financial Approach Model. OLS Estimations

Dependent Variable: PREMIUM				
Method: Least Squares				
Sample: 2001Q2 2014Q1				
Included observations: 52				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
$D(IY, 1)^*$	-33.11	5.50	-6.01	0.00
$D(10YR\ GILT, 1)^*$	-4.38	2.72	-1.61	0.11
RG	1.08	0.10	10.81	0.00
FLWS	0.00	0.00	2.07	0.04
R-squared	0.77	Mean dependent var		4.58
Adjusted R-squared	0.76	S.D. dependent var		14.13
S.E. of regression	6.87	Akaike info criterion		6.76
Sum squared resid	2266.78	Schwarz criterion		6.91
Log likelihood	-171.93	Hannan-Quinn criter.		6.82
Durbin-Watson stat	0.93			
Note				
(*)	The variable enclosed with a D() means that a first-difference was applied to make it stationary, and to avoid a spurious regression.			

The t-tests show that all coefficients are significant, at 10 % level of significance, to explain the ex-post property Risk Premium. The signs for Rental Value Growth, Average Net Initial yield, the Net Flows²⁵ and the 10-year Gilt yield were expected.

The adjusted R-square shows that the explanatory variables used in this model explain 76 % of the changes of the property risk premium. The Financial model has more capacity to explain the changes in the property premium than the Economic model, with a 58 %.

²⁵Despite the significance of the Net Flow variable, its coefficient value is almost insignificant

Let's now compare the historical risk premium series (the line in green) with the one fitted with the model (the line in red). The Financial Approach model fits much better the ex-post premium than the Economic Approach model. Despite there are some outliers between the late 2007 and late 2010, most of the residuals (the line in blue) ²⁶, lay between the interval -5 and +5 %.

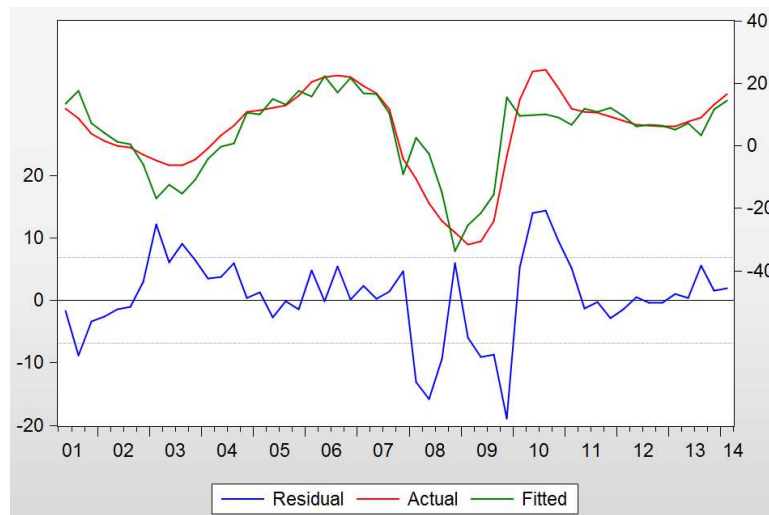


Figure 2.4 – The Financial Approach Model. Actual, Fitted and Residual

Let's analyse the stationarity of the residuals with the tests of the (1) Dickey-Fuller, and the (2) Phillips-Perron.

²⁶Residuals are the deviation respect the two series

Table 2.10 – The Financial Approach Model. Residual Autocorrelation Test: Dickey-Fuller

Null Hypothesis: Residual, ε_t , has a unit root				
Exogenous: None				
Lag Length: 0 (Automatic - based on SIC, maxlag=10)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.89	0.00
Test critical values:	1% level		-2.61	
	5% level		-1.95	
	10% level		-1.61	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: $D(\varepsilon_t)$				
Method: Least Squares				
Sample (adjusted): 2001Q3 2014Q1				
Included observations: 51 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\varepsilon_t(-1)$	-0.46	0.11	-3.89	0.00
R-squared	0.23	Mean dependent var		0.07
Adjusted R-squared	0.23	S.D. dependent var		6.49
S.E. of regression	5.69	Akaike info criterion		6.33
Sum squared resid	1619.92	Schwarz criterion		6.37
Log likelihood	-160.55	Hannan-Quinn criter.		6.34
Durbin-Watson stat	1.85			

The t-Statistic of the augmented Dickey-Fuller test, -3.89. This value is larger than the three critical values (1%, 5%, and 10%), and the null hypothesis cannot be accepted. Therefore, residuals are not autocorrelated. Let's compare it with the Phillips-Perron autocorrelation test.

Table 2.11 – The Financial Approach Model. Residual Autocorrelation Test: Phillips-Perron

Null Hypothesis: Residual, ε_t , has a unit root				
Exogenous: None				
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-3.80	0.00
Test critical values:	1% level		-2.61	
	5% level		-1.95	
	10% level		-1.61	
*MacKinnon (1996) one-sided p-values				
Residual variance (no correction)				31.76
HAC corrected variance (Bartlett kernel)				28.93
Phillips-Perron Test Equation				
Dependent Variable: $D(\varepsilon_t)$				
Method: Least Squares				
Sample (adjusted): 2001Q3 2014Q1				
Included observations: 51 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\varepsilon_t(-1)$	-0.46	0.11	-3.89	0.00
R-squared	0.23	Mean dependent var		0.07
Adjusted R-squared	0.23	S.D. dependent var		6.49
S.E. of regression	5.69	Akaike info criterion		6.33
Sum squared resid	1619.92	Schwarz criterion		6.37
Log likelihood	-160.55	Hannan-Quinn criter.		6.34
Durbin-Watson stat	1.85			

The t-Statistic of the augmented Phillips-Perron test is -3.80. This value is larger than the three critical values (1 %, 5 %, and 10 %), and null hypothesis cannot be accepted. Therefore, residuals are not autocorrelated. Both tests, the Dickey-Fuller and the Phillips-Peron, are in accordance, as they lead to the same results. Table 2.12 displays residuals are neither correlated with the regressors (i.e. the explanatory variables), and so the model is consistent.

Table 2.12 – The Financial Approach Model. Residual Correlation Matrix

	RESIDUAL
$D(IY, 1)$	0,01
$D(10YR\ GILT, 1)$	0,00
RG	0,00
FLAWS	-0,04

2.1.4 The Historical Property Risk Premium vs. the Yield Gap

Section 1.1.4 refers that some real estate practitioners confuse the concepts of the property risk premium and the yield gap. To reckon, the yield gap is not an expectation. It is the difference between the initial property yield and a redemption yield of a risk-free rate. On the other hand, the expected property risk premium is based on investors' expectations, and it's the difference between the required return and a riskless asset return. Annex 1.4.1 demonstrates mathematically that the property yield gap is a component of the expected property risk premium.

This section analysed the historical premium which is not based on expectations. It is based on past performances as it's the difference between the office total return and a riskless asset return. Therefore, it is the same for all investors.

To illustrate *the importance to define a proper property risk premium*, this section takes both the Economic and Financial models and estimate them again using the yield gap as endogenous variable. Tables 2.13 and 2.14 compare the estimations obtained in both models.

In the Economic model, variables like the employment, vacancy rate, net additions, and the yield curve are not significant. Also, the adjusted R-squared has reduced to 0.30. In the Financial model, the Net Initial yield and the 10-year UK Gilt yield are two explanatory variables used to explain the premium. However, both variables formed the yield gap. To explain the premium through the yield gap, both the Net Initial yield and the 10-year UK Gilt yield were moved to the right side of the equation to estimate the yield gap. In this model, the rental value growth becomes not significant, and the capacity of the explanatory variables to explain the yield gap has also reduced up to 0.20.

Both models reduced their explanation capacity with the yield gap. As a result, the adjusted R-square also decreased. This happens because the yield gap only considers the net income to explain the property premium, and it omits the change in capital values. Then, when real estate practitioners use the yield gap to explain the property risk premium, this can lead them to form a disrupt perception of risk when they invest in real estate because they omit the capital growth, which is the most volatile component of the total return.

Table 2.13 – The Economic Approach Model. OLS Estimations. The Risk Premium vs. the Yield Gap

Method: Least Squares								
Sample: 2001Q2 2014Q1								
Included observations: 52								
Dependent Variable:	(1) PREMIUM				(2) YIELD GAP			
Exogenous Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
<i>D</i> (UK EMPLOYMENT, 1)*	5.72	3.01	1.90	0.06	-0.15	0.14	-1.13	0.26
<i>D</i> (VAC, 1)*	-9.70	2.66	-3.64	0.00	0.02	0.12	0.13	0.90
<i>D</i> (NAD, 1)*	-3.94	1.39	-2.84	0.01	0.07	0.06	1.04	0.30
FTSE100	0.18	0.10	1.79	0.08	-0.01	0.00	-3.12	0.00
<i>D</i> (TERM, 1)*	-3.84	2.14	-1.79	0.08	-0.29	0.10	-2.93	0.01
C	3.74	1.45	2.57	0.01	0.10	0.07	1.51	0.14
R-squared	0.63				0.37			
Adjusted R-squared	0.58				0.30			
S.E. of regression	9.10				0.41			
Sum squared resid	3811.26				7.87			
Log likelihood	-185.44				-24.68			
F-statistic	15.37				5.44			
Prob(F-statistic)	0.00				0.00			
Mean dependent var				4.58				-0.01
S.D. dependent var				14.13				0.50
Akaike info criterion				7.36				1.18
Schwarz criterion				7.59				1.41
Hannan-Quinn criter.				7.45				1.27
Durbin-Watson stat				0.88				1.99
Notes								
(1) The PREMIUM is the difference between the Office Total Return (YoY %), and the 10-year UK Gilt yield (YoY %)								
(2) The YIELD GAP is the difference between the Office Net Initial Yield (%), and the 10-year UK Gilt yield (YoY %)								
(*) The variable enclosed with a D() means that a first-difference was applied to make it stationary, and to avoid a spurious regression								

Table 2.14 – The Financial Approach Model. OLS Estimations. The Risk Premium vs. the Yield Gap

Method: Least Squares									
Sample: 2001Q2 2014Q1									
Included observations: 52									
Dependent Variable:	(1) PREMIUM				(2) YIELD GAP				
Exogenous Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.	
<i>D</i> (AV N I YIELD, 1)*	-3.31	5.50	-6.02	0.00					
<i>D</i> (10YR UK GILT, 1)*	-4.39	2.72	-1.61	0.11					
RENTAL VALUE GROWTH	1.09	0.10	1.08	0.00	0.00	0.01	0.22	0.83	
AREF NET FLOWS	0.00	0.00	2.08	0.04	0.00	0.00	-3.63	0.00	
R-squared	0.78				0.21				
Adjusted R-squared	0.76				0.20				
S.E. of regression	6.87				0.44				
Sum squared resid	2266.78				9.85				
Log likelihood	-171.93				-30.52				
Durbin-Watson stat	0.93				2.08				
Mean dependent var					4.58				-0.01
S.D. dependent var					14.13				0.50
Akaike info criterion					6.77				1.25
Schwarz criterion					6.92				1.33
Hannan-Quinn criter.					6.82				1.28

Notes

(1) The PREMIUM is the difference between the Office Total Return (YoY %), and the 10-year UK Gilt yield (YoY %)

(2) The YIELD GAP is the difference between the Office Net Initial Yield (%), and the 10-year UK Gilt yield (YoY %)

(*) The variable enclosed with a D() means that a first-difference was applied to make it stationary, and to avoid a spurious regression

2.1.5 Summary

This case study considers different variables to explain the historical property risk premium for the Central London office market. Two approaches were used in the analysis: (1) the Economic and (2) the Financial models. On one hand, the Economic model uses economic, financial and property variables to estimate the property premium. On the other hand, the Financial model uses proxies of the office total return to estimate the property premium. Both models were estimated with the Ordinary Least Square method. Although these models seem to have a high degree of explanatory power, the Financial Approach obtained better results to explain the ex-post premium.

Finally, the chapter covers the importance to define a proper property risk premium. The Economic and Financial models were estimated again to estimate the risk premium through the yield gap. Results reveal that both models reduced their explanation capacity because the yield gap only considers the net income and omits the increase in capital values. Then, when real estate practitioners use the yield cap to explain the property risk premium they disrupt their perception of property risk because they omit the capital growth, which is the most volatile component of the total return.

So far the analysis of the property premium was tackle from an ex-post perspective. This thesis stressed that a high deviation of the **ex-post property risk premium** to its long-term average would imply higher risk. The risk is higher as rents and property values are likely to devaluate. The high deviation of the premium to its long-term average is a sign for investors to sell properties before the capital values start to decrease. If we change the perspective from ex-post to **ex-ante**, the interpretation of the premium changes. For example, in case the office total return increases, that would induce investors to think that the property market is expanding. As they have less perception of risk, they would request less premium to invest in property. The following section deals with the premium from an ex-ante perspective.

2.2 Required vs. Expected Property Premium

This section analyses price risk across different European real estate markets. "By 'pricing' we mean setting a minimum acceptable level of return, or hurdle rate for a market, based on various characteristics of a market that can serve as a proxy for the real risks of investing in those markets" (see David Lynn, 2011, p.67). The difference between the hurdle rate for a market and the yield of a riskless asset leads to the **expected property risk premium**.

The study shows the relationship between expected returns on debt and real estate, and the risk incurred. The methodology used is based on a publication developed by Maurizio Grilli and Richard Barkham published in 2011 (see David Lynn, 2011, chapter 6). This study proceeds on the basis of two key assumptions: 1) Investors require returns that are commensurate with the risk of investing, however they conceive them; and 2) there are many ways of defining risk and an even wider array of possibilities for measuring it. "Even in the most complex quantitative risk measurement systems **there is an element of judgment and estimation**: mature analysts and mature organisations recognise the weaknesses inherent in their risk systems and make them explicit" (see David Lynn, 2011, p.67).

2.2.1 Hurdle Rate or Target Return

As mentioned in section 1.1.2 on page 36, the hurdle rate or property target return, is the minimum acceptable rate of return that an investor will accept for investing in assets that involve extra risk. The riskier the investment, the higher the hurdle rate. In section 1.1.2, on page 36, was stated that real estate tends to be riskier than top rated government bonds because its income derives from tenants that develop a business activity. Their income is more unpredictable than government bonds. Also, private companies have more chances to go bankrupt than Central Governments that run a developed country. So it's logical that property investors require higher returns for investing in property. Let's take equation 1.5 on page 36:

$$RETR = RFR + RP \quad (2.1)$$

Where:

- $RETR$ is the real estate hurdle rate, or target rate of return
- RFR is the risk-free rate, or the riskless asset return
- RP is the risk premium

This equation is inspired by the Capital Asset Pricing Model (CAPM), one of the most used pricing risk models in finance. It assumes the existence of a risk-free rate (RFR) (e.g. Top-rated government bond yield), which is used as a risk threshold. In case investors want to invest in riskier assets, as property, they would require a premium to invest in property. Each investor would have his or her own risk perception of the market. Depending on their risk perceptions, they would require a different rate to invest in property. This rate is the real estate hurdle rate, or real estate target return (RETR). Below this target return investors won't invest in property because the level of the property return is insufficient to compensate them for the increase of risk exposure. The difference between investors' target return and the risk-free rate is the expected property risk premium. Let's now breakdown the components of the risk-free rate and the property risk premium to calculate the real estate target return.

The Risk-Free Rate

The ten-year bond yields are generally used by investors as a proxy for a risk-free rate. Grilli and Barkham (2011) consider the government bonds have come into question as the sovereign crisis expands. They argue that *Government bonds are no longer perceived as the risk-free asset return as they were in the past*. This is what led Grilli and Barkham (2011) to replace the risk-free characteristic of government bonds, and to build a synthetic risk-free rate. The synthetic risk-free rate is obtained from the GDP-weighted average of bond rates for a number of high credit quality countries²⁷ rated by Moody's. If sovereign debt continues to expand globally, Grilli and Barkham (2011) are aware that even investors won't be protected investing in top rated countries as the risk of default will also increase. "As the global economic and financial outlook is changing rapidly, there is no guarantee that today's "safe" countries will be the same in the future" (see David Lynn, 2011, p.69).

To calculate the GDP-weighted average of the bond rates, Grilli and Barkham

²⁷Countries considered are Australia, Canada, Chile, Denmark, Finland, Germany, South Korea, Norway, Sweden, and Switzerland

(2011) take the gross domestic product (GDP) at market prices in 2011 of the countries considered. They sum up all the GDP figures from ten countries: Australia, Canada, Chile, Denmark, Finland, Germany, South Korea, Norway, Sweden, and Switzerland. Despite Grilli and Barkham (2011) included the US in their analysis, this thesis decided to exclude it. The United States Federal Budget has been increasing since the end of the Second World War. Budget Control Act of 2011 (BCA) had established spending caps on spending. In two occasions, in January 19, 2017 and February 8, 2018, the US Senate failed to pass new budget the US Federal Government, and the US Government had a short shutdown. In both occasions Republican and Democratic leaders reached an agreement to increase the budget caps. Nevertheless, two consecutive shutdowns, along with the concerns about the high levels of public spending²⁸ may give investors signals that the US Treasury Bond is less and less likely to be perceived as risk-free.

To create the GDP-weights, the GDP of each country is divided to the sum of the GDP figures of the ten countries. The GDP-weighted average of the bond rates is the sum product between the GDP-weighted of a country multiplied by its ten-year Government bond, plus the GDP-weighted of another country multiplied by its ten-year Government bond, and so on. The sum product results in a single figure of GDP-weighted average of bond rates (i.e. the **synthetic risk-free rate**). The reason to used GDP to weight bond yields is the following. A global investor would probably diversify his/her investments among different countries. The neutral allocation of the portfolio may be based on the relative size of different markets. The reason comes from the theoretical assumption of thinking in a world as a global market. The size of economies dictates the share of markets. For this reason, GDP figures are generally used to allocate global portfolios.

Tables 2.15 and 2.16, show that the GDP-weighted average of the bond rates, which is the risk-free rate defined by Grilli and Barkham (2011), it is the same for all countries. Risk-free rate resulted in 1.9 % and 1.4 % for 2011 and 2014, respectively,

²⁸3,8 trillions in 2016, according to the Federal Reserve Bank of St. Louis

The Risk Premium

To obtain the expected risk premium Grilli and Barkham (2011) subtract the risk-free rate of return from the property hurdle rate:

$$RP = RETR - RFR \quad (2.2)$$

Where:

- RP is the risk premium
- $RETR$ is the real estate target return, or hurdle rate
- RFR is the risk-free rate

Before any property investment, investors need to inform themselves to understand the reality about what is happening in the market. For this investors recover information about the country, and they market they pretend to invest. They will look to the situation of the economy, finance and politics. Within the country, they will also check the state of the real estate sector. The information considered will allow investors to analyse their opportunities and risks. This will permit investors to determine a value of the fair risk premium for investing in property. "The time-varying component of the risk premium is captured by regularly updating the hurdle rates to take account of movements in the input variables" (see David Lynn, 2011, p.68).

Components considered by investors to assess the premium can be infinite. To simplify, let's assume investors assess the country risk and, within-country, property risks²⁹ (see David Lynn, 2011, p.68). Certain risk factors may explain the changes in the premium. The global economy and financial outlook are changing rapidly, so are the risk premium and its input variables.

Let's see and describe the risk factors used in this case study to build a general property risk premium:

- **Country Risk**

There is a variety of country risk assessment methodologies that are publicly

²⁹There are other types of risk, including leverage, currency and taxation. The analysis of these three types of risk is beyond the scope of this chapter

available. Grilli and Barkham (2011) consider the methodology from the New York University Stern School of Business. This methodology uses Moody's country credit ranking and calculates the country risk by looking at bond spreads. The higher the spread of a government bond yield respect to the safest government bond (the US Treasury Bill) is, the higher is the country risk.

- **Real Estate Risk**

The Real Estate Risk is approached with: (1) the degree of transparency in a country, (2) the liquidity risk, (3) Business Risk, (4) Depreciation Risk, and (5) the Income-security risk:

1. **Transparency Index** "is often mentioned by real estate investors when investing in countries characterised by scarce of information and no benchmarks" (see David Lynn, 2011, p.72). Grilli and Barkham (2011) use the Jones Lang Lasalle Transparency index³⁰. This index considers different items: (1) the ability of measure performances (from MSCI), (2) availability of market data, (3) the presence of listed vehicles (REITs), the presence of a (4) regulatory system, and (5) professional standards. This index scores markets between 1 and 5. The higher the value, the higher the risk.
2. **Liquidity Risk** derives from the uncertainty associated with exiting an investment. It takes time and cost to sell a property. "The greater the time and/or the higher the cost of selling the asset, the more compensation investors will require" (see David Lynn, 2011, p.72). The indicator they use is based on two measures:
 - (a) The *absolute liquidity* is the level of office investment turnover (i.e. in currency) in a city divided by the average office investment turnover across cities. Let's consider three cities: City A, B, and C. City A has a higher level of office investment turnover than B, and city B has more office investment turnover than C. Let's take the average of different investment turnovers. The office liquidity of city A is higher than cities B and C, compared to the average.
 - (b) The *relative liquidity* is the level of office investment turnover in a city respect to the total office stock value in the same city (i.e. in currency). Let's consider the same cities mentioned above: city A, B and C. The office

³⁰Jones Lang LaSalle, Real Estate Transparency Index, 2014

stock market (i.e. in sq m) of city A is bigger than B, and the office stock value of city B is bigger than C. The office stock value (i.e. in currency) of city A is also higher than B and C. Let's also assume the proportion of office investment turnover in city A respect to its stock value is 20 %. The proportion of office investment turnover is 70 % in City B, and 50 % in city C. By comparing these ratios, although city A is the biggest market and the most prized, only 20 % of its total office stock value is traded. For market B, 70 % of its total office stock value is traded, and for market C is 50 %. This means market B is the most liquid in relative terms, followed by markets C and A.

Both variables, the absolute and the relative liquidity, are build in-house thanks to PMA³¹ data. These two measures are combined and standardised to create a liquidity premium for every market. The higher is the level of liquidity in a market, the lower is the liquidity risk. Grilli and Barkham (2011) consider the liquidity premium range values between 25 bps and 150 bps. These numbers are set arbitrary, and they permit to rank the different property markets. Even though the level of liquidity in a market is high, there always exist some liquidity risk. For this reason, the liquidity premium is not zero. Grilli and Barkham (2011) assumed the City of London office market is the most liquid office market in Europe, as assets tend to trade easily. So they considered this market as the benchmark. They assigned to the City 25 bps of liquidity risk premium. To be consistent with Grilli and Barkham (2011), this thesis decided to use the same assumption. The rest of the European office markets are less liquid, and so Grilli and Barkham (2011) assign a higher liquidity risk premium. In our study, the Rome office market has the highest liquidity risk as assets are not easily traded. For this reason, this thesis assigned the highest liquidity risk premium (i.e. 150 bps) to the Rome office market.

3. **Business Risk** is associated with the uncertainty of a company's future cash flows. Grilli and Barkham (2011) use the standard deviation of long-run historic market rental growth at city level. The higher the variation (volatility) of rental growth, the higher risk on cash-flows, due to unexpected changes in income. Data comes from PMA.

³¹Property Market Analysis

4. **Depreciation risk** is the loss in value of an asset over time due to physical deterioration, age and locational obsolescence. While there is plenty of literature on this subject, the value of depreciation is difficult to estimate. PMA estimates depreciation based on land value as share of capital value, lease length and new supply volatility. Depreciation is lower if the total property value due to land is higher. Depreciation is also lower the longer the lease. The longer the lease, the longer tenants stay in the building. As a result, new office construction levels are lower, and depreciation is also lower.
5. **Income-security risk** is based on typical lease lengths, break clauses in renewal leases, and recovery cost from a tenant. Typically the longer the contract, the lower is the risk of income loss. Data comes from DTZ³²

The overall risk premia is the sum of the country risk and the real estate risk. The real estate risk is formed by the sum of five factors: (1) Transparency risk, (2) Liquidity risk, (3) Business risk, (4) Depreciation risk, and (5) Income risk.

Grilli and Barkham (2011) obtained the overall property risk premia in 2011 for 42 markets, and also considered different sectors³³. From the 42 office markets considered in Grilli and Barkham (2011). To replicate the research of Grilli and Barkham (2011) for 2014 this thesis only has access to 19 office markets. Despite the number of cities and the retail sector missed, this case study is still capable to analyse the most important markets in Europe, and it also can observe the changes in the premium across cities between 2011 and 2014. This way it is possible to observe how investors' risk perception changed over time. Results of the property risk premia are shown in tables 2.15 and 2.16 for 2011 and 2014 respectively.

³²DTZ investor Friendliness Matrix

³³Grilli and Barkham (2011) used different cities, countries and sectors (office and retail) in their analysis. For the *office sector* they considered the following markets: Los Angeles, Brisbane, Brussels, Calgary, Frankfurt, Hong Kong, the City of London, London West End, Madrid, New York City, Paris, San Francisco, Sydney, Tokyo, Vancouver, Washington D.C. For the *retail sector* they considered the following markets: Italy, Spain, Portugal, Shanghai

Table 2.15 – Risk premia in 2011, compared across different European office markets

	London (1) UK	Paris (2) FR	Amsterdam NL	Frankfurt DE	Munich DE	Brussels BE	Barcelona ES	Madrid ES	Milan IT
Country risk	0.0	0.0	0.0	0.0	0.0	1.1	1.3	1.3	1.5
Real Estate Risk (3)	3.5	3.7	3.8	4.0	4.0	4.4	4.4	4.6	4.5
Transparency risk	0.3	0.4	0.3	0.5	0.5	0.7	0.7	0.7	0.7
Liquidity risk	0.7	0.8	1.3	1.3	1.4	1.4	1.5	1.3	1.5
Business risk	1.1	0.9	0.6	0.7	0.6	0.7	0.8	1.1	0.8
Depreciation risk	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Income risk	0.3	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3
Overall risk premia (4)	3.5	3.7	3.8	4.0	4.0	5.5	5.7	5.9	6.0
Adjusted risk premia (5)	3.9	4.1	4.2	4.4	4.4	6.0	6.2	6.5	6.6
RFR (GDP-weighted average)	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Target Return	5.8	6.0	6.1	6.3	6.3	7.9	8.2	8.4	8.5

Notes

- (1) City of London
- (2) Paris CBD (Central Business District)
- (3) The Real Estate Risk is the result of the sum of: Transparency, Liquidity, Business, Depreciation and Income risks
- (4) The Overall Risk Premia is the sum of the Country Risk and the Real Estate Risk
- (5) As the City of London is considered the most liquid and safest market, the Overall Risk Premia of each European office market is adjusted to the long-term ex-post Premium of the City of London
- (6) The Target Return is the sum between the Adjusted Risk Premia and the risk-free Rate

Due to reasons of transparency and liquidity, Grilli and Barkham (2011) considered the City of London as the market with lowest property risk. For this reason the City of London had the lowest overall risk premia in 2011. In case investors want to invest in any other property market, investors will require an additional risk premia. Following this statement, the overall risk premia for other locations was adjusted to the London's premia³⁴.

Let's take Paris CBD to explain how the risk premia is adjusted respect to the benchmark. The overall risk premia for Paris (3.7 %) is divided respect to the overall risk premia of London (3.5 %). This ratio is multiplied to the long-term average of the historical property risk premium of the City of London (3.9 %). The target return for Paris CBD is obtained by adding the adjusted risk premia (4.1 %) and the risk-free rate of return (1.9 %). Let's now check the results obtained for 2014.

³⁴The model can be adapted to each investor's view, and set other locations as a benchmark

Table 2.16 – Risk premia in 2014, compared across different European office markets

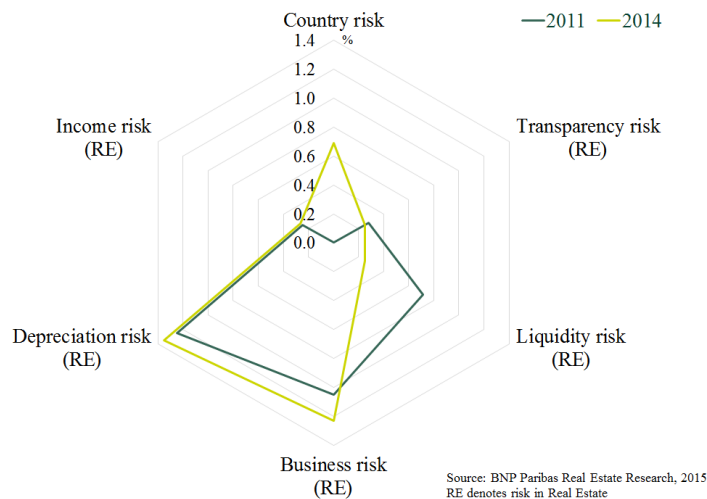
	London (1) UK	Munich DE	Frankfurt DE	Amsterdam NL	Paris (2) FR	Brussels BE	Barcelona ES	Madrid ES	Milan IT
Country risk	0.7	0.6	0.6	0.7	1.4	1.3	2.2	2.2	3.0
Real Estate Risk	3.4	4.6	4.7	4.7	4.6	4.9	6.0	6.1	5.6
Transparency risk	0.3	0.8	0.8	0.5	0.5	0.9	1.0	1.0	1.1
Liquidity risk	0.3	1.1	0.9	1.3	0.8	1.2	1.2	1.2	1.4
Business risk	1.2	0.7	0.9	0.7	1.1	0.5	1.3	1.5	1.1
Depreciation risk	1.4	1.6	1.6	1.7	1.4	1.7	2.1	2.0	1.7
Income risk	0.3	0.4	0.4	0.6	0.8	0.6	0.3	0.3	0.4
Overall risk premia	4.0	5.3	5.3	5.4	5.9	6.2	8.2	8.3	8.7
Adjusted risk premia	2.7	3.5	3.6	3.6	3.9	4.1	5.5	5.5	5.8
RFR (GDP-weighted average)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Target Return	4.1	4.9	4.9	5.0	5.3	5.5	6.8	6.9	7.1

Notes

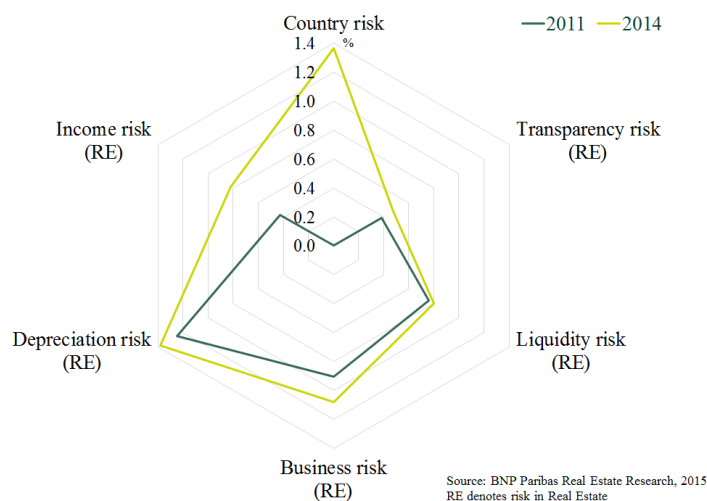
-
- (1) City of London
(2) Paris CBD (Central Business District)
(3) The Real Estate Risk is the result of the sum of: Transparency, Liquidity, Business, Depreciation and Income risks
(4) The Overall Risk Premia is the sum of the Country Risk and the Real Estate Risk
(5) As the City of London is considered the most liquid and safest market, the Overall Risk Premia of each European office market is adjusted to the long-term ex-post Premium of the City of London
(6) The Target Return is the sum between the Adjusted Risk Premia and the risk-free Rate
-

To be in consistency with Grilli and Barkham (2011), the City of London was also considered to be the most secured property market in 2014. The City of London had the lowest overall risk premia, with 2.7 % in 2014. Following the explanations explained in table 2.15 it is possible to obtain the property target return. It is important to stress the decrease in the risk-free rate based on the GDP-weighted average. Generally, there are no significant yearly changes in GDP figures, in market prices, in most developed countries because economic structures can produce a similar amount of money every year. The most likely reason that leads to a decrease in the risk-free rate, based on the GDP-weighted average, is due to the reduction of top rated government bond yields.

Let's now compare the variation of the different risk factors between the City of London, and Paris CBD office markets.



(a) City of London



(b) Paris CBD

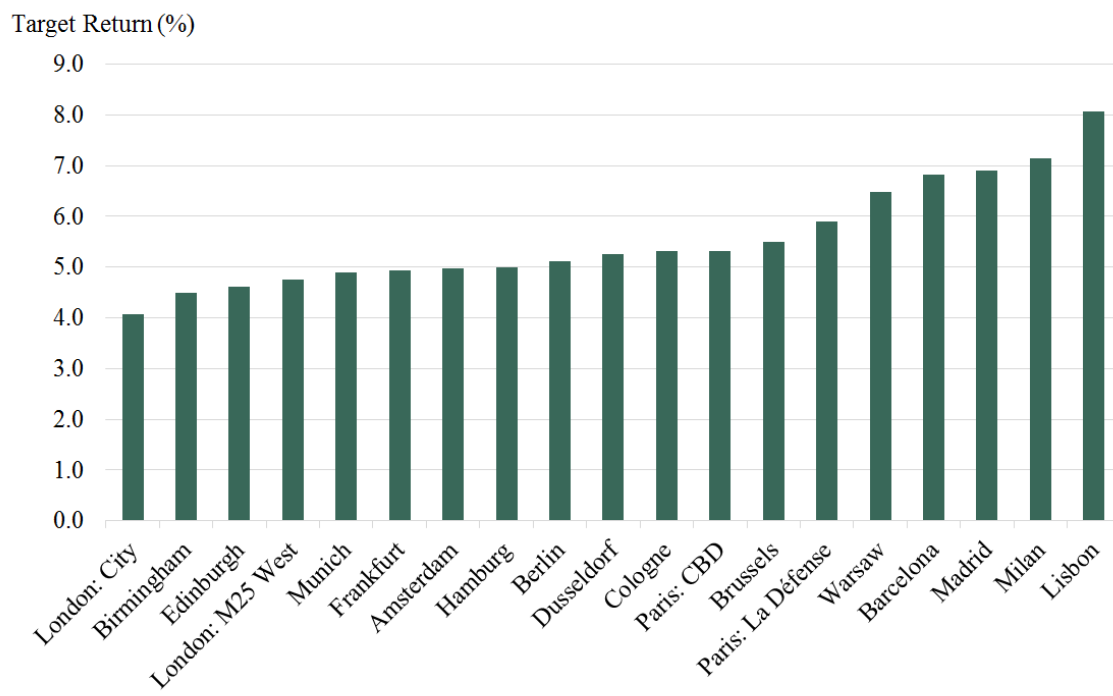
Figure 2.5 – Country and Property Risks for London and Paris

In figure 2.5 it is possible to observe how risks (i.e. country and real estate risks) have changed in the City and Paris CBD. Despite prime net yields decreased in both markets³⁵, most levels of risk rose in 2014 respect to 2011. Most of the increase in risk in both cities comes from the Country risk. During that period the sovereign debt continued to expand. Both, the 10-year gilt yield and the 10-year OAT yield continued to increase their bond spread respect to the US Treasury bond yield. According to Damodaran (2003), the increase in the bond spread provoked an increase of the **Country Risk** in both cities.

³⁵According to PMA, prime net yields decreased -100 bps and -70 bps from 2011 to 2014, for the City and Paris CBD, respectively

Despite the increase of the Country risk, Paris CBD also increased the **Income Risk** in 2014, respect to 2011, due to the rise of incentives like rent-free periods. According to the Immostat, the office rent incentives rate went from 16.3 % in Q2 2012 to 20.3 % in Q4 2014³⁶. The increase of rent-free periods increases Landlords' income risk as they provide incentives to secure the tenancy. The rest of the variables don't show significant changes in 2014 respect to 2011. Both markets are matured, and so it is not rare that transparency, business and depreciation risks almost did not change between these two periods.

The sum of the adjusted-risk premia and the risk-free rate leads to the required property target return. Figure 2.6 displays different levels of requirements to invest in the main European office markets in 2014.



Source: BNP Paribas Real Estate Research, 2015

Figure 2.6 – Estimated targets of return

It is important to stress here that the *hurdle rate*, or required rate of return, for investing in real estate is different from the *expected rate of return*. Hurdle rates set a minimum acceptable level of return to invest in property, depending on investors' risk perceptions. The expected office total returns are forecasts that are modelled with different variables and estimated using different models. Let's see some variables that are widely used in the real estate industry to model the office total returns.

³⁶For more information, please go to <http://www.immostat.com/market-data>

2.2.2 The Expected Return Equation

Property agents measure the *real estate expected return*, REER, with the following factors: the (1) rental yield attained over the period of the investment, (2) inflation, and the (3) change in capital value over time less any transaction cost incurred. Let's describe this with the following equation:

$$REER = y + inf + CG \quad (2.3)$$

Where:

- y is the initial income yield. It is intended to capture the office market conditions
- inf is the expected inflation rate. In the long term, rental growth rises with inflation.
- CG is the expected rate of capital growth, which measures the change in capital value over a period of time.

To compare the expected returns respect to investors' required property returns, this study used office total return forecasts (from 2015 to 2019) produced by BNP Paribas Real Estate Research.

2.2.3 Expected Returns vs. Required Returns

Hurdle rates, or *real estate target return* (RETR), are used to set the minimum performance required to invest in a property. Therefore, investors will invest in a property when *real estate expected returns* (REER) (i.e. forecasts) are expected to be above their required return. Such forward rates, or expected returns, are usually based on going-in income return, forecast rental growth, capital growth less any transaction cost incurred. Assuming that forecasts are accurate, or **unbiased**, the commercial market is:

- **Investable** if $REER \geq RETR$.

In case forward rates are higher than required property return, commercial markets look attractive, as they offer enough rate of return for their risk involved

- **Not Investable** if $REER < RETR$.

In case forward rates do not reach the investors' required property return, the commercial market does not offer a sufficient rate of return to compensate investors for their risk exposure

Figure 2.7 compares the hurdle rates with the market forecasts. Let's see what markets are more investable than others:

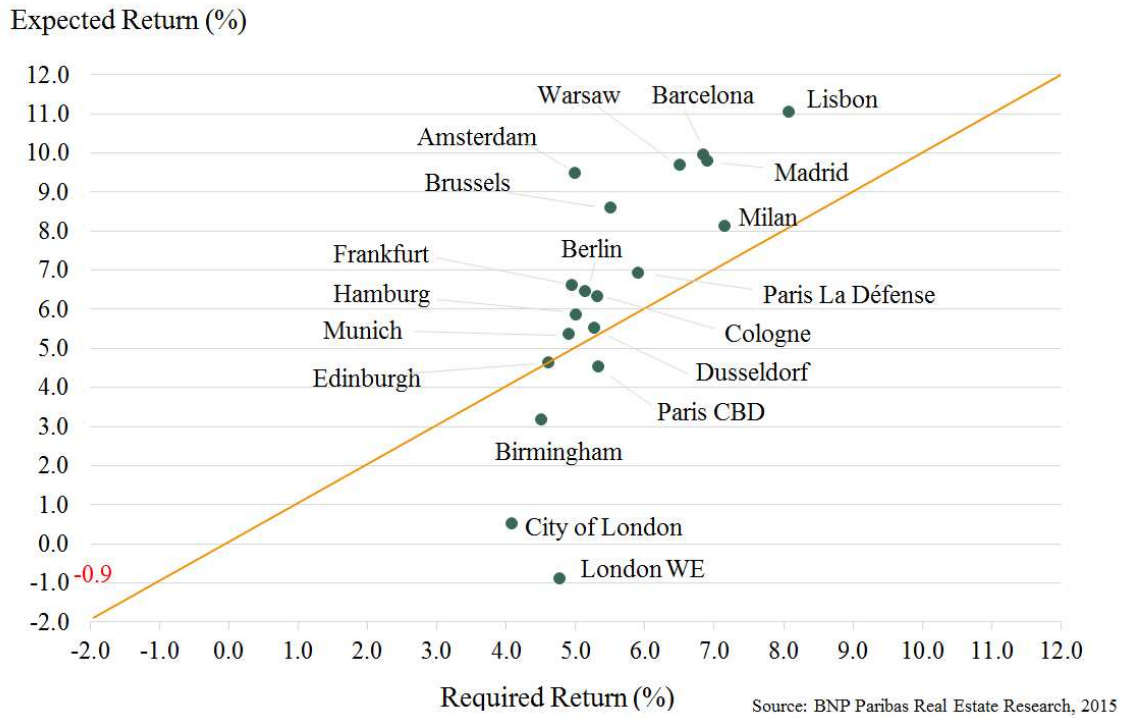


Figure 2.7 – Target vs. expected returns

This figure compares the expected real estate returns (from 2015 to 2019) with the required real estate returns in 2014. The orange line represents investors' risk profile. This study assumed that investors have a risk-neutral profile (i.e. 45-degree line), which means investors' required return increases at a constant rate while their risk perception increases. In 2014, risk neutral investors will invest in markets like Germany, Amsterdam, Barcelona, Brussels, Edinburgh, Lisbon, Madrid, Milan, and Warsaw, because the expected office total returns lie above investors' required return. In other words, these markets are expected to offer a yield that compensates for the risk exposure of investing in the commercial real estate.

On the other hand, expected office total returns for markets like the City of London, Paris CBD and Birmingham, neutral investors won't invest in these markets as the expected return is below their required return. Although London and Paris were considered the less risky markets in 2014, neutral investors increase their investment requirements due

to their low level of office yields in the three markets³⁷. That could give them a sign that these markets are overpriced, and they have probably arrived at the top of their cycle. They expect these markets will revert their trend with the risk of having a significant capital discount. Again, according to this model, neutral investors won't invest in these markets as they do not reach their required return.

³⁷According to BNP Paribas Real Estate, the Office Prime Net Initial Yield for the City of London, Paris CBD were 4% in 2014, and in Birmingham was 5.4%. These figures are the lowest yield since 2007

2.2.4 Summary

Assessing risk associated with investment in real estate markets is difficult but critical to investors. Understanding the risk that affects property is important, from both a risk-adjusted return perspective and diversification. To this purpose, this study compares the expected to target returns to gauge the worthiness of investing in specific markets. However, this method is not lack of drawbacks: (1) To simplify, this study assumed that investors are risk neutral. Other investors may have either a risk-averse or a risk taker profile. (2) The target returns considered here are a market average. Target returns are different for every investor, as each one will have a different market risk perception. (3) Required target return depends on forecasts to decide which markets are investable. But forecasts are subject to criticism as it is not possible to foresee markets accurately. These three drawbacks limit the capacity of this model as they can lead investors to take the wrong investment decisions.

Results of this study should be seen in the context of a deeper understanding of different risk components involved in investing in property. This case study showed that the expected risk premium varies over time, as do market conditions, affecting the investment decision of different investors to whether invest or not in specific markets according to their risk perceptions.

2.3 Annex. Stationary Tests

This annex analyses the stationary of variables used in both models, the Economic and the Financial Approaches. In case observations in a series are high correlated, the series contains a unit root, and therefore it is not stationary.

$$x_t = \phi x_{(t-1)} + \mu + \lambda t + u_t \quad (2.4)$$

Where:

- x_t is the variable x in period t
- x_{t-1} is the variable x in the previous period, t-1
- μ is a constant
- λt is the trend

The equation used is from the book written by Brooks and Tsolacos (see [2010](#), p.379). Both stationary tests have the same null hypothesis, H_0 :

- H_0 *The series contains a unit root: $\phi = 1$*
- H_1 *The series is stationary: $\phi < 1$*

For each variable considered in both models (i.e. the Economic or the Financial Approach) it is conducted two stationary tests: the Augmented Dickey-Fuller and the Phillips-Perron test statistics. Both tests are very similar as both examine the autocorrelation between the observations of a series. In other words, they analyse the significance of the lagged observations, or past values, of a series. The only difference is that the Dickey-Fuller test statistic incorporates "an automatic correction to the DF [Dickey-Fuller] procedure to allow for autocorrelated residuals" (Brooks and Tsolacos, [2010](#), p.380). The two tests have the option to include (1) a constant, (2) a constant and trend, or (3) none of them. One of these three options is included in the test when the coefficient is statistically significant.

Both t-statistics are compared with the standard normal critical values at 1, 5 or 10 per cent. In case the t-statistic is higher (in absolute value) than the critical value at 5 % level of significance, the null hypothesis of a unit root is rejected. This means the

series is stationary. In case a variable is not stationary, the first difference is applied to the variable. Then, Dickey-Fuller and Phillips Perron t-statistic are compared with their respective critical values to see if variables are stationary. Usually, variables are stationary with a first difference. If this is not the case, a second difference is applied, and the stationarity of the variable is re-tested with the two tests. Stationarity is consistent when both the Dickey-Fuller and Phillips Perron tests lead to the same conclusion.

The following tables examine the stationary of variables. Tables 2.17 and 2.18 display the Dickey-Fuller and the Phillips-Perron test statistics for the Economic model. Tables 2.19 and 2.20 display the Dickey-Fuller and the Phillips-Perron test statistics for the Financial model.

Table 2.17 – The Economic Approach. Augmented Dickey-Fuller test statistic

Null Hypothesis: The variable has a unit root

Method: Least Squares

Sample (adjusted): 2001Q2 2014Q1

Included observations: 52 after adjustments

	Property Premium Central London (ex-post)	UK Employment	Vacancy Rate	Net Addition	FTSE 100 UK Total Return	TERM
In level						
Test for H_0 : unit root						
Reject H_0	x				x	
Do not reject H_0		x	x	x		x
t-Statistic						
Test critical values:						
1% level	-2.61					
5% level	-1.95	-3.91	-1.26	-2.86	-1.89	-2.43
10% level	-1.61					
Probability	0.00	0.19	0.06	0.06	0.02	0.23
Include in test equation:						
Intercept			x			
Trend and intercept						
No Trend and no Intercept	x	x		x	x	x
The variable is:						
Stationary	x				x	
Not Stationary		x	x	x		x

Null Hypothesis: The variable has a unit root
 Method: Least Squares
 Sample (adjusted): 2001Q2 2014Q1
 Included observations: 52 after adjustments

Property Premium Central London (ex-post)	UK Employment	Vacancy Rate	Net Addition	FTSE 100 UK Total Return	TERM
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1st difference

Test for H_0 : unit root

Reject H_0	x	x	x	x
Do not reject H_0				

t-Statistic

Test critical values:

1% level	-2.61				
5% level	-1.95	-4.65	-4.05	-5.97	-7.50
10% level	-1.61				

Probability	0.00	0.00	0.00	0.00
-------------	------	------	------	------

Include in test equation:

Intercept				
Trend and intercept				
No Trend and no Intercept	x	x	x	x

The variable is:

Stationary	x	x	x	x
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Table 2.18 – The Economic Approach. Phillips-Perron test statistic

Null Hypothesis: The variable has a unit root
 Method: Least Squares
 Sample (adjusted): 2001Q2 2014Q1
 Included observations: 52 after adjustments

	Property Premium Central London (ex-post)	UK Employment	Vacancy Rate	Net Addition	FTSE 100 UK Total Return	TERM
In level						
Test for H_0 : unit root						
Reject H_0	x			x	x	
Do not reject H_0		x	x			x
t-Statistic						
Test critical values:						
1% level	-2.61					
5% level	-1.95	-2.20	-0.95	-2.75	-3.85	-2.43
10% level	-1.61					
Probability	0.03	0.30	0.22	0.00	0.02	0.17
Include in test equation:						
Intercept						
Trend and intercept			x			
No Trend and no Intercept	x	x		x	x	x
The variable is:						
Stationary	x			x	x	
Not Stationary		x	x			x

Null Hypothesis: The variable has a unit root
 Method: Least Squares
 Sample (adjusted): 2001Q2 2014Q1
 Included observations: 52 after adjustments

Property Premium Central London (ex-post)	UK Employment	Vacancy Rate	Net Addition	FTSE 100 UK Total Return	TERM
---	---------------	--------------	--------------	--------------------------------	------

1st difference

Test for H_0 : unit root

Reject H_0		x	x		x
Do not reject H_0					

t-Statistic

Test critical values:

1% level	-2.61				
5% level	-1.95	-4.69	-4.08		-7.49
10% level	-1.61				

Probability		0.00	0.00		0.00
-------------	--	------	------	--	------

Include in test equation:

Intercept					
Trend and intercept					
No Trend and no Intercept		x	x		x

The variable is:

Stationary		x	x		x
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Table 2.19 – The Financial Approach. Augmented Dickey-Fuller test statistic

	Property Premium Central London (ex-post)	Initial Yield	10y Gilt Yield	Rental Growth	AREF Net Flows
Null Hypothesis: The variable has a unit root					
Method: Least Squares					
Sample (adjusted): 2001Q2 2014Q1					
Included observations: 52 after adjustments					
In level					
Test for H_0 : unit root					
Reject H_0	x			x	x
Do not reject H_0		x	x		
t-Statistic					
Test critical values:					
1% level	-2.61				
5% level	-1.95	-3.91	-2.37	-2.30	-5.38
10% level	-1.61				
Probability	0.00	0.16	0.43	0.00	0.00
Include in test equation:					
Intercept		x			
Trend and intercept			x		
No Trend and no Intercept	x			x	x
The variable is:					
Stationary	x			x	x
Not Stationary		x	x		

Table 2.20 – The Financial Approach. Phillips-Perron test statistic

Null Hypothesis: The variable has a unit root
 Method: Least Squares
 Sample (adjusted): 2001Q2 2014Q1
 Included observations: 52 after adjustments

	Property Premium Central London (ex-post)	Initial Yield	10y Gilt Yield	Rental Growth	AREF Net Flows
In level					
Test for H_0 : unit root					
Reject H_0	x			x	x
Do not reject H_0		x	x		
t-Statistic					
Test critical values:					
1% level	-2.61				
5% level	-1.95	-2.20	-1.14	-2.32	-2.67
10% level	-1.61				
Probability	0.03	0.23	0.41	0.01	0.00
Include in test equation:					
Intercept					
Trend and intercept			x		
No Trend and no Intercept	x	x		x	x
The variable is:					
Stationary	x			x	x
Not Stationary		x	x		

2.4 Annex. Principal Component Analysis

In section 2.1.2, on page 92, 25 variables were selected to be included in the **Economic Model**. But include 25 variable in a model is unfeasible. To reduce the number of variables it is used the **Principal Component Analysis** (PCA). This method identifies variables that correlate high with other variables, and it forms a group of variables called components. Before reducing the number of variables, let's have a look at all the variables considered in the Economic Model:

Table 2.21 – PCA. List of Variables

Variable	Units	First Difference (1)	Source
1. Premium (2)	%		MSCI and Datastream
2. UK GDP	YoY %	x	Datastream
3. UK Employment	YoY %	x	Datastream
4. OECD GDP	YoY %	x	Datastream
5. Vacancy Rate	% (End-of-Year)	x	BNP Paribas Real Estate
6. Net Absorption	YoY %		BNP Paribas Real Estate
7. Net Addition	YoY %		BNP Paribas Real Estate
8. Rental Value Growth	YoY %		MSCI
9. Prime Rent	YoY %		BNP Paribas Real Estate
10. Av. Net Initial Yield	% (End-of-Year)	x	MSCI/IPD
11. Prime Yield	% (End-of-Year)	x	BNP Paribas Real Estate
12. Total Return	YoY %		MSCI
13. Income Return	YoY %	x	MSCI
14. Capital Growth	YoY %		MSCI
15. Net Flows (3)	YoY %		AREF
16. Net Flows Value (4)	YoY %		AREF
17. 10-year Gilt yield	% (End-of-Year)	x	Datastream
18. 10-year GER Bond yield	% (End-of-Year)	x	Datastream
19. 3-month Libor	%	x	Datastream
20. Spread A vs. B Corp. Bonds (5)	%	x	Datastream
21. Spread A Corp. Bond vs. Libor (6)	%	x	Datastream
22. Spread B Corp. Bond vs. Libor (7)	%	x	Datastream
23. Spread 10-year Gilt vs. Libor (8)	%	x	Datastream
24. FTSE 100 PE Ratio (9)	%	x	Datastream
25. FTSE 100 UK Total Return	YoY %		Datastream

Notes

- (1) First difference was applied to the variable to make it stationary (x=Yes)
- (2) Difference between the Office Total Return YoY (%) (MSCI/IPD) and the 10-year Gilt Yield (%) (Datastream)
- (3) Difference between money coming into funds of the AREF and the amount of money redeemed
- (4) Value of existing funds in the AREF
- (5) Difference between the 10-year AAA and the BBB rated Corp. Bonds Yields
- (6) Difference between the 10-year AAA rated Corp. Bonds Yields and the 3-month Libor
- (7) Difference between the 10-year BBB rated Corp. Bonds Yields and the 3-month Libor
- (8) Difference between the 10-year Gilt Yield and the 3-month Libor
- (9) FTSE 100 Price to Earning Ratio Reversed

Data initially had 54 observations, and it went from Q1 2001 to Q1 2014. However, some observations were missed because some variables required a first difference to make them stationary³⁸. The PCA Analysis was run with data that has 47 observations, and it goes from Q3 2002 to Q1 2014. Before running it all variables were verified to be stable to make the analysis more consistent.

The PCA identifies different components. The number of components equal to the number of variables. Components identify the patterns of association between variables. This is done throughout correlations across different variables. The amount of variance in the data explained by a component is represented by the **eigenvalues**. The first component has the largest eigenvalue, and so on.

Table 2.22 – Principal Components Analysis

Balanced sample (listwise missing value deletion)					
Computed using: Ordinary correlations					
Extracting 25 of 25 possible components					
Eigenvalues: (Sum = 25, Average = 1)					
Component	Eigenvalue	Difference b/n eigenvalues	Proportion	Cumulative Value	Cumulative Proportion
1	9.10	5.14	0.36	9.10	0.36
2	3.96	0.95	0.16	13.05	0.52
3	3.00	1.28	0.12	16.06	0.64
4	1.73	0.26	0.07	17.79	0.71
5	1.46	0.25	0.06	19.25	0.77
6	1.22	0.25	0.05	20.47	0.82
7	0.96	0.12	0.04	21.43	0.86
8	0.84	0.12	0.03	22.28	0.89
9	0.72	0.14	0.03	23.00	0.92
10	0.58	0.26	0.02	23.58	0.94
11	0.32	0.04	0.01	23.90	0.96
12	0.28	0.05	0.01	24.18	0.97
13	0.23	0.04	0.01	24.42	0.98
14	0.20	0.07	0.01	24.61	0.98
15	0.13	0.04	0.01	24.74	0.99
16	0.09	0.04	0.00	24.83	0.99
17	0.05	0.01	0.00	24.88	1.00
18	0.05	0.01	0.00	24.93	1.00
19	0.03	0.01	0.00	24.96	1.00
20	0.02	0.01	0.00	24.98	1.00
21	0.02	0.02	0.00	25.00	1.00
22	0.00	0.00	0.00	25.00	1.00
23	0.00	0.00	0.00	25.00	1.00
24	0.00	0.00	0.00	25.00	1.00
25	0.00	—	0.00	25.00	1.00

³⁸Please, see table 2.21

The 25 components explain most variation of the data (the cumulative proportion is 100 %). The first six components have eigenvalues above one, which means that these components explain more variation in the data. The cumulative proportion of the six eigenvalues explain 82 % of the total variation of variables. Let's see the graph of the eigenvalues:

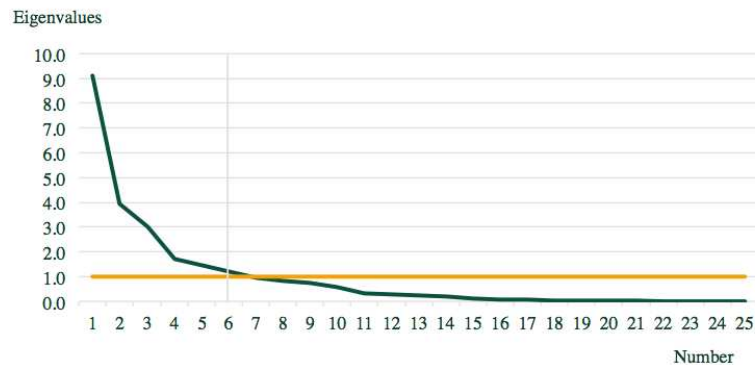


Figure 2.8 – PCA - Eigenvalues

The first six components are above the orange line. The *correlation between the components and the original variables* is known as **loadings**. Let's analyse the correlations obtained:

Variables have different levels of correlation respect to each principal component (PC). Variables that high correlate to one component form a cluster of variables³⁹. For instance, the variables : UK GDP, UK Employment, and OCDE GDP correlate high to component (PC) 2. Let's see the main groups formed in the different *principal components*, PC:

- *PC1*

- *Property Fundamentals*: (1) Vacancy Rate, (2) Net Absorption, (3) Net Addition, (4) Rental Value Growth, (5) Prime Rent

- *Property Investment*: (1) Total Return, (2) Income Return, (3) Capital Growth

- *PC2*

- *Macroeconomic variables*: (1) UK GDP, the (2) UK employment, (3) OECD GDP

- *Property Fundamentals*: (1) Rental Value Growth, (2) Prime Rent, (3) Average

³⁹Different rotations were applied to the vectors, but results didn't change. This is why they are not included in this annex

Table 2.23 – PCA. The Loadings

Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6
Premium	0.32	-0.03	0.08	-0.13	-0.06	0.00
UK GDP	0.14	0.31	-0.19	-0.11	0.06	-0.02
UK Employment	0.16	0.12	-0.01	-0.06	0.16	0.28
OECD GDP	0.15	0.36	-0.21	-0.01	0.05	-0.06
Vacancy Rate	-0.27	-0.03	-0.10	0.14	0.00	-0.06
Net Absorption	0.18	-0.09	0.21	0.01	0.47	0.32
Net Addition	-0.12	0.17	-0.06	0.14	0.58	0.26
Rental Value Growth	0.18	-0.31	0.24	0.00	-0.07	0.06
Prime Rent	0.25	-0.20	0.22	0.02	0.14	0.12
Av. Net Initial Yield	-0.18	-0.35	0.06	0.09	0.09	0.24
Prime Yield	-0.17	-0.29	0.15	0.10	0.00	0.07
Total Return	0.32	-0.03	0.08	-0.12	-0.04	-0.02
Income Return	-0.29	0.12	-0.11	0.13	0.08	0.08
Capital Growth	0.32	-0.05	0.10	-0.11	-0.05	-0.01
Net Flows	0.02	-0.05	-0.01	-0.18	0.46	-0.36
Net Flows Value	0.23	0.01	0.13	0.00	0.02	-0.20
10-year Gilt yield	0.07	0.20	0.24	0.53	-0.10	-0.04
10-year German Bond yield	0.07	0.16	0.29	0.54	-0.06	-0.05
3-month Libor	0.21	-0.15	-0.23	0.42	0.02	-0.09
Spread 10-year A vs. B Corp. Bonds	0.08	0.20	-0.14	-0.02	-0.16	0.56
Spread 10-year A Corp. Bond vs. Libor	-0.16	0.24	0.38	-0.19	-0.06	0.12
Spread 10-year B Corp. Bond vs. Libor	-0.18	0.13	0.42	-0.17	0.01	-0.14
Spread 10-year Gilt vs. Libor	-0.16	0.27	0.37	-0.11	-0.08	0.07
FTSE 100 PE ratio	0.10	0.22	0.10	0.09	0.28	-0.31
FTSE 100 UK Total Return	0.24	0.19	-0.01	0.03	-0.14	0.17

Net Initial Yield, (4) Prime Yield

– *Financial Variables*: (1) Spread 10-year Gilt vs. Libor, (2) FTSE 100 PE ratio, (3) FTSE 100 UK Total Return

• *PC3*

– *Financial Variables*: (1) Spread 10-year A Corp. Bond vs. Libor, (2) Spread 10-year B Corp. Bond vs. Libor, (3) Spread 10-year Gilt vs. Libor

• *PC4*

– *Financial Variables*: (1) 10-year Gilt yield, (2) 10-year German Bond yield, (3) 3-month Libor

• *PC5*

– *Property Fundamentals*: (1) Net Absorption, (2) Net Addition

- *PC6*

- *Macroeconomic variables*: (1) UK Employment
- *Property Investment*: (1) Net Flows, (2) Net Flows value
- *Financial Variables*: (1) Spread 10-year A vs. B Corp. Bonds

Six principal components have eigenvalues larger than one. As the Property Risk Premium is included in the principal component analysis, five variables were selected to explain the property risk premium. One variable is selected among the variables included in each group (i.e group PC 1, group PC 2, etc. in Table 2.23). The selection process is based on the variable that has a high correlation respect to the principal component. The selection process was also complemented with variables considered in the academic literature to explain the property risk premium. The variables selected to explain the property risk premium are: the (1) UK Employment (YoY %) - for PC6 -, the (2) Vacancy Rate (%) - for PC1 -, the (3) Net Addition (YoY %) - for PC5 -, the (4) FTSE 100 U.K. Total Return (%) for PC2 -, and the (5) TERM - for PC3 -, which is the financial Spread between the 10-year UK Gilt yield (%), and the 3-month Libor (%).

Part II

Property Investment Practices. How Investors Judge, Decide and Behave

CHAPTER 3

Cognitive and Emotional Bias in Commercial Property Investment

This chapter analyses how cognitive and emotional biases affect investor decisions when buying or selling office buildings. To meet this aim, a qualitative research is conducted to detect the most important biases. A total of 26 interviews was carried out across the real estate industry covering investors, fund managers, brokers and valuers. The questions cover three main topics: (1) what triggers the investment decision of buying or not buying an office building; (2) to see who is involved in the investment decision; and (3) to see how practitioners in real estate determine the value of an office building.

Keywords. Real Estate Investment, Qualitative Research, Cognitive and Emotional Bias

3.1 Cognition, Emotions, Heuristics and Biases in Property Investment

The way humans think or process information is known as **cognition**. According to the Collins Dictionary: "*Cognition is the mental process involved in knowing, learning, and understanding things.*" Analogously, the Oxford Dictionary defines cognition as: "*the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses.*"

Emotions arise from cognition through thoughts and feelings. Emotions can be classified in pleasant feelings (such as happiness, enjoyment), or unpleasant feelings (such as sadness, fear) ¹. Emotions are underestimated or even ignored in the world of business. If someone express any emotion it is generally seen as a sign of weakness. Indeed, what prevails in business is rationality. If investors bring emotions into investment they may overpay, and this can lead to a lousy investment. As a result, emotions are hold down or even ignored.

However, emotions themselves are not a problem. In fact, they inform individuals that something is happening. For instance, an investor has a sentiment that property market is getting too hot. Office rents are excessively high, and property transactions are leading yields to historical low. Uncertainty may cause the investor to feel fear² as long as the investor thinks the market is likely to slip into a recession. The fear caused by the possibility of a bearish scenario can lead the investor to sell the office building out quickly to avoid capital depreciation. The consequences of this decision will be determined later on by the market. If the investor's sentiment was right (i.e. the market went down), and the investor succeed to sold the property at the top of the cycle. In this case the emotion of fear was a good wisdom guide. The investor was able to sell the property at a good price. Then, the investor took the right decision. In contrast, if the same market continued to grow because it still had momentum, the investor lost the opportunity to hold on the property for some time, and sell it at a higher price.

The problem with emotions appears when individuals are controlled, either consciously or unconsciously, by their emotions. Bondt and R. Thaler (1985), Odean (1998b) and De Bondt (1998) already described situations where investors overreact to an unexpected salient news. This is due to the fact that investors become excessively pessimistic

¹See, for example, Larivey (2002) for a classification of emotions

²This emotion is related to the *Loss Aversion Bias*. See more on page 180

after a series of poor performance market reports or any other bad news.

"We have gone too far in emphasizing the value and import of the purely rational - of what IQ measures - in human life. Intelligence can come to nothing when emotions hold sway." (Goleman, 1996, p.4)

Making decisions in commercial real estate can be very complex. Property investors need to consider a large number of factors before purchase an office building. The factors list increases when they set up a business plan to do a long-term hold. They have to deal with future income and capital growth, which will depend on unknown future market conditions. Individuals (including investors) are capable to process only a certain amount of information per given time. To simplify the complexity of property investment, investors develop models that derive from mental shortcuts (also known as mental schemas or rule-of-thumb). Shortcuts are helpful to make decisions more rapidly and with ease. Hutchinson and Alba (1997) and Anderson and Settle (1996) emphasize about the tendency of investors to simplify investment decision environment. Investors prefer to use partial but relevant and richness information rather than having too many. This is where the term heuristics appears. **Heuristics** is an own-way taking decision process investors use when they have a large amount of information and limited time. Rule-of-thumb are build up through years of experience working in their own specific domain (see Hardin, 1999). Let's see some rule-of-thumbs that are used in the real estate sector:

1. An investor that compares his/her opinions, decisions or behaviour respect to other investors to know if he/she is doing the right thing
2. Investors that compare similar office buildings to make predictions of future income and capital performances
3. A vendor that sets the asking price of a building 10 % above the valuation done by an independent valuer. Nevertheless a potential buyer offers 20 % below the asking price, independently of today's property market dynamics

Mental schemas might be useful and work in most circumstances. They might also look rational. Rational in the sense that (1) mental schemas have to satisfy some basic requirements of consistency and coherence (see Tversky and Kahneman, 1981). At the same time, (2) they help investors to achieve their goals (see Baron, 2007, p.5). However, mental schemas that worked in the past doesn't mean that they will continue to work always. Regularly mental schemas distance from normative models. Normative models

are considered by the majority as an ideal rational standard. The consensus considers mental schemas that distance from normative models as poor judgments. And so, they are considered as **biases** because they are discrepant to an ideal standard. Despite the reason(s) that lead some individuals to develop their own mental schemas, normative models consider that poor judgments result in poor decisions and behaviours. This may enable investors to achieve their goals. Or even when they attain their goals with mental schemas that distance from an ideal standard, the consensus considers that those goals could be accomplished more effectively when they are aligned with normative models.

Investors' behaviour can operate consciously. However, there is evidence that investors' behaviour can often be operated unconsciously. Greenwald and Banaji (1995, p.4) analysed implicit social cognition in social behaviour, and they concluded that "attitudes, self-esteem, and stereotypes have implicit modes of operation" in individuals. Either consciously or unconsciously, investors are exposed to biases. *This thesis* uses a qualitative research to investigate how property investors are affected by biases when they decide either to buy and sell an office building. One assumption considered in this research is that the decision of buying or selling the property might be affected by the opinions or information shared between investors and other real estate agents. A total of 26 interviews were conducted to see if this assumption is right or not. This research hopes to warn investors that their decisions may be affected, consciously or unconsciously, by biases in some circumstances. If investors are aware of biases, this researcher believes this will help investors to achieve their investment goals more effectively.

The remainder of the paper is organized as follows. The next section reviews the most recent academic literature related to biases in psychology, behavioural finance and real estate. Section 3.3 describes the main purpose of this research, and explains the methodology used to find biases in real estate. Results follow in Chapter 4 showing the most relevant property biases observed in this research.

3.2 Literature Review

The study of mental process derived from the theoretical works of Herbert A Simon (1957), Newell and Herbert Alexander Simon (1972) and Herbert A Simon (1978). Both contributed to the earliest Artificial Intelligence program in computer science. In the 70s, Tversky and Kahneman (1971) introduced the behavioural theory into economy and finance. This paper claims that individuals have erroneous intuitions when assigning probability to a random sampling. Probabilities are evaluated by the degree to which a sample is representative respect to a population, or another sample. In another paper Tversky and Kahneman (1973) explore how individuals use heuristics under uncertainty. They conclude that individuals assign subjective higher probability to events that are easier to recall, and so individuals believe they more likely to occur. Both papers put Traditional Economic Theory into question. Traditional Economic theory designed different models to understand the behaviour of agents and markets. Modeling the behaviour of economic agents is complex, and economists tend to simplify it with assumptions. For instance: (1) an agent represents the rest of economic agents. This agent will behave with rationality; (2) markets tend to a equilibrium between supply and demand; also (3) prices represent the fair value of an asset, and so markets are efficient.

In the last few decades, renown economists warned that, in reality, markets do not always behave according to assumptions used. Grossman and Stiglitz (1980) denoted that the assumptions that all markets are in equilibrium and perfectly arbitrated are inconsistent when arbitrage is costly. Bondt and R. Thaler (1985) found evidences that investors are not always rational, as they overreact to unexpected and dramatic news events. They claim that investors tend to give more importance to recent information. Anomalies in efficient market hypothesis, and rational behaviour reflect that traditional economic and financial models only explain part of market behaviour and movements. Therefore, they are biased. To reduce biases, Shiller (1999) and R. H. Thaler (2010) highlight the need to look at other models of human behaviour, that have been developed in social sciences, to improve current economic and financial models.

3.2.1 Classification of Bias

A large number of biases have been detected and analyzed in psychology. In recent years, several attempts have been made to classify discovered biases. The psychologist Stanovich (1999, Ch.24) explained that there are two modes of thinking: the first mode, (1) **System 1**, refers to the thoughts that are done with ease, with almost no effort or no sense of voluntary control. For example, the blink of an eye, or intuitive thoughts. The second mode, (2) **System 2**, refers to the thoughts that demand a high degree of attention and effort. For instance, solving complex mathematical equations. Based on this dual-process of thinking, Kahneman and Frederick (2002) attempted to account some of the biases that have been discovered.

The psychologist Baron (2007, p.54) explains that all biases that have been discovered were discovered by looking at normative models. Normative models define the set of rules that individuals should follow. They also "tell us how to evaluate judgments and decisions in terms of their departure from an ideal standard" (Baron, 2007, p.34). Then, their decisions are evaluated according to the established rules (see Baron, 2007, p.48). If the way real estate practitioners achieve their goals is done following the established rules they are rational agents, and their decisions are optimal when they lead to an ideal standard outcome. By contrast, behavioural psychology suggests that investors frequently act sub-optimally (Gallimore, Hansz, and Gray, 2000) due to biases. Baron (2007, p.56) also attempts to classify biases that appear during the cognition or thinking process. He distinguishes three group of biases: The first group includes (1) biases that are produced by a lack of attention; The second group contains (2) biases that are related to motivation, confirmation (or myside), and wishful thinking; The third group comprises (3) psychological distortions.

Bias can be classified in many ways. This chapter classifies biases according to the mains steps followed by individuals in any situation: *judgments*, *decisions*, and *behaviours*. **Judgments** result from the process of thinking. During this process, cognition and emotions overlap. Although it is not obvious to describe when and how emotions take place, this thesis reinforces the importance of emotions during the process of thinking. How and when emotions appear will entirely depend on the way each individual process information. At the end of the thinking process, individuals will make a **decision**, and decisions will lead to a **behaviour**. The three steps described above are represented in the following figure 3.1:

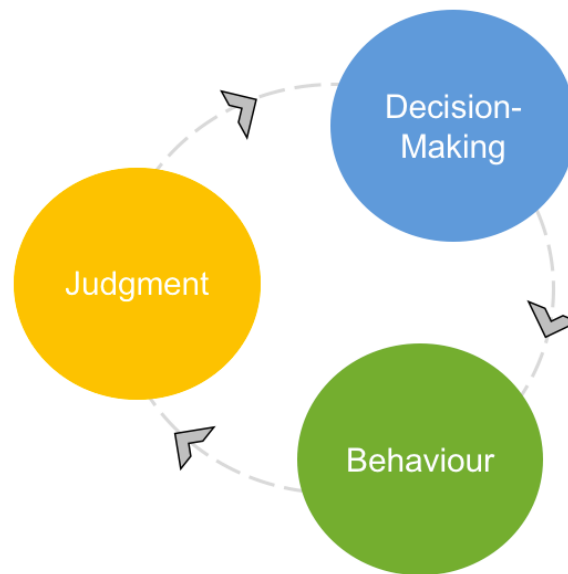


Figure 3.1 – Belief, Decision-Making, and Behaviour

Information and reality are changing continuously. As a result, individuals are constantly changing their judgments, decisions and behaviours, adapting to circumstances. In the three phases - judgment, decision, and behaviour - individuals may be affected by biases, either consciously or unconsciously. This research also attempts to classify most important biases discovered in psychology, finance, and real estate.

Judgment Bias

Judgments are outcomes of thinking. Baron (2007) defines thinking as purposive. Thinking starts in the mind, and thoughts may be triggered by needs, desires, or personal goals. At the first stage of thinking, individuals may question about the way to obtain their needs, desires or goals. In the meantime, questions and doubts will arise: 'how should I proceed to attain them?' Different degree of believe (i.e. weak, moderate, and strong beliefs) and intuition may also help individuals to continue in their process of thinking. Then it starts a cognition or mental process. The **cognition process** consists of four stages³:

- I *Learning*. Through senses investors explore information and *search* for possibilities and evidences that will help to cover their needs, or achieve beliefs or goals. Throughout this process *attention* is crucial to be aware about the information investors are processing in their mind.

³Please, check out, on page 158, the definition of *cognition* provided by the Collins Dictionary

- II *Knowing*. As long as investors process information in their mind; information is selected and stored in *memory*. Pleasant and unpleasant experiences are imprinted in the nerves through emotions (Goleman, 1996).
- III *Understand things*. Once investors processed the information they start to have different perceptions and *beliefs*. With the information available individuals will form an opinion about anything.
- IV *Conclusion* is formed from the result of the previous stages of the cognitive process. At this stage, in order to reduce uncertainty, investors *compare* their experiences and opinions with other investors. Opinion or *judgments* are formed, and they may be affected from the social comparison process (Festinger, 1954).

Let's see some biases that affect to different stages of the cognition process, and which lead to judgment bias.

I Learning

(A) *Search*

During the process of thinking, investors may look, gather and process more information than they need before making any decision. This bias is known as **information bias** (see Baron, 2007, p.177). To gather and process information, investors may use computer programs (i.e. algorithms) to recover and/or analyse data. Changes on market conditions may bias results obtained from algorithms which fail to adapt to new market conditions. The over-reliance and dependency on automated processes may also lead to take wrong judgments and decisions (see Mosier et al., 1998). This bias is known as **automated bias**.

(B) *Attention*

In the learning process, investors may focus or place much attention into a single piece of information. For example, an investor is asked to construct a probability distribution for the total return of an office building. The investor is likely to start by estimating the median, and this point is likely to serve as an anchor for the sequent probability assessments (see Rabin, 1998). Consequently, their judgments may also be too anchored to that information (i.e. **anchoring bias** or **focalism bias**) (see Tversky and Kahneman, 1974).

Slovic and Lichtenstein (1971) claimed the adjustments made from an initial anchor are usually insufficient. On residential property *negotiations*, R. T. Black and Diaz III (1996), and R. T. Black (1997) found that incongruous asking price affect on subsequent negotiation bid prices. Negotiators are strongly influenced by asking price, and settlement price may not differ much from the asking price. R. T. Black (1997) also claimed that the asking price embodies both the seller's price expectations, and market prices for similar properties. On negotiations where the asking price is inconsistent with market information (i.e. it's higher respect to current transaction prices of similar properties), the real estate buyer may use the market information to adjust away the asking price towards a bid price that is more aligned to current market conditions. If the seller anchors to the asking price, this restrains the negotiation process. Diaz, Zhao, and R. Black (1999) carry out a study where participants were asked to negotiate the price of a residential properties. Their results showed that negotiations with no information about an asking price, the settlement price was much lower than for those negotiations that had information about an incongruous asking price.

In *property valuation*, Ibbotson and Siegel (1984) recognized that using appraisal values to estimate real estate returns series tends to smooth returns. They attribute the smoothing problem to valuers, as they are influenced by historic cost and transaction information. Diaz and M. L. Wolverton (1998) tested this hypothesis by asking expert appraisers to value twice a residential project, in Phoenix, with 8-months between each appraisal. They results revealed that expert insufficiently adjust from previous value judgments.

Anchoring can also affect investors when they look for *investment opportunities*. In this process, the lack of transparency in most property markets limits the quantity and quality of data available. This may induce some investors to "focus on one investment opportunity, as it becomes more viable, rather than continually seeking better opportunities" (Gallimore, Hansz, and Gray, 2000, p.610). Investors may exhibit preference for investing locally, instead of diversifying their investment across international markets. This is known as **home bias** (see, for example, K. R. French and Poterba (1991) and Tesar and Werner (1995)). The reason to invest local is because they know and understand better the market (e.g. law system, tax benefits, transaction costs, etc.) and assets, which make investors feel safer. This **familiarity bias** may have strong influence on what investors buy. In their experiments, Heath and Tversky (1991,

p.7) found that individuals "bet in the context where they consider themselves knowledgeable or competent than in a context where they feel ignorant or un-informed." M. Wang, Keller, and Siegrist (2011, p.17) claimed that *Familiarity Bias* may create "feelings of greater (sometimes illusive) competence," which can lead to an overconfident behaviour⁴.

Empirical studies suggested that the high investment concentration in domestic property markets are due to information asymmetry (see, for example Bravo-Ortega (2005) or Hatchondo (2006)). For example, an investor that wants to diversify a property portfolio with cross-border property investment. In this case local real estate agents hold valuable information about a market or an asset because they know the market very well. Levitt and Syverson (2008, p.609) points out that "this information is helpful to those who hire them, but can also be a source of welfare-reducing distortions." They found evidence that experienced local agents obtained higher returns for their clients, However, local agents may also exaggerate cost, hinder a solution and provide unneeded services, or alter the information to maximize agent fees. Situations where individuals have different information is known as **asymmetric bias**. In order to reduce asymmetrical information, property investors invest in a known local market, they purchase properties with long income story, and avoid to hire informed professional brokers (Garmaise and Moskowitz, 2003).

In addition to anchoring, thinking is distorted by a having different thoughts at the same time. Depending on the degree of attention or focus when thinking about one thought, the attention may be affected by other thoughts that come to mind. The lack of attention (i.e. **attentional bias**) unable individuals to consider other ways or alternatives to learn or solve a problem (Bar-Haim et al., 2007).

Attention is also affected by individual's expectations or desires. Olsen (1997, p.65) investigated how professional investment management's forecasts are influenced by their expectation of future economic events. Their forecasts are biased by how things would like to happen. They "overpredict desirable outcomes, and underpredict unwanted outcomes." This influence is known as **desirability bias** or **wishful thinking**.

⁴See more on page 181

Table 3.1 – Classification of Cognition Bias. Learning

Group Bias	Bias	Bias Type*	Reference	
Learning				
(A) Search				
	Excess of Information	· Information	C	Baron (2007, p.177)
	Technology	· Automation	C	Mosier et al. (1998)
(B) Attention				
	Focus on One Thing	· Anchoring	C E	Tversky and Kahneman (1974)
		· Home	C E	K. R. French and Poterba (1991)
		· Familiarity	C E	M. Wang, Keller, and Siegrist (2011)
		· Asymmetric	C	Levitt and Syverson (2008)
	Distractions	· Attentional	C	Bar-Haim et al. (2007)
	Wishful Thinking	· Desirability	C E	Olsen (1997, p.65)
(*)	C : Cognitive			
	E : Emotional			

II Knowing

(A) Memory

Individuals have different memory capacity to store and recall information when thinking. **Availability heuristics** appears when individuals rely on recurring thoughts to evaluate anything before making decisions (Schwarz et al., 1991). Depending on the context, information is recalled with more ease. Vivid memories or recent market movements may consciously or subconsciously distort investors' judgments. **Recency bias** appears when recent experiences may heavily influence investors decisions (see Zwicky, 2005). For example, investors that look for investment opportunities, they may remember easily a property they observed on a picture, rather than the name of the property they discovered through reading (i.e. **picture superiority effect**) (see Shepard (1967) or McBride and Doshier (2002)).

Pleasant experiences, like great past investment performances, are also easy to recall. They induce investors to be in a good mood (i.e. **Mood-Congruent Bias**) (see Berkowitz, 2000). But also, unpleasant experiences (e.g. the financial crisis of 2007) may be stored in the human brain for long time, and retrieved with ease than do neutral or positive things. This is known as **negativity effect** or **fading affect bias** (see Baumeister et al. (2001), Lewicka, Cza-

pinski, and Peeters (1992), Rozin and Royzman (2001), Haizlip et al. (2012) or Skowronski et al. (2014)).

In the different cases mentioned above, investors may remember things more easily. These biases appear when investors tend to rely too much on the information they remembered, which may lead them not to consider other information that is less easy to recall. These biases are in relation with the **anchoring bias**⁵.

Another issue about memory is *time*. Investors may think that once they became aware or learned something, they will maintain the same level of perception of what they learned. However, everything is on perpetual change. As time goes by, humans live new experiences, they learn new things and reach other levels of awareness. As a result, they lose perspective about things that happened in the past (i.e. **consistency bias**) (see Cacioppo, 2002).

Table 3.2 – Classification of Cognition Bias. Knowing

Group Bias	Bias	Bias Type*	Reference
Knowing			
(A)	Memory		
	Outline	· Availability	C Schwarz et al. (1991)
		· Recency	C Zwicky (2005)
	Context	· Picture Superiority Effect	C Shepard (1967) McBride and Doshier (2002)
	Feelings	· Mood-Congruent	C E Berkowitz (2000) Fiedler and Hütter (2013)
		· Fading Affect or Negativity Effect	C E Skowronski et al. (2014) Haizlip et al. (2012)
	Distortion	· Consistency	C Cacioppo (2002)
(*)	C : Cognitive E : Emotional		

⁵See more on page 164

III Understand

The process of learning and knowing leads to understand things. When investors comprehend things, they have more evidence, or believe, that something is likely to be true (Baron, 2007, p.12). This research considers three categories of beliefs: weak, strong, and uncertain beliefs.

(A) *Weak Beliefs*

Perceptions or beliefs we have may enhance or reduce when are compared to things we observed (Plous, 1993). This is known as **contrast effect**. In property, this effect appears in real estate when investors contrast the situation of different property markets or buildings. For example, a property market looks less attractive in isolation, but it's becomes more attractive when the market is compared with other less attractive property market.

Investors may have a good or bad impression, idea or believe about a property market because they managed a portfolio which performed well or bad in the past. However, investor's preconceived impression, ideas or believes may be distorted from reality. Past performance is not indicative of future performance. This effect is known as the **halo effect**, and it's coined to the psychologist Thorndike (1920). Another example, an investor that pretends to buy a property in a good location, such as a Central Business District (CBD). The investor may believe that investing in a prime location increases the chances to protect them against capital depreciation. However, the high demand for office buildings located in CBD shortages the number of buildings available. As a result, investors may overpay for a property. Overpayment reduces the chances of getting a good performance. At the end of the investment, investors may not get back the value they paid for the office building.

Hot-hand fallacy is the belief that an individual who had continued success in a random event has more chance to have success in additional attempts (Green and Zwiebel, 2015). Before investing in a real estate fund, investors may look to the historical tracking record of fund managers. A good tracking record may alleviate investors. They feel confident because they expect fund managers will attain a promised target return. However, this belief does not guarantee that the target return will be attained.

An event, or anything, that recently come to individual's attention, and which

seems to appear repetitively afterwards. Individual's perception may affect estimates on new occurrences. This bias is known as the **Frequency illusion** (see Zwicky, 2005).

(B) *Strong Beliefs*

Confirmation bias, or **myside bias**, is the tendency to perceive information in a way that when the individual search for or recall information the individual gives more consideration to the information that confirms his or her pre-existing beliefs. Therefore, the individual gives less consideration to other information (Plous, 1993).

Gallimore (1996) found some evidence that a sample of RICS valuers suffered from confirmation bias when they precipitate to value a property. Valuers look to current transaction prices that confirm their opinions and limit the search of comparables to the ones that are in line with their beliefs. This implies that valuers "are failing to process efficiently available information and are therefore less likely to arrive at valid representations of market decisions" (Gallimore, 1996, p.270).

Confirmation Bias may induce investors to overestimate their abilities, as they believe they control a situation or events, where in fact situation are governed by chance (Langer, 1975). This term, known as **optimism bias**. For example, figure 4, on page 27, shows that in 2016 both European long-term government bond yields and property prime yields are near to historical lows. An investor may think that even government bond yields rises, the performance of his/her property fund won't be affected because his/her fund carries out a great diversification strategy to avoid capital depreciation. *Optimism Bias* causes the investor to believe he/she is less exposed to negative outcomes than others (see Baker and Ricciardi, 2014).

The relation between two events or things also may lead individuals to refuse outcomes where expected relation doesn't appear. This is known as **illusory correlation** (see, for example, Little and Shneidman (1959) and L. J. Chapman and J. P. Chapman (1969)). For example, most property investors believe there is a positive relationship between Bond yields and property yields. An M&G Real Estate report explains that "a rise in bond yields does not necessar-

ily always imply a concurrent rise in property yields.⁶ The expected negative relationship between the yields may induce investors to not accept the negative correlation. This effect is known as *illusory correlation*.

A person of authority is perceived as a very influential and respectful person that prescribes the set of laws or rules that must be carried out. Ascribe accurate opinion to a person of authority that is not an expert on a field, and it takes for granted, it may lead to the **authority bias** (see Milgram, 1963).

Some investors believe successes are achieved thanks to his/her abilities, but see other individuals or circumstances as responsible for investor's failures (Campbell and Sedikides, 1999). This attribution error is known as **self-serving bias** or **self-attribution bias**. M. Glaser and Weber (2009) and Hoffmann and Post (2014) found evidence that high past portfolio returns lead investors to think investment performance is due to their investment skills. This bias may increase investor's confidence, and this could lead on over-trading and under-diversification strategies⁷.

An excess of investor's confidence may tend to self-enhancement increases. Pronin, Lin, and Ross (2002) suggested that some individuals perceive cognitive and emotional biases more in others than themselves (i.e. **blind spot bias**). As a result, individuals may see themselves better-than-average, as they do less mistakes than their peers. Their study also revealed that even some individuals were reported to be affected by some bias, they denied that their assessments had been biased.

(C) *Uncertain Beliefs*

Although individuals followed a learning, knowing and understanding process, beliefs may continue to be uncertain. This usually occurs when individuals face to uncertainty. These beliefs are generally expressed in statements such as : "I think that...", "chances are...", "it is unlikely that...", (Tversky and Kahneman, 1974, p.1).

Individuals usually assess the possibility (or probability) of an unknown situation or uncertain event to happen. This entails individuals to do subjective

⁶(See more on see <https://www.fondsnieuws.nl/marktrapporten/file/6901>, p.3

⁷See more on page 170

assessments based on perceptions or beliefs. When individuals perceive or believe that unknown outcome shares some characteristics or relations to another known outcome, consciously or unconsciously, individuals tend to generalize. So then, they assign known characteristics or probabilities of the known situation to the unknown situation. This heuristics method of generalization is known as **representativeness** heuristics (Tversky and Kahneman, 1974).

In Real Estate exists a wide consensus that required property returns are affected by movements in Government bond yields. This consensus comes from conventional investment theory, which assumes investors' required return are explained by a risk-free Bond yield, a property risk premium and the expected property net income growth. Based on this assumption, some property reports state the significant effect that bond yields have on property yields, although they do not move in parallel⁸. Despite the evidence, other reports enhance that a rise in bond yields may not necessary imply an increase in property yields. For example, the M&G Real Estate report compares the average property yields (MSCI data) and the property prime yield (CBRE data) respect to Gilt yields and UK Bank rate. They found that prime yields are less correlated to gilt yields and UK Bank rate than the average property yield⁹. On one hand, bond yields and Bank rates data are available daily. On the other hand, property yields are available every month or quarter. Economic agents may suffer from a *representative bias* when they use daily, monthly, or even long-term average, Bond and Bank rates to estimate property yields. As mentioned above, it's not evident to explain the relationship between property, bonds and bank rates. Then, if economic agents over-rely in their relationship, they may lead to obtain more biased property yield forecasts.

Assign similar probabilities between different events, just because they are alike, may lead to serious errors or biases. For example, it is widely believe among real estate practitioners that the property market is cyclical. After the expansion of an office market, rents are more likely to decrease towards the mean reversion. When investors observe good asset performances, they may not expect poor performances in the short term. However, as times goes by, they presume chances to have poor asset performance in the future are

⁸See, for example, <https://www.avivainvestors.com/content/dam/aviva-investors/united-kingdom/documents/Investors-Journal-Interest-rates-and-property-yields.pdf>

⁹For more information, see <https://www.fondsnieuws.nl/marktrapporten/file/6901> and on page 171

more likely to happen (Tversky and Kahneman, 1971). This misperception is known as **gambler’s fallacy** or **Monte Carlo fallacy**, and it can arise in many situations, especially with gambling. "This tendency to over-infer from short sequences, in turn, leads to misperception of regression to the mean" (Rabin, 1998, p.25).

After an unpredictable event took place, a person belief that he/she knew it could happen (Fischhoff and Beyth, 1975) is known as **hindsight bias** or **knew-it-all-along effect**.

Table 3.3 – Classification of Cognition Bias. Understand

Group Bias	Bias	Bias Type*	Reference
Understand			
(A) Weak Belief	Compare	· Contrast Effect	C E Plous (1993)
	Distortion	· Halo Effect	C E Thorndike (1920)
	Ilusion	· Hot-Hand Fallacy	C E Green and Zwiebel (2015)
		· Frequency Illusion	C Zwicky (2005)
(B) Strong Belief	Confirm	· Confirmation	C Plous (1993)
		· Optimism	C E Baron (2007)
	Contradiction	· Illusory correlation	C L. J. Chapman and J. P. Chapman (1969)
	Authority	· Authority	C E Milgram (1963)
	Self-esteem	· Self-Serving or Self-Attribution	C Campbell and Sedikides (1999)
		· Bias Blind Spot	C Pronin, Lin, and Ross (2002)
(C) Uncertain Belief	Probability	· Representative	C Tversky and Kahneman (1974)
		· Gambler’s Fallacy	C Tversky and Kahneman (1971)
		· Hindsight	C Fischhoff and Beyth (1975)
(*)	C : Cognitive E : Emotional		

IV Conclude

At the end of the thinking process individuals tend to compare their beliefs with others to verify if they are aligned. An individual may experience a mental stress or discomfort caused by the new information that contradicts his/her own ideas or beliefs (Festinger, 1962). For example, residential prices started to decline and an owner planned to sell his/her residence. The owner may experience a **cognitive dissonance** caused by contradictory thoughts: either accept a lower price offered by a potential buyer and sell it; or hold the property and sell it when residential market conditions ameliorate.

(A) *Compare*

Investors may perceive or evaluate an individual or situation differently. An investor can make assumptions about other investors without having all the information. This leads to biased interpretations and a disruption vision from reality. This bias known as **attribution error** (see, for example, Nisbett and Ross (1980) and Funder (1987)).

Real estate investors can also complain or blame about an individual or a situation that lead to poor investment performance, without taking into account any external issues that may also affect the results. This effect is known as **fundamental attribution Error** (Ross, 1977)

Investors that obtained poor performances can attribute his/her actions to the actions followed by others. This bias is known as **Actor-Observer bias**, and was investigated by Jones and Nisbett (1971). This bias is related to the **herd behaviour**¹⁰. Individuals follow the beliefs and opinions of others to not dissent from the consensus (see Colman, 2015).

(B) *Judgment*

Different conclusions or preferences can be obtained depending on how the information is presented (Plous, 1993). In property, when an investor wants to purchase an office building, the buyer either contacts to directly to the vendor or to a broker that works for the vendor. The broker presents the building to the buyer. The excess of positive information, and underestimate negative issues about the asset, may expose the investor to important risks.

¹⁰See more on page 183

In this case, the information is framed by an excess of positive information, and investor’s judgments may be affected somehow by the excess of positive information. This bias is known as **framing bias**.

Valuers are also exposed to framing. When valuers proceed with a valuation of an office building, they will compare the property to other buildings that have similar characteristics. Gallimore and M. Wolverton (1997) stressed that the choice of "best" real estate comparables selected by valuers affect to their judgments and estimated values. Therefore, selected comparables frame the rest of their analysis, and this will have an impact on their valuation. Gallimore and M. Wolverton (1997) and Adair, Berry, and McGreal (1996) also evidence that differences in valuation rules and pre-approved forms used by valuers, to report their opinions of value, may lead to considerable differences on valuations.

Table 3.4 – Classification of Cognition Bias. Conclusion

Group Bias	Bias	Bias Type*	Reference
Conclude			
(A)	Compare		
	· Attribution Error	C E	Nisbett and Ross (1980) Funder (1987)
	· Fundamental Attribution Error	C E	Ross (1977)
	· Actor-observer	C E	Jones and Nisbett (1971)
(B)	Judgment		
	· Framing effect	C	Tversky and Kahneman (1981)
(*)	C : Cognitive E : Emotional		

Decision Bias

Property investment decision-making is performed by using factual market data. The majority of property markets are characterized by the lack of quality and quantity of information. To complement the available information, investors may also consider perceptions or market sentiment. The study of Gallimore and Gray (2002) carry out a survey in the UK to 983 individuals involved in the property investment process. Their results revealed that, aside from market data, investors also use market sentiment (i.e. the personal feel or the state of the market) as an important form of information.

Small changes in the way information is presented may cause eloquent changes in decision-making. Roughly, there are two types of decisions: act, or no act.

I *Act*

(A) *Over react*

Gallimore and Gray (2002) discussed that investor sentiment is aligned with personal network sources, and which investors seem to use more extensively than either public or other private information sources. Daniel, Hirshleifer, and Subrahmanyam (1998) stressed that individuals give a lot of importance to information they collect, and they tend to magnify the accuracy of that information. Gallimore, Hansz, and Gray (2000, p.611) also emphasize about the importance of private information passed on through market contacts, and how sensitive it can be, "leading potentially to **availability bias**¹¹ and **over reaction**." People tend to judge things and act based on most recent information. Good or bad news about a market or a property can lead investors to react quickly. Bad news might cause a severe decrease in property prices. Investors may start selling assets to protect against capital depreciation. Property prices may decrease below fair values. Over reaction may lead investors to take sub-optimal decisions when investors cannot achieve a target return.

(B) *Under react*

Paradoxically, when investors perceived there is no chance to avoid a negative outcome (e.g. a unrecoverable cost from a bad investment decision), some investors *maintain* firmly his/her commitment and decision instead of

¹¹Availability heuristics is related to memory. Please check it out on page 167

alter the course. This bias is known as **escalation of commitment** (Staw, 1981) or **sunk cost fallacy** (Arkes and Blumer, 1985). In this case investors may also tend to justify that a wrong investment decision was the best choice giving the current market conditions (Mather and Johnson, 2000). The self-justification results is known as **choice supportive bias** or **post-purchase rationalization**.

(C) *Reject*

The use of probability is commonly accepted in the normative models for decision making. It can help to reduce the level of uncertainty and facilitate the process of making a decision. However, having an uncertain perception about future may lead some investors to ignore probability when making a decision, even if the probability was relevant for the decision (Baron et al., 1993). Some investors claim there is no way to know what is going to happen in the future, and so, and they deny the use of probability. According to Kahneman (2011, p.144), the phrase **probability neglect** was coined to the professor Cass Robert Sunstein.

When investors make predictions, some tend to ignore the optimistic and pessimistic scenarios to focus on the central scenario (Bar-Hillel, 1980). They do so because, even they don't have enough evidence about future market conditions, they prefer to stay with the base scenario as it's the "most likely" outcome. Furthermore, the central scenario is of more relevance than the other two because it's the one that is expected to lead to investors' target return. This bias is known as **base-rate fallacy** or **neglect of base rates**.

II *No Act*

(A) *Remain*

There are many situations in which investors are exposed to risks. These periods of uncertainty may provoke investors a psychological discomfort. In a risk situation, investors may have "a strong tendency to remain at the **status quo**, because the disadvantages of leaving it loom larger than advantages" (Kahneman, Knetsch, and R. H. Thaler, 1991, p.197). This effect was discovered by Samuelson and Zeckhauser (1988), and it's related to **loss aversion**¹².

¹²See more on page 180

When investors perceive risk, some pretend risky circumstances do not exist. This term is known as the **ostrich effect** (See, for example, Galai and Sade (2006), Karlsson, Loewenstein, and Seppi (2009), and Sicherman et al. (2015)). Sicherman et al. (2015) claimed that ostrich and non-ostrich investors trade differently on the financial market. They claimed that ostrich investors tend to trade less in down-markets. The inaction may help them to avoid mistakes such as overreacting to an excess of bad news. In property, when real estate sales are low, and there is usually an excess of supply. Long-term investors may hold their properties to protect against capital depreciation. In periods of turmoil, ostrich investors may miss opportunities to pick up a property on the cheap, as they may deprive of information in some circumstances.

Table 3.5 – Classification of Decision-Making Bias

Group Bias	Bias	Bias Type*	Reference
Act			
(A) Over react	· Over reaction	C E	Gallimore, Hansz, and Gray (2000, p.611)
(B) Under react	· Escalation of Commitment or Sunk cost Fallacy	C	Staw (1981) Arkes and Blumer (1985)
	· Post-Purchase Rationalisation or Choice Supportive	C	Baron et al. (1993, p.507)
(C) Reject	· Neglect of Probability	C	Baron et al. (1993, p.507)
	· Base-Rate Fallacy	C	Bar-Hillel (1980, p.507)
No Act			
(A) Remain	· Status Quo	C E	Samuelson and Zeckhauser (1988)
	· Ostrich effect	C E	Galai and Sade (2006)
(*)	C : Cognitive E : Emotional		

Behavioural Bias

The frame used by a decision-maker is controlled partly by how the problem is articulated, but also by the rules, habits, and personal characteristics of the decision-maker (Tversky and Kahneman, 1981, p.453). Decisions are reflected on behaviours. Many types of behaviours can be triggered from the same situation. Let's cope some behaviours:

I *Risk Perception*

(A) *Risk Aversion*

Kahneman and Tversky (1979), Kahneman and Tversky (1984) analyzed decisions of individuals when they face situations under risk. A risk averse person prefers a certain prospect to any other outcome that involves any risk. This behaviour is known as **loss aversion**, and it was represented by Kahneman and Tversky (1979) in a descriptive model called *Prospect Theory*. This model describes how losses are psychologically more difficult to accept than gains. Positive and negative prospects are judged or evaluated respect to the current situation of individual, known as the *reference point*.

The acquisition price becomes a *reference point* when investors purchased a property. If a buyer makes an offer to buy a property which is above the seller's reference point, the seller will be more willing to sell it. Some investors may even decide to sell too soon investments that increase in value to re-balanced their portfolio (see Odean, 1998a). In other circumstances, if the buyer's offer is below the seller's reference point, the seller will be averse to selling the asset because the investor wants to avoid any loss. Some investors may sell rapidly assets that dropped its value below their reference point to stop a loss. Other investors will hold the asset and do active management until they get a price they would be ready to sell it. However, the holding may last too long. Some investors may insist on holding it because they believe they are capable of reverting the situation. This effect has been labeled the **disposition effect** by Shefrin and Statman (1985). Crane and J. C. Hartzell (2010) also analysed this behaviour in corporate managers that make investment decisions in the REITs. They found two results: (1) Investment managers are less inclined to sell properties that underperform respect to a reference point. In some cases (2) CEOs' managers accepted to sell profitable investments when they are eager

to sell, either to recognise a gain, or to complete a transaction. However, they found little evidence that this behaviour is lead due to optimal tax timing, mean reversion of property returns, and asymmetric information.

Tversky and Kahneman (1981) conclude that choices that involve gains are often risk averse. However, choices that involve losses are often risk taking. However, Andersson et al. (2014) and Eriksen, Kvaloy, and Luzuriaga (2017) found evidence that when investors decide on behalf of others they reduce *loss aversion*, and they are more willing to increase their risk exposure.

(B) *Risk Taker*

An increase of risk perception lead individuals to look at new information, and update or confirm with new evidence the pre-existing beliefs (see the *Confirmation Bias* on page 170). Nevertheless, some investors are reluctant to change their current beliefs. They tend to revise their judgments and decisions insufficiently. Therefore, investors may "underreact to abstract, statistical, and highly relevant information, and they overreact to salient, anecdotal, and less relevant information" (Odean, 1998b, p.1887). This attitude or behaviour is known as **conservatism bias** (see, for example, Edwards (1968) or Baker and Ricciardi (2014)).

Despite the increase of risk, high past portfolio returns make investors feel **overconfident**. On one hand, overconfidence may lead investors to think that past performances were due to their investments skills, and so they are affected by the **self-serving bias**¹³. Griffin and Tversky (1992) suggest that overconfidence is more present on experts, rather than inexperienced individuals. Shiller (1999, p.22) stated that overconfidence "may also be traced to the **representative heuristic**" (Tversky and Kahneman, 1974)¹⁴.

Investors may also feel confident, for instance, when they observe the relation patterns of different series of data which are random. Rabin (1998) characterised this by judgment errors of individuals who deduce common probability distributions of data from short sequences, or even when they forget of contrary relation patterns evidence in observed data.

Overconfidence can lead to underestimate the volatility of stock returns, and

¹³See more on page 171

¹⁴See more on page 172

investors may expose to higher risks (M. Glaser and Weber, 2009). Overconfidence affects market trading activity and performance. "How depends on who in the market is overconfident and on how information is distributed" (Odean, 1998b, p.1887). Odean (1998b) also described that overconfidence roughly increases expected trading volume, and investment asset volumes, among others. One of the consequences is that overconfident investors may influence to rest of investors to underact to the information or rational traders.

Eichholtz and Yönder (2015) and Yung, D. D. Li, and Sun (2015) investigated the CEO overconfidence on real estate investment trust (REIT). Among the main results, Eichholtz and Yönder (2015) found that overconfident CEOs acquire more assets, and tend to keep assets if they have enough cash in their funds. They also found that property investment performances obtained by overconfident investors generally have lower, so then shares of their property companies perform less. Yung, D. D. Li, and Sun (2015) also found overconfident CEOs pay less dividends to shareholders. Besides, they found that overconfident CEOs use more long-term debt to acquire assets.

II *No Risk Perception*

(A) *Risk Taker*

On periods where economic activity rises, investors are more optimistic. Investors feel more protected, and the level of risk perception decreases. Therefore, they are inclined to move up their risk curve. As a result, they tend to invest in assets that offer higher yields (Peltzman, 1975). This bias is known as **risk compensation** or **Peltzman effect**. Depending on the level of leverage, and the degree of risk exposure, this behaviour may lead investors to critical financial situations they may *regret*. For example, low prime property yields in a market lead some investor to overpay for an office building, due to the limited number of buildings available in an area. When investors overpay, when they decide to sell, they risk not getting the price they paid for the asset. Also, depending on the level of target return investors agreed with their shareholders, investors decrease the chances to obtain the target return. If this happens, the most likely is that investors will probably regret their decision of overpaying an asset. A negative emotion appears as bad performances affect directly to their tracking record and reputation.

III *Other Biases*

Investors may ascribe more value to properties they have on their portfolio. In case they decide to sell a property, they will demand a higher price than they will pay to acquire it (see R. Thaler (1980), and Kahneman, Knetsch, and R. H. Thaler (1991)). This effect is known as **endowment effect**.

Investors' thoughts, feelings, and decisions can be affected when they observe other investors. According to Hirshleifer and Hong Teoh (2003) explains that the observational influence may be constructive through rational learning. This means that, as long as investors observe one each other, they learned from information exchanged, actions and/or the consequences of their actions. Thoughts, feelings, and decisions may *converge* or *herd* between investors when their preferences are aligned. But they can also *diverge* or *disperse* when investors' preferences are not aligned. When investors mimic or follow other investors is known as **herd behaviour**. In Real Estate, for example, some investors may observe that the majority of investors are investing in core office buildings. Investors herd when they decide to invest in what the majority of investors do. Devenow and Welch (1996) and Chang, Cheng, and Khorana (2000) describe that *herding* can be either irrational or rational. Herding is *rational* when an investor's opinion or decision may converge respect to other investors' opinions or decisions because the investor has fear that an observer will damage his/her reputation or payoff in case he/she doesn't follow other investors' opinions or decisions (see Keynes (1936, pp.157-158), Scharfstein and Stein (1990), and Rajan (1994)). Herding can also be *irrational* when investors blindly follow other investors and ignore their private information or prior beliefs.

Bikhchandani, Hirshleifer, and Welch (1992), Welch (1992) and Hirshleifer and Hong Teoh (2003) also refer *herd behaviour* as an **informational cascade**. There is a contagion between individuals. Qin (2012, p.15) states that when asset prices are moderate, investors consider their information to decide whether they invest or not. If asset prices become very high, some investors may ignore their information, and won't trade. However, in case asset prices continue to increase investors tend to follow the market because "they do not want to bet against the market and regret afterwards." As more investors do something, this put pressure on other investors who will tend to think, act and behave in the same way (Schindler, 2007). This effect is known as **bandwagon effect** (see Schadler, 1993).

Table 3.6 – Classification of Behaviour Bias

Group Bias	Bias	Bias Type*	Reference
Risk Perception			
(A) Risk Aversion	· Loss Aversion	C E	Kahneman and Tversky (1984)
	· Disposition Effect	C E	Shefrin and Statman (1985)
(B) Risk Taker	· Conservatism	C E	Edwards (1968) Baker and Ricciardi (2014)
	· Overconfident	C E	Griffin and Tversky (1992) Rabin (1998) Odean (1998b) Shiller (1999) Eichholtz and Yönder (2015)
No Risk Perception			
(A) Risk Taker	· Risk compensation	C E	Peltzman (1975)
Other Biases			
	· Endowment Effect	C E	R. Thaler (1980)
	· Herd Behaviour or Informational Cascade	C E	Devenow and Welch (1996) Bikhchandani, Hirshleifer, and Welch (1992) Welch (1992)
	· Bandwagon effect	C E	Lakonishok, Shleifer, and Vishny (1994)
(*)	C : Cognitive E : Emotional		

3.3 Methodology. A Qualitative Research

Qualitative research is characterised by an inductive method. The inductive method is a process of observing a phenomenon as it naturally occurs, allowing researchers to describe general instances about it (see Hill, B. J. Thompson, and Williams (1997) and Kvale and Brinkmann (2015)).

To explore phenomena, qualitative researchers ask participants to participate in a semi-structured interview. This kind of interview is neither an open conversation nor a closed questionnaire (Kvale and Brinkmann, 2015, p.31). It is an interview where the interviewer asks the participant to discuss specific topics that are included in an interview guideline. In case the participant decides to participate, the interviewer, without too much-preconceived ideas, asks the participant open-ended questions to describe his/her experiences. Interviews are audio-recorded and transcribed into text afterwards. Both the recording and transcriptions are the materials (i.e. the knowledge produced from the interview) that will be used to do the qualitative analysis. The quality of materials depends not only on the interaction between the interviewer and the participant; it also depends on the skills of interviewing of the researcher (Kvale and Brinkmann, 2015, p.20) Transcribed interviews are coded, which means to categorise interview statements (Kvale and Brinkmann, 2015, p.224). From categories, social researchers identify patterns and devise possible explanations and relations among these patterns.

To conduct a semi-structured interview, there are no standard rules. However, different approaches need to be considered in every interview investigation. Kvale and Brinkmann (2015, p.128) describes seven stages are required to carry out on an interview inquiry: (1) Thematizing, (2) Designing, (3) Interviewing, (4) Transcribing, (5) Analyzing, (6) Verifying, and (7) Reporting.

3.3.1 Thematizing

Generally institutional investors (i.e. pension funds, life insurance companies), but also family offices, pooled property funds, and private clients, contact with a Commercial Real Estate Company to assemble a property investment portfolio. It could also happen in the other direction.

The Acquisition Process of an Office Building.

The acquisition process can be carried out in two ways: (1) *on-market* - the Seller advertised the property in an open market. The building goes to auction, and bidders make their bids to acquire the Building - and (2) *off-market* - is a silent listing transaction, which means a Buyer negotiates the sale directly with the Vendor. **off-market** transactions are less frequent in Commercial Real Estate. They generally take place when a Seller finds an investor that is willing to pay the Seller's asking price. In this case, the transaction is carried out with the absence of competition. On the other hand, **on-market** transactions induce competition, and the Vendor has more chances to get a higher price than the asking price when the market is booming. The inconvenient of on-market transactions is that the transact process - the bid process and sale - can take six months to be completed. The principal seller's risk is that the Buyer who gets the exclusivity may not to execute the transact at the end of the process. During this time, market conditions may have changed. In case the market continues to expand, the Seller may decide to put the asset again on the market. But in case the market restraints, the Seller either (1) withdraws the asset from the market, and hold it till market conditions are favourable to get a better price for it; or (2) the Seller sells the asset at a lower price in case he/she needs liquidity. This research focuses entirely on on-market transactions. On-market acquisitions generally have four stages:

1. **Initial Due Diligence** The Commercial Real Estate Company elaborates a full *Due Diligence Report*, which includes the textitBusiness Plan Strategy. The strategy meets investors' requirements to attain a specific target return. The strategy also includes the principal policy determinants as (1) Investment Objectives (e.g. the sector, location, set the level of risk and return) (2) Investment Volume, (3) Gearing Policy, (4) Diversification, (5) Ethical Considerations, and (6) decide whether to do a Direct or Indirect Property Investment. The strategy also includes property market analysis (i.e. economic forecasts) with the expected effect on the property market

Once set the Business Plan Strategy, Fund Managers contact Asset Managers and Brokers to source and identify assets that are aligned with the Business Plan. Selected assets are discussed on the investment committee. In this meeting, investors and fund managers assess the level of risk and opportunities according to the information they have. The information may include the characteristics and value of the building, its location, comparables, state of the market, a plan to follow, etc. At the end of the meeting, the investment committee decides whether they proceed

or not with the acquisition process

2. **Final Bid** A Negotiation process starts between the Buyer and the Vendor to set the market price of the building. At the end of the negotiation, the Buyer submits the Letter of Intent to the Vendor, which includes the final bid
3. **Detailed Due Diligence.** If the Vendor accepts the Final Bid, the Vendor signs the Letter of Intent, and the buyer enters into an exclusivity agreement. This means the Buyer has access to all information and documents of the building for a limited period (generally it last two months). With the available information, the Buyer updates the Due Diligence reports. For example, environmental reports, technical reports, and the legal due diligence reports. New information provides the Buyer with a more clear view of the value of the building. If there is an issue with the asset, the Buyer renegotiates the price of the building with the Vendor
4. **Closing of the Transaction.** In case both the Buyer and the Vendor reach to an agreement the deal is completed. Otherwise, the Buyer withdraws from the transaction, and the Vendor starts a new selling process

3.3.2 Designing

Three Topics

This research attempts to observe how property investors and fund managers make judgments, investment decisions, and behave. The main purpose is to investigate if they are affected by biases. Nevertheless, this research inquired if it's appropriate to explain to participants that the purpose is to analyse if any bias influences them. Yow (1994, p.90) stress the importance that researchers must explain clearly the purpose of the research. Researchers of this study warned that they were exposed to the *cognitive dissonance*¹⁵. On one side, if researchers require honesty to participants, it won't be ethical if researchers carry out interviews without revealing the real purpose of this research. On the other side, it is very likely that participants won't feel comfortable very comfortable in case researchers ask them to speak about systematic mistakes they do (i.e.) biases. Automatically, participants might try to eliminate their own conscious biases as long as they recount what they do. Yow (1994, p.91) shed a light on this point. To avoid disturb participants in this research, researchers of this study decided not revealing the specific

¹⁵See more on page 174

aim of this study, and to analyse biases with discretion. A general topic of the purposes of this study was given to participants: To learn how real estate practitioners take decisions in Office Property Investment. The explanation is covered from three perspectives:

1. *To see who is involved in the investment decision*

This research presumes investors' decision of starting or not the acquisition process for an office building may be influenced by the exchange of information among different agents. For example, during the *Initial Due Diligence*¹⁶ investors and/or fund managers notify asset managers (or transaction managers) and brokers to start looking for office buildings that are aligned with the business plan requirements. The assets reported by asset managers and brokers are discussed with investors and fund managers. Discussion may include judgments about the state of the building, its location, rental leases, the amount of vacant space, the quality of the tenant, and an approximate value of the building. Investors and fund managers may also contact valuers to have another opinion about the valuation of the asset. The information shared will frame the analysis, and this will affect investors' judgments, decisions and behaviour.

2. *To see how practitioners in real estate determine the value of an office building*

A lot of financial models have been adapted to Real Estate to analyse the performance of a property asset. Some are widely used by practitioners to decide whether they purchase or not a property. The most widely used is the *Discounted Cash-Flow* model, or *Internal Rate or Return* (IRR). To obtain the IRR, the model considers the acquisition price, hypotheses about expected income, costs, and a theoretical selling price to be received at the end of the investment period. Projections are uncertain. The IRR model is very sensitive to numbers. Small changes of inputs embedded in the model might lead to big changes in the performance of the asset. That said, inputs used in the model frame results.

3. *To observe what triggers the investment decision of buying or not buying an office building.*

Investors unknown what will be the situation of the property market in five or ten years time. Although in the *Discounted Cash-Flow* analysis they consider different scenarios to assess different future conditions, this study presumes investors generally focus on the baseline prediction (i.e. heuristics) to decide whether they

¹⁶See more on page 186

buy or not the building. The baseline projection also implies that the initial capitalisation rate or initial yield¹⁷ will be the same to the final capitalization rate or exit yield¹⁸.

Interview Questions

Questions¹⁹ are different depending on the interview profile. This research considers three interview profiles: (1) Investors, Fund managers, and Asset Managers, (2) Brokers, and (3) Property Valuers. Interview questions consist of semi-open questions, neutral, with no opinion, just descriptive. Questions of different profiles were designed to cover three topics mentioned above:

1. **Investors, Fund Managers and Asset Managers** are present all along the Acquisition Process. They sit on Investment Committees. They discuss information and decide whether they execute the purchase or not. This is why they answered to the same questions profile. Questions for this profile include (i) investment preferences and motivations, (iii) people they contact to help them in the investment process, (iv) procedures they follow to buy an office building, (v) strategy and risks, (vi) how they calculate the Internal Rate of Return, and the hypothesis embedded in the model, (vii) procedures they follow when they are near to close a deal, (viii) how they manage conflicts of interest, (ix) what are feelings or emotions perceived before and after closing a deal, (x) procedures to sell an office building
2. **Brokers** advice investors, come along with them during almost the entire investment process, and negotiate the price of a building during the bidding process. They also intermediate between buyers and the seller to make possible the execution of the transaction succeeds. Brokers can either work on buy-side or sell-side. However, they can only be on one side of a transaction to avoid any conflicts of interest. To find a deal, brokers working on one-side contact with brokers that work on the other side.

Brokers get a commission when investors close the deal. The level of commission depends on the price agreed. As a result, sell-side brokers will try to get the highest price, and buy-brokers will try to pay the lowest price to acquire the property. Once

¹⁷The Initial Yield equals rental income obtained in the first year of investment period ($t=1$) divided by the acquisition price at $t=0$

¹⁸The Exit Yield equals rental income generated obtained in last year of investment period ($t=T$) divided by the theoretical selling price at $t=T$

¹⁹Interview questions are available in Annex 4.4.2 on page 264

the buyer makes the final bid and enters in exclusivity, brokers' role, on both sides, is more secondary. They supervise everything goes right between the two parties until they close the deal.

Questions for brokers include: (i) if they are much buy-side or sell-side, (ii) their motivation, (iii) if they have any influence to negotiate their commission, or (iv) if they recommend the client a price to pay for the office building, (v) how they include risk in the pricing. Some questions are equal to the questions used in the investors' profile. For example, (vi) how they proceed when they are near to close a deal, (vii) what are the feelings or emotions perceived before and after the closing a deal, (viii) procedures to sell an office building, (ix) how they convince their client to sell the building at a specific price. The last question examines the interaction between brokers and valuers: (x) if any valuer ask him/her an opinion about the value of a building.

3. **Property Valuers** proportionate investors an idea of the building value. Investors use valuations as a reference point to start negotiations. Interview questions for valuers comprise (i) the people they report their valuations, (ii) how they obtain the market value of the building, (iii) if they include gut feelings on their valuations. Also to know (iv) if they contact any broker or someone else to help them on their valuations. (v) At what stage they have the feeling the market value is formed. We asked (vi) about the number of comparables used. (vii) If they have reported a valuation which they were not comfortable with, and (viii) the feelings they felt at that moment. It is interesting to see (ix) how they obtain the valuation when they have a very short time, and (x) if they have used another valuation of another expert to value the asset. Finally, (xi) what they do when their client doesn't agree with his/her valuation, and (xii) if they ever had the impression that someone affected by their valuation.

Questions of the different Interview Profiles were commented, ameliorated and tested with some investors, values, and brokers before interviews started. An *interview guideline* was designed to give to each participant information about the goal of the interview, and the process to be followed during the interview. Explanations also include confidential matters. The interview guideline helped us to make participants feel more comfortable during and the interview.

How we build up the Sample?

Once the interview questions and guideline were ready, this research started to think about the persons that are going to participate. The sample was build up from scratch. In December 2016 I went to the SIMI, the Professional Real Estate event²⁰, hosted in Paris. I attended different conferences related to commercial investment. At the end of each conference, I met some people that attended to those conferences: investors, fund managers, asset managers, brokers and experts. The process followed was always the same: (1) I introduced myself, (2) I explained the purpose of my study, and (3) I proposed them to participate in my research. If they accept to participate in the research, we set a date for the interview. The Interview Guideline, which describes the main lines of the interview, is sent before the interview²¹. However, I explain participants that no questions are addressed before the interview to avoid them prepare the answers. Therefore, I prioritise spontaneity in their responses.

From different encounters I had at the SIMI event, three investors, one asset manager, one broker and one valuer agreed to organise an interview at their offices. At the end of each interview, I asked the participants to provide me with other contacts that might be willing to participate in the study. To avoid any interference, I always asked participants that have a different profile. So, for example, if I interviewed an investor, I asked the investor if he/she can put me in contact with a broker or a valuer. The process continued until I had a total of 8 investors, 6 fund managers, 2 asset managers, 5 valuers, and 5 brokers. Most of the participants of the sample have important job positions and an extensive experience in real estate.

3.3.3 Interviewing

The aim of Interviewing is to get a precise description about what individuals experienced when they faced to situation related to the three topics covered in chapters 3 and 4: (1) what triggers the investment decision of buying or not buying an office building, (2) to see who is involved in the investment decision, and (3) how practitioners in real estate determine the value of an office building. The process followed in each interview was always the same:

²⁰The SIMI is a commercial real estate exhibition which is organised once a year, from December 6th and 8th. The event comprises more than 60 conferences, and there are around 350 exhibitors that offer real estate services in offices, logistics, business and retail

²¹Interview Guideline is available in Annex 4.4.1 on page 259

1. Off-Tape

Before starting an interview, the interviewer explains to the interviewee - always off-tape - the purpose of the meeting. The interviewer explains why he/she was selected for the interview. Besides, the interviewer describes how they are going to proceed during the interview. Procedures are described in the interview guideline²². The guideline includes aspects of confidentiality to guarantee the protection of the participant, and to make him/her feel more comfortable. The interviewer also warned the participant that he would make some notations during the interview. Before the interviewer turns on the recording, the interviewer asks the participant if he/she has any question, and he also verifies the participant is ready to start the interview.

2. On-Tape

The interviewer asks for permission to record the interview, and the interview starts. Despite questions of each profile are the same, each interview is different. The interviewer tried to follow as much as possible the order of the questions set up in each profile. The interviewer was very cautious about the words used, trying to be as much as neutral and objective on every asked question. In case the interviewee deviates too much from the topic of the question, the interviewer intervened to bring the interviewee back to asked topic. This is not always easy to do.

3. Off-Tape

At the end of each interview the interviewer asks the participant to report some information: (1) Gender, (2) Years Old, (3) Nationality, (4) Years of Experience Working in Real Estate, (5) Profile (i.e. Investor, Fund Manager, Broker, Valuer), (6) Years of Experience in Current Job Position, (7) Department (i.e. Investment Management, Transactions, Valuation), and if he/she has a (8) RICS²³ Certification. The collected information is used to describe the sample. No information that may compromise the identity of the participant is released. At the end of the interview both sign the document to confirm (1) that both, the investigator and the participant, have checked together the informed consent, and (2) they agreed with the conditions covered in this document. The agreement serves to guarantee the confidentiality of the interviewee. This agreement is always asked at the end of

²²See more in annex 4.4.1, on page 259

²³RICS stand for "Royal Institution of Chartered Surveyors." It is a professional body that accredits professional valuers with qualifications and standards in land, property, infrastructure and construction

the interview. It is when the interviewee knows the questions they asked and the answers he/she reported. This way the interviewee has more control of the information exchanged with the interviewer (Yow, 1994, p.85). Finally, after the encounter, the interviewer writes some notes about what happened in the interview. Notations are archived along with the archives of the tape and transcriptions documents (see Yow, 1994).

The qualitative research is affected by the words exchanged between the interviewer and participant. Words employed by the interviewer will cause participants to reckon some memories with more ease. This effect is known in psychology as **priming**, and it was discovered in the 1980s (see Baron, 2007). Words create words, and this directly influences the answers reported by the participant. Although the researcher had this in mind, it's complicated to control all words we say when we're talking. To minimise priming, interview questions were revised before each interview. The order of questions was maintained to some extent to increase consistency between interviews. Although questions are the same among participants with the same profile, each interview is different because participants are different. Each participant has with his/her personality, background and experience. Some participants are more talkative than others. Participants that speak more sometimes give more information than needed and the interviewer must conduct the participant to answer the question. In some cases, the interviewer doesn't need to ask a question because the participant already covered the point. Interviews with less talkative participants the interviewer needed to follow up questions with the aim to get more information. This aspect is critical because the interviewer cannot force the participant to answer something he/she doesn't want to talk. It is vital to pay a lot of attention and perceive when the interviewer must stop asking questions to avoid any intrusion. For all these reasons, the interviewer needs to be very cautious when he puts the questions and to put a lot of attention to the information he/she receives.

Different interviews were organised through encounters, by phone, or email. After setting a date, the interviewer went to the offices where the participant works. The discussion is carried out in a meeting room. Meeting rooms guaranteed excellent conditions to do interviews. They provide excellent audio conditions to record the interview. Interviews continued until answers reported by participants started to have correspondences. B. Glaser and Strauss (1967) describe this effect as data saturation. As a control measure, the same person carried out all the interviews to guarantee the interview's style across interviews. Interviews have a duration of 60 min, on average, and they last from 35 min to 1 hour and 12 min.

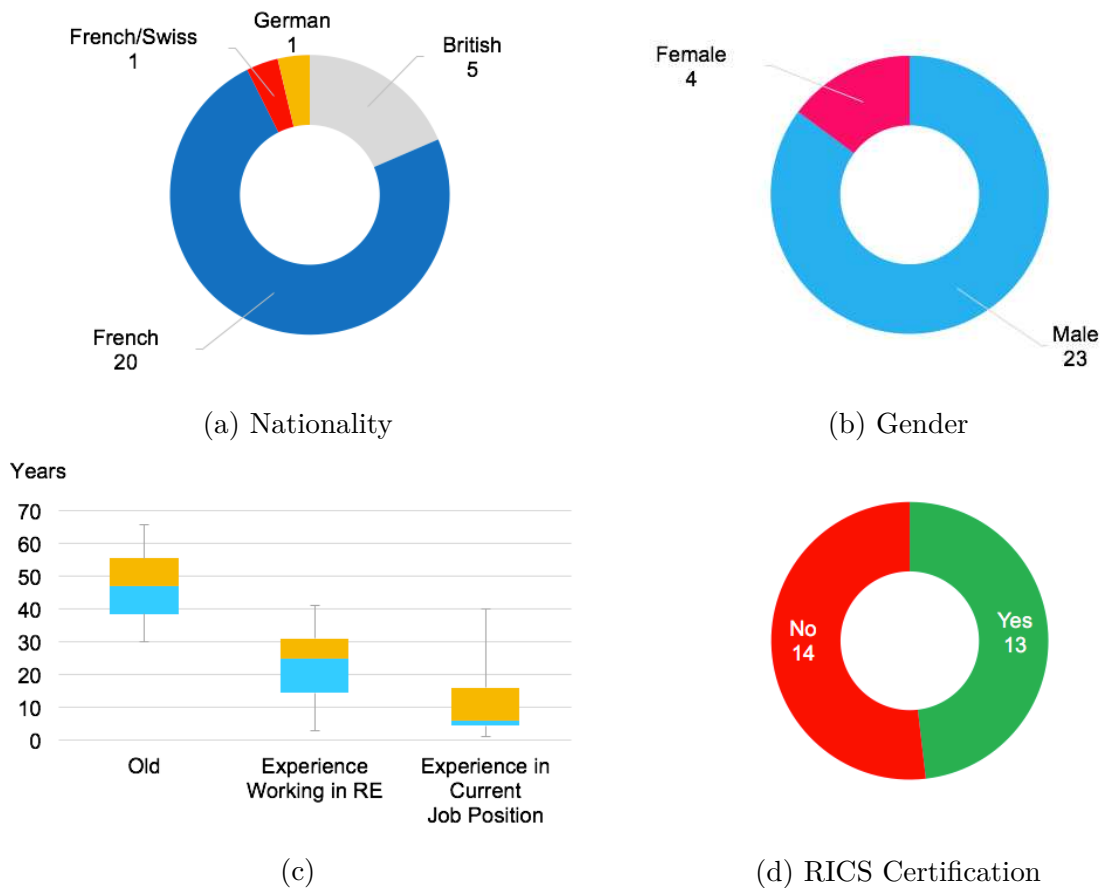


Figure 3.2 – Qualitative Research Sample

Twenty-seven individuals formed the sample of this research. Most interviews were carried out in Paris, and some in London. This explains why most individuals are French, but there are also five British, a German, and one individual has double nationality French/Swiss. Four individuals are women, which reflects most people that rule the property investment are men. The sample comprises individuals that are between 30 and 66 years old. The median age is 47 years, and the first and third quartile show that most individuals of the sample are between 39 and 56 years old. The quality of answers reported in the participants will be affected by the number of years working in real estate, and in their current job position. Most individuals have between 15 and 31 years of experience in real estate, and they also have between 5 and 16 years of experience in their current job position. The sample comprises 9 investors, 6 fund managers, 2 asset managers, 5 brokers and 5 property valuers. Among the individuals, 13 have a RICS certification. We have to point out that all valuers of the sample have a RICS certification. Only four investors have the certification followed by two fund managers, one asset manager, and one broker.

3.3.4 Transcribing

Transcription means writing, and so there is a transition from the oral language to the written. Transcribe with fidelity oral interviews into text is demanding and time-consuming. A confused word transcribed can change the meaning of a sentence, affecting the interpretation and results of the research. For this reason, transcriptions were tackled with caution. During this process, the identity of participants was kept in strict confidentiality. Two professional agencies helped to transcribe sixteen interviews, and ten were transcribed by the interviewer. All transcriptions were verified twice by the interviewer to ensure that what was written exactly corresponds to what was recorded. Verified interview transcripts were analysed with my thesis director.

3.3.5 Analyzing

The qualitative analysis it was permanent, to avoid being confronted with all the material at the end of the interview transcripts. The method of analysis started before interviews were conducted, with the preparation of interview questions and the interview guideline. Both set the base to structure the analysis of biases. The qualitative analysis continued during the interview process. Interview questions of Investors Profile ²⁴ were structured to cover the main stages of the acquisition process of an office building, holding period, and selling. Brokers and Valuers also go along with investors during the purchase and the sale. Their advisory role is important, as they give investors support to take their decisions. Interview questions of Brokers and Valuers are a complement to know more about their role, how they help investors to make their decisions.

All interview questions are descriptive and objective. The interviewer directs the interview and collects information about phenomena researchers are investigating. However, the goal is not merely to collect statements. Questions need to lead up to aspects that researchers have intuitions that some bias may appear. To this aim, the interviewer was active listening and follow-up with questions on the answers reported by the participant. The discretionary decision of bias analysis lead the interviewer to analysed responses objectively and with discretion. Both interviewer and interviewee co-determine the course of the interview. After each interview, the interviewer outline the main points appeared during the meeting.

²⁴The investor's profile includes investors, fund managers and asset managers

The qualitative analysis continued in the interview transcription. The analysis did not only rely on the transcripts. It was complemented with the audio recordings to check, clarify, enrich passages with participant intonation, validate and expand meanings what was expressed in the text. There are no rules, or standard methods, to arrive at the meaning of what is expressed in interviews. "The analysis of the transcribed interviews is a continuation of the conversation that started in the interview situation, unfolding its horizon of possible meanings" (Kvale and Brinkmann, 2015, p.219).

To facilitate the qualitative analysis, interview transcripts were analysed using a computer software called NVivo²⁵. The software aids task researchers to collect, to organise, structure and code the interview material for the analysis, to find keywords, make a table and graphic displays, etc. However, to find relationships and interpretations of results depend on researchers.

Before introducing the interview transcripts in the computer program, all the transcripts were transcribed in a Word document. A text format was applied to the Interview Questions²⁶. Another text format was applied to the name of the Interviewer, and the name (or Pseudonym) Interviewee. A third text format was assigned to answers reported by Interviewees. The reason to do this is to allow the computer program to do a faster and automatic coding before continue with the qualitative analysis.

Once transcripts are imported into Nvivo and coded, different interview questions were classified into groups. So, for example, all questions asked to investors were included in a folder named Investors. This way, the computer program permits researchers to select a question of a profile and analyse participants answers of the same or different profile.

As long as researchers explored answers reported in different questions, researchers coded different words or sentences of the interview material. To unfold possible meanings and relationships, it is fundamental to organise the interview material and to have a consistent structure of the code. To do this, researchers coded the interview material in two axes. The first axis includes all information related to **Investment**, and the second axis deals with **Biases**.

The **Investment Axis** includes two lines of analysis. A *specific* analysis applied to each interview profile. Then, the interview material of each profile is coded separately

²⁵For more information, see <http://www.qsrinternational.com/what-is-nvivo>

²⁶To differentiate questions and profiles, all questions started with the name of the interview profile. For example, "Question 1" asked to an investor was indicated with the tag: "Investor. Q1"

from other profiles. The structure of the code was formed following the major topics covered in questions of each interview profile. So, for example, the first interview profile (i.e. Investors, Fund Managers, and Asset Managers) the interviews material was classified according to the following structure: (1) the Strategy used, (2) the Acquisition Process, (3) Holding Period, or Asset Management, (4) Cases were they put pressure on someone, or someone put on pressure to them, and (5) the Selling Process. Each of these folders encloses other sub-folders with related coded information. For example, the folder named "Acquisition Process" includes different other stages that appear at this investment stage: (2.1) Business Plan Requirements, (2.2) Search for Assets, (2.3) Initial Due Diligence Report, and the (2.4) Investment Committee. And this sub-classification also includes another sub-classification level. For example, the sub-folder named "Search for Assets" includes coded information investors revealed assets they are interested in investing: Core, Core Plus, Value-Added, and Opportunistic. The same process was followed to classify the interview material of Valuers and Brokers profiles.

The other line of the investment analysis is more *general*. All interview transcripts are classified in three categories: (1) Who is involved in the Investment Decision, (2) How do they determine the value of an office building, (3) What triggers the Investment Decision. These three categories are the objectives researchers revealed to participants before the interview. The *first general category* classifies any real estate practitioner mentioned by interviewees. The *second general category* includes any concept used by participants to determine the value of a building. For example, the different methods used to value an office building, advice on pricing in a negotiation, etc. Finally, the *third general category* classifies explanations that lead investors to buy or sell an office building. For example, to overperform the MSCI Index, to have a long and stable income return, or even when investors are pressured to execute a sale or a purchase before a specific date. The interview material coded in the general analysis serves to compare different material coded between different interview profiles²⁷.

The reason to include two lines of analysis in the **Investment Axis**, one *general* and another more *specific*, is to have more control of coded information across the different interview profiles. All interview questions are semi-open questions. When a participant replies to a question (e.g. Question 7), and the explanation also refers to a topic of another interview question (e.g. Question 8), researchers also coded (or classified) into the question where the topic is covered. Furthermore, in case the explanation refers to one of the three topics covered in the *general* analysis, the information is also classified. For example, when an investor and a valuer speak about a developer, the information is

²⁷See more in Section 4.1, on page 202

coded and classified in the same sub-folder named "Developer", which is enclosed in the folder (1) Who is involved in the Investment Decision.

The second axis of this qualitative analysis is the **Bias Axis** detected from answers reported in the three interview profiles. Biases are classified in: *judgment*, *decision*, and *behavioural* bias. Each bias includes other sub-classification biases. More information is described in Section 3.2.1 on page 162.

With both, the **Investment Axis** and the **Bias Axis**, researchers are capable of comparing biases between the three interview profiles, and also to breakdown detected biases across different stages of the Investment Process. Preliminary results and relationships between biases and different samples were also discussed with my thesis director. Here it is important to say that qualitative analysis is concerned with words rather than numbers (Bryman, 2015, p.375). Relationships and biases identified in the interview material reveal a pattern in a concrete situation. However, this doesn't mean that an identified pattern will also appear among other real estate practitioners. Therefore, results cannot be generalized, but judgment, decisional or behavioural patterns can be unfold. Researchers continued with the analysis until no more relationships were found between the two axes.

3.3.6 Verifying

Following the concept of validation of Strauss and Corbin (1997), the verification process is permanent, and carry out throughout all stages of the research. Kvale and Brinkmann (2015, p.285) also reinforces that "validation should not be confined to a separate stage on an interview inquiry but rather permeate all stages from the first thematisation to the final reporting." Continual checks - questioning the validity, objectivity, and interpretation of results - increase credibility, plausibility and trustworthiness of results.

Different **control measures** are used to identify and reduce selective perceptions and biased interpretations that may risk the objectivity of results. (1) The first control measure was used to prepare the interview questions of the three different profiles. Interview questions were commented, improved and tested with some investors, brokers and valuers before the interview process. (2) To conserve the same interview style, interviews were

carried out by the same person. Also, aware that different wordings used in a question lead to different answers, the interviewer tried to use the same words on the different questions when the interviewer interviewed the participants. (3) Interview transcriptions were verified twice by the interviewer to ensure interview transcripts reflect with fidelity all what is said in the oral interviews. Transcriptions were also analyzed, commented and validated by co-researchers of this study. (4) No prejudicial treatment was given to different answers reported by different participants. Interview material was classified following the two axes, Investment and Bias Axis. Results were systematically cross-checked with participant statements to guarantee the trustworthiness of results.

CHAPTER 4

Cognitive and Emotional Bias in Commercial Property Investment. Main Results

This chapter reports the main biases that affect investors when buying, holding or selling office buildings. It covers the last stage required by Kvale and Brinkmann (2015) to carry out an interview inquiry: **'Reporting.'**

The primary results show that (1) some investors and fund managers assume the exit yield of their investment is equal to the initial yield when they estimate the Internal Rate of Return (IRR). Therefore their assumptions are anchored (biased) to the acquisition price of the office building. Also (2) the assumptions and scenarios considered by investors and fund managers are framed by the data source they used such as MSCI, PMA or similar data. Besides, (3) their judgments are affected by social influences; the pressure and herding effects from brokers, valuers and asset managers. Finally, (4) investors and fund managers are willing to take higher risks with the money of the fund than with their own money.

Keywords. Real Estate Investment, Qualitative Research, Cognitive and Emotional Bias

4.1 A General Analysis

This section uncovers the main biases that affect investors when buying, holding or selling office buildings. This research has found twenty-six biases. As some are related to other biases, this research focuses on twelve biases to simplify the analysis. These twelve biases displayed in tables that are shown below.

4.1.1 I. Who is involved in the Investment Decision

Table 4.1 describes a list of real estate practitioners that appeared in the interviews. So, for example, when an interviewee (i.e. Investor, Fund Manager, Asset Manager, Valuer, or Broker) refers to a real estate practitioner (i.e. a valuer, lawyer, etc.), the passage was coded to take into account the person that was involved in the investment transaction. Besides, this table crosses individuals with biases that were detected in the qualitative analysis of the interviews. The reason to do this is to observe when and how practitioners had any effect on the biases reported by interviewees.

The final decision about buying or not a commercial property entirely depends on an Investment Committee. Nonetheless, there are other people working on different domains that also contribute to this decision. For example, fund managers are responsible for developing an investment business plan that will be capable of attaining the investment criteria required by the Investment Committee. Henceforth, the Fund Manager transmits the investment criteria to local agents (i.e. brokers, asset managers, developers, other investors, etc.) that are going to start sourcing property assets. Local agents are going to put their attention on assets that are aligned with investment criteria. During this period, members of the Investment Management Team, or IM Team, contact to local agents: Asset Managers, Brokers, other investors, etc. They exchange information about recent property transactions that are for sale, and they put all their attention on properties that match the investment criteria. When the IM Team is reluctant to check properties that do not entirely match with the investment criteria. This is a sign that they are **anchored bias** to the investment criteria. This bias may cause them to lose investment opportunities that could benefit the performance of the portfolio property fund.

Local agents work close to public organisms like City Halls, and this allows the IM Team to be aware of the latest future city developments. The expanding areas in a city have more possibilities of income and capital growth than other parts of the city. Public organ-

isms also have interests to establish a relationship with investors. Most of the real estate developments are carried out by private funds. Those developments will create labour, and the Public Sector will receive income taxes. This relationship between local investors and the Public Sector may cause that they are reluctant to transact with new investors. This restrains the entrance of new investors into the market and causes a **familiarity bias**. This preference effect can also be found in Brokers¹. One issue investors face when they work with intermediaries, like Brokers, it's that an investor will probably never know when Brokers arbitrate one hundred per cent for his/her client's interest instead of their interest. For example, a broker could recommend his/her client to purchase building A instead of building B. What the investor unknowns is that the broker would obtain higher fees in case his client buys building A. This bias is known as **asymmetric information**.

Recent market movements are also easy to recall than other market movements that happened in the past. When local agents rely more on recent vivid memories than any other memory, agents are affected by **availability heuristics**. Based on what happened recently, local agents give to the IM Team their visions of both the market and the property and investment recommendations. For example, in case the market is expanding, they may continue to think that the market will continue to grow. When judgments are affected by the evidence of what happened recently, this effect is known as **recency bias**. This bias can also affect brokers when they give investment recommendations, and valuers when they do a first appraisal of the property. The IM Team and Brokers cannot be involved in valuations to avoid any influence in the appraisal. However, they are in contact with Valuers to have an idea of the value of the building. Even though every property is unique, Valuers appraise buildings based on the evidence of other market transactions. The **confirmation bias** appears when Valuers appraise the value of a building based on the evidence of other market transactions. As it is explained in section 4.1.2, valuers are upset when there are no market transactions. Valuations were **anchored bias** to most recent transactions, and most valuers are more likely not to change their appraisals. Hence, their behaviour is **conservatism bias**. Furthermore, when valuers set an opinion of value based on what others do, this leads to **actor observer bias**. The latter bias also appears on Investors when they observe actions followed by other bidders during the bid process. Brokers help their clients when they try to get information from bidders. As bidders are offering high bids, an investor will tend to offer a higher bid to have more chances to be selected by the Seller. In case bids are below the appraisal of the sell-side Valuer, this could lead Sellers to hold the property, and postpone the sell once the Seller attains a required return. The latter case is known as **disposition effect**.

¹For more information, please go to section 4.2.2 on page 216

With all the information gathered, the Fund Manager selects the building(s) that it is expected to attain a required target return set by the Investment Committee. The IM Team elaborates a business plan for the building and prepares all the information to be presented to the Investment Committee. The business plan includes the Internal Rate of Return, IRR, the building is expected to generate in different scenarios (or sensitivity analysis) of income and capital growth. The IRR may help investors to have an idea about the performance they will obtain for investing in a property within a "probable" ranges of scenarios. However, articles like Peto, N. French, and Bowman (1996, p.99) already refer that small changes in the subjective inputs used in the sensitivity analysis can cause big changes in the DCF. Furthermore, subjective inputs can be manipulated to attain a required return. When this happens, the IM Team is framing the analysis to attain a desirable require return. Therefore, they are affected by three biases: **framing**, **desirability** and **anchoring** biases. This explains why the Discounted Cash Flow method has been criticized. As this research shows later on, in section 4.2.1, some Investors and Valuers think that market conditions will remain the same during the holding period. This is reflected in their calculation of the IRR when they assume that the initial and exit yield will be the same. Their assumption makes that some investors focus on the base scenario to make the investment decision. This causes the **base-rate fallacy**, and it reflects investors' **conservative biased** behaviour. For example, current market yields are currently at a historical low. Some investors are reluctant to believe that current market conditions will change, even if they have some evidence that market yield will revert to the long-term average. An increase of yields implies a decrease in property values, and this would imply an increase in risk perception.

Finally, all the analysis is presented to the Investment Committee. The information exposed is a summary, and so it is framed by the IM Team, of all the information received from different agents. After all the work is done, the goal of the IM Team is to convince the Investment Committee² that building(s) presented is a good investment opportunity for the fund. Above all, the IM Team has the interest to proceed with the purchase as each time they buy an asset they get their commission and increase their tracking record.

²Composed by a Fund Manager, Asset Manager, other Investors, etc.

Table 4.1 – I. Who is Involved in the Investment Decision?

Judgment										Decision			Behaviour												
Search	Attention		Knowing		Understand		Conclude		Act	Risk Perception	Other														
1. Automation	2. Anchoring	3. Home	4. Familiarity	5. Asymmetric Information	6. Attention	7. Desirability	8. Availability	9. Recency	10. Contrast Effect	11. Halo Effect	12. Hot Hand Fallacy	13. Confirmation	14. Optimism	15. Representative	16. Actor Observer	17. Cognitive Dissonance	18. Framing Effect	19. Over Reaction	20. Escalation of Commitment	21. Base-Rate Fallacy	22. Disposition Effect	23. Conservatism	24. Overconfident	25. Endowment Effect	26. Herd Behaviour

I. People Involved in the Investment Decision

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Building																										
Asset Management		5		1		1	1	3									10								2	
Developer		1	1					1									2									
Property Management																										
Tenant				1																						
Investment Management																										
Investment Analyst		1																								
Fund Manager		3		1			3										17									
Fund Rising																										
Investor		5	2	2		2		1									6							2		
Research		2		3		4	2	1									20							2		
Risk Management																										
Legal																										
Compliance																										
Lawyer																	1									
Public Notary																										
Other																										
Accountancy																										
Agency Design																										
Bank																										
External Adviser																										
Tax Adviser																										
Public Sector																										
City Hall				1																						
Other Public Government																										
Transaction																										
Broker		7	3	8		2		7						1			14							1		
Valuation																										
Valuer		16		1		7		4				3					13				2		3	2		

4.1.2 II. How Practitioners in Real Estate Determine the value of an Office Building

Table 4.2 describes ways and concepts that interview participants take into account to value an office building. Aside from comparing different valuation methods³, they also have in mind the heterogeneity of assets, market imperfections, like the lack of transparency. They also consider uncertainty about the future and the difference between valuation and the worth of a building. Following the same procedure as before, these concepts are crossed with biases that were detected in the qualitative analysis of the interviews. This makes possible to see how the valuation process is affected by any bias.

Valuation is also a personal opinion of the value of a property. Some organisms, like the RICS, try to set common guidelines to appraise a property. However, two different agents valuing the same property, on the same day, would come up with a different valuation. And sometimes, depending on markets and properties, the difference in valuation can reach up to 20 per cent. But real estate practitioners are aware of this. Some interviewees used the known statement "Valuation is an art, not a science." For this reason, real estate practitioners, i.e. Investors, Fund Managers, Brokers, and specially Valuers, tend to compare different valuations methods to check if there are significant appraisal differences. If values obtained from different methods are close to each other, real estate practitioners won't ask many questions as different valuation methods drove to the same conclusion. However, if there are significant appraisal differences between the valuation methods, real estate practitioners may have a **cognitive dissonance** when they have to decide which appraisal is more accurate.

Real estate practitioners can be more inclined to take the valuation which is close to a market reference rate. In this case, the attention of real estate practitioners is influenced by **anchored**, **recency** and **confirmation biases** because if any appraisal moves away from recent market references it can be perceived as aberrant, and so the appraisal can be dismissed. Therefore, real estate practitioners tend to select an appraisal that confirms a market reference rate. Additionally, in case the property market is following an upward trend, real estate practitioners may tend to select the higher appraisal obtained from valuation methods. In case the property market is stable, they will take the mean value. Or in case the market follows a downward path, they may take the lower appraisal. Inputs used by real estate practitioners will lead real estate practitioners to form judgments value

³These are the Sales Comparison Approach and the Income Approach. Both are described in sections 4.2.1 and 4.2.1, respectively

of a property. However, judgments are a personal opinion and depend on each individual. The conclusion of value is therefore **framed** by inputs used and judgments considered.

When the number of comparables is very limited it is very difficult to do a valuation. This happened in the Brexit referendum that took place on June the 23rd, 2016, in the United Kingdom. After the UK decided to leave the EU, Valuers had to assess the impact of this decision. The problem valuers faced is that there were no direct comparables in the marketplace. Most valuers agreed to maintain the price of recent market transactions that appeared before the Brexit referendum. Therefore, their valuations were **anchored bias** to recent market transactions, and their behaviours followed a **conservatism bias**. Due to uncertainty, Valuers also monitored every transaction that took place to see if there was any price adjustment on valuations.

As it is described in Peto, N. French, and Bowman, 1996, p.82, investors will decide to buy an asset in case the valuation is equal or below to a present worth. This is the investor's required or a target return. The worth is also formed by transaction evidence. For example, an office building, located in the CBD of a city, was transacted at 4.5 per cent. As every building is unique (i.e. heterogeneity), a potential buyer will compare building transactions to the building the investor tries to acquire. The investor will make price adjustments based on objective and/or subjective judgments. For example, in case the building the investor tries to appraise has longer leases (objective judgment), or the investor considers the building has a better location or tenants (subjective judgments), the Buyer may conclude that the building is worth 4.25 per cent. This kind of reasoning found in the interview process gives evidence that investors' judgments about worth is **anchored bias** to the market evidence. A disparity of appraisals reported by different Valuers leads that Investors are reluctant to accept a price that is different to a required return. So, in case a Buyer has a lower appraisal than a Seller, the Buyer will try to negotiate low, and the Seller will try to negotiate high. The **desire bias** to get a target return that is aligned to an appraisal may interfere with the close of a transaction.

The heterogeneity of assets and the lack of transparency in most property markets causes real estate practitioners to lay down a network with other agents to obtain the information they need. For example, information about income return, headline or economic rents, vacancy rates, etc. With information recovered, they can know how the building they try to appraise is positioned with respect to a market benchmark. But even having a network, individuals do not always succeed to obtain all the information they need to form a clearer opinion of value. This justifies the need to do a *Detailed Due Diligence* at the end of the bid process to recover more information about the property.

At this stage, there is a risk that the Seller does not release sensitive information that will lead the Valuer to set an appraisal in case the Valuer was aware of it. Different level of information between Valuers and Investors leads to **asymmetric information bias** that affects the appraisal of the property.

Table 4.2 – II. How Practitioners in Real Estate Determine the value of an Office Building

		Judgment		Knowing		Understand		Conclude		Decision		Behaviour																
		Search	Attention	3. Home	4. Familiarity	5. Asymmetric Information	6. Attention	7. Desirability	8. Availability	9. Recency	10. Contrast Effect	11. Halo Effect	12. Hot Hand Fallacy	13. Confirmation	14. Optimism	15. Representative	16. Actor Observer	17. Cognitive Dissonance	18. Framing Effect	19. Over Reaction	20. Escalation of Commitment	21. Base-Rate Fallacy	22. Disposition Effect	23. Conservatism	24. Overconfident	25. Endowment Effect	26. Herd Behaviour	
II.	To Determine the value of an Office Building																											
	Comparing Valuation Methods	4				1				4				2				1	7									
	Heterogeneity	2				2				2				2					3									
	Lack of Market Transparency	1				1				1				1					1									
	Uncertainty	1				1				1				1					1						1			
	Worth	3				1				1				1					2									

4.1.3 III. What Triggers the Investment Decision of Buying or not Buying an Office Building

Table 4.3 tackles what lead Investors, Fund Managers, along with the Investor Committee, to decide about not investing, to buy, to hold it or sell a property. Decisions found in this research are crossed with biases to see how they are affected by biases.

- *Not Investing*

Thematic changes and research data are useful to know about the history of a market, the current situation, and trends that are likely to follow in the future. Both thematic changes and research forecasts help investors to understand impacts that might appear on different investment opportunities. Investors have a lot of regard on what expected returns are going to be for a particular sector in different locations. The way thematic changes and forecasts are presented to investors vary depending on visions and the information available by agents. Therefore, information is **framed** by those visions and information available. For example, based on recent information that glimpses a negative trend (i.e. **recency bias**), some agents foresee a negative expected rental growth in a market that it's still growing. This can lead investors to be reluctant to continue monitoring investment opportunities in a market because they risk of not meeting a target return (i.e. **anchored bias**).

- *To Buy*

Every year Investors and Fund Managers set their investment objectives. The actions they follow are **anchored** to accomplish the objectives before the end of the year. For example, (1) to attain a certain level of IRR (target return) of 4 or 5 per cent, (2) to match or over-perform a Property Index (e.g. MSCI/IPD, OPCI: open-ended Funds, etc.), (3) to obtain a stable income return. When the objective is a combination of those, Investors and Fund Managers will have to allocate their portfolio to obtain a promised return. They look first at how the portfolio benchmark (e.g. The Office Total Return MSCI/IPD Index) balances across different European cities. Then, they compose the investors' portfolio. However, their portfolio may be biased (i.e. overweight or underweight) towards a particular city or a particular type of office building to attain their goal. All the analysis is elaborated or **framed** in a way to attain the desired target return.

Additionally, the **framing effect** also occurs when investors elaborate the

Internal Rate of Return, IRR. As it is referred in section 4.2.1, the IRR requires to assume a theoretical selling price. Results reveal that some Investors, Fund Managers and Asset Managers take their decisions based on the results obtained in the Base Scenario (i.e. **base-rate fallacy**). This scenario assumes that market conditions will remain the same. Therefore, they consider that the initial yield will be the same as the exit yield. Sometimes, they are even reluctant to project an exit yield higher than the initial yield when there is some evidence that property yields will increase in the short or mid-term. In other terms, this means that rents are expected to decrease, and property values will depreciate. With such a pessimistic scenario nobody would be interested in investing in real estate, and this explains why they prefer to be **conservative** and **frame** their analysis in a way that they encourage investors to continue to invest in property.

Different biases are involved in this decision. First, when investors elaborate a business plan, they focus their attention on the current situation. All their assumptions about the future are biased toward what happened **recently**. Especially when current property market conditions are strong and some investors expect that rents will continue to growth. Based on transaction evidence that confirms a positive growth (i.e. **confirmation bias**) some investors project in their business plan their **desire** that favourable conditions will continue to be the same. Different market trends can also support transaction evidence. For example, a Fund Manager argue that what happens in the US property market serves as precedent to what will sooner or later occur in the European property market. This generalisation, to assign a possible relation between markets without knowing if this will inevitably have an effect in Europe, it is known as a **representative heuristic**. As a result, some investors will follow a **conservative** behaviour, and they will decide to buy a property assuming that market conditions won't change in the future. Nevertheless, in case future conditions won't result as they expect, for example, an asset is under-performing below a target return, some investors will be reluctant to sell them. Therefore, they will hold them in case they believe they will be capable of recovering the value of buildings, and they will sell them once they are capable of obtaining a targeted return. This decision leads to a **disposition bias**.

Investors and Fund managers may have difficulties in attaining their objectives of target return. For example, market conditions are very strong and/or they have been rejected in many bid processes. Their frustration of being rejected from many bid process can lead investors to **overreact** when they must buy or sell a certain amount of properties before a date. In this case, investors would tend

present to the Investment Committee compelling information (i.e. **frame bias**) that supports the idea to offer a higher price to purchase a building. This way they increase their chances to get the exclusivity of the building in the next bid process. Of course, the price agreed with the Investment Committee cannot compromise the property fund. This is normally justified with the IRR. The calculated IRR of the building must meet a required return to approve the decision to buy the property. Otherwise, the Investment Committee would not agree to proceed with the transaction.

- *To Hold*

During the holding period, Investors and Fund Managers review their analysis of the IRR every quarter. They check if what they foresaw is aligned with the current market trends. As long as market trends do not sheer from what was set in the business plan, and the building is performing as expected, they will continue to hold the asset. But also market trend may deviate from what they expected. In case that market conditions become unfavourable, investors risk of not reaching their objective of target return. They will start to make judgments to find ways to steer the course building to get their required return. Their analysis will be **framed** by different new performance scenarios. They are going to continue to hold the building in case they believe they are capable of obtaining their target return (i.e. **anchored bias**).

- *To Sell*

Investors and Fund managers study different markets on permanent to assess market trends. Research Teams give support to investors and give their vision about future market trends. Investors use research forecasts to anticipate property market cycles. When property yields are low, some investors expect a negative rental growth, and they will proceed to sell properties to decrease their risk of losing rental income and capital values. Then, their decision of selling is **framed** by the research vision. Their accuracy to predict the future will be determined later on by future market conditions. Besides, Investors and Fund managers may decide to sell a property because the building arrives at the end of the business plan. The Seller observes that market is nearing the top of the cycle, and so market conditions are favourable to sell the building at a good price. The Seller **confirms** the selling price through market evidence, and which also meets a required return. The Seller will only proceed with the sale in case he/she finds a Buyer that is willing to pay the asking

price (i.e. the **anchored bias**).

Table 4.3 – III. What Triggers the Investment Decision of Buying or not Buying an Office Building?

	Judgment										Decision			Behaviour														
	Search	Attention				Knowing	Understand				Conclude	Act	Risk Perception	Other														
	1. Automation	2. Anchoring	3. Home	4. Familiarity	5. Asymmetric Information	6. Attention	7. Desirability	8. Availability	9. Recency	10. Contrast Effect	11. Halo Effect	12. Hot Hand Fallacy	13. Confirmation	14. Optimism	15. Representative	16. Actor Observer	17. Cognitive Dissonance	18. Framing Effect	19. Over Reaction	20. Escalation of Commitment	21. Base-Rate Fallacy	22. Disposition Effect	23. Conservatism	24. Overconfident	25. Endowment Effect	26. Herd Behaviour		
II. To Trigger the Investment Decision																												
Not Investing																												
RE Performance																												
Expected Negative Rental Growth									1								1											
The Asset Doesn't Meet a Required Return		1																										
To Buy																												
Motivation																												
Obligation to Buy Before a Date		1															1		2									
Portfolio Diversification		1															2											
RE Performance																												
To attain a certain level of IRR		2					1										2			2		1	2					
To Over-Perform an Index (MSCI, OPCI, etc.)		1					1										3											
Stable Income Return		2															1											
Expected Positive Rental Growth		1										1		1			3											
The Asset Meets a Required Return		4					2										5			1				2				
To Hold																												
RE Performance																												
The Asset is Performing as Expected		1															1											
To Sell																												
Motivation																												
Obligation to Sell Before a Date																				1								
RE Performance																												
Expected Negative Rental Growth																	1											
The Asset Meets a Required Return		1										1					1											

4.2 A Specific Analysis

In Commercial Real Estate, not all investors are the same. Generally, investors are categorised according to the type of building they are interested to buy. For example, Core⁴, Value-Added⁵, and Opportunistic⁶ properties. Each category implies different levels of investment requirements⁷ that depend on a client-by-client basis, according to their risk profile and objectives of target return. Investment requirements are reflected in the strategy of the fund.

4.2.1 Initial Due Diligence

Anchoring Bias

Once the strategy is set, investors and fund managers stick to an objective of *target return*. It is important that the strategy is in line with the reality of the market. However, this is not always an easy task. Property markets change continuously, and business plans do not always adapt to new market conditions. For example, a market that plunges into a recession. Fund managers may struggle to attain the target return agreed with shareholders of the fund. Also, adhere in excess to a target return may also affect to the diversification strategy. For example, when investors exhibit a preference for investing in international markets, the market cycle, tax and law system are different across markets. Although the sourcing of the assets is made local, the strategy, at the fund level, may not change.

"It's always the same... it does not change." Q.5.2⁸ - Investor, Female

"It's exactly the same everywhere we look. [08:31] There is no difference whatsoever. So, it's absolutely exactly the same." Q.5.2⁹ - Fund Manager, Male

⁴Core properties are high-quality buildings, located in a prime location, with low vacancy, durable and secured income streams

⁵Value-Added properties have medium/high vacancy and initial yield, and require building redevelopment or development to allow for rental growth and capital value

⁶Opportunistic Properties are exposed to an even higher degree of risk than Value-Added properties. They require building development to generate rental income and significantly increase the value of the property

⁷See, for example, Shilling and Wurtzebach (2012)

⁸Answer to Question 5.2, page 265

⁹Answer to Question 5.2, page 265

Familiarity Bias

It takes time to understand markets. Local information is vital to define an appropriate investment strategy, to assess risks, to enlarge the investment network, and to find good investment opportunities. The time needed to understand new markets may discourage investors come into new investment horizons.

"I prefer to invest nearby because... At least [Smile] if there is no other option... It's like, well, it's always better, I find to be, to know the... Already it takes time, to get to know each market which is very important." Q.5.2¹⁰ - Investor, Male

When investors exhibit their preference to invest local, they reduce the diversification of their investment portfolios geographically. As a result, they miss other investment opportunities that perform well in terms of yield, and which not necessarily involve more risk. Either investor invest local or across international markets, they generally transmit their investment criteria to a buy-side broker, and other local agents (i.e. asset managers, developers, etc.) to identify assets that match that criteria.

"So organizing with, brokers, .. and ... or making contact, we have ... people in-house who are researchers to actually contact promoters, investors, brokers [...] We must try to establish links, a degree of loyalty, some, permanent ties to these people." Q.5.1¹¹ - Investor, Male

From now on, we are going to use the terms "Buyer" and "Seller" to simplify the explanation. Although the reader should have in mind that when we refer to a Buyer or Seller, we mean a Buy-side or Sell-side investment team that approach their respective investment committees. The investment committee is the only one who can validate the decision to buy or sell an office building. This is explained later on section 4.2.3.

Buy-side Investor and/or Broker(s) look for office buildings that are on sale which they feel match that criteria. Buy-side Broker(s) also can make a recommendation to his/her client to potentially consider acquiring some at a price. In case they are interested in buying a building they approach the Seller or sell-side Broker(s). It can also be in the opposite direction. A Seller or sell-side Broker(s) talk to buy-side investors that may be prepared to pay the price within a range. For example, somewhere between 95 and 105 million euros. The Sell-side Broker call selected investors for tender, and they have

¹⁰Answer to Question 5.2, page 265

¹¹Answer to Question 5.1, page 265

a timetable to present to the Seller a Letter of Intent, or LOI. The LOI is a general guideline to express the Seller the intent to purchase the property. The LOI includes the main aspects of an offer. For example, a description and state of the building, rental situation, the level of occupancy, income yields, a property appraisal - which it is generally the offer - and also conditions of the contract to purchase the building. The LOI is used in Commercial Real Estate to avoid the expense of a legal agreement to buy before the Seller accepts the offer. The Seller might say to a sell-side Broker that in case he/she finds an investor that is willing to pay a certain price for the asset, the Seller will sell it with no competition (i.e. off-market). Generally, when market conditions are on a sustainable path, most market transactions are executed **on-market** because the likelihood the Seller will get a higher price for the building is more elevated.

Herd Behaviour Bias

Currently, there is a lot of interest in the prime office building across Europe. This circumstance benefits Sellers that prefer to sell their premises in a bidding process, that is on-market, to obtain the highest price possible. The high-demand is causing a shortage, and have driven most European prime office yields to historic lows.

"So, in fact, ... and the problem with the market today is that there is so much money on the market that... there is massive competition. Everyone is looking for more or less the same thing when all is said and done, aren't they? premium offices. And interest rates have fallen, of course because the rates of return are no longer what one might have expected." Q.4¹² - Investor, Male

"In general, there is a call for tender, so everyone is extremely competitive because the market is very competitive and there is... there is... there is a bit of euphoria... in this market at the moment and there is a lot of money ready to, to put into this market." Q.3.2¹³ - Investor, Male

"So today people, and in the market we live... are all, all want to buy a building in Paris, well located or in the first ring. Except that, as everyone wants buy this type of building, uh- prices are more and more expensive." Q.15.1¹⁴ - Broker, Male

¹²Answer to Question 4, page 265

¹³Answer to Question 3.2, page 265

¹⁴Answer to Question 15.1, page 266

Assets found that match investor's requirements are discussed and visited to understand and navigate critical risks. The assets that are more convenient for the fund strategy are scrutinised to assess their risks, and the impact risks will have on investor's *required* or *target return*. The investor may decide to proceed with the acquisition of a building in case its potential return equals or exceeds the investor's required return.

Representativeness Bias

To assess risk at asset level investors tend to compare their **target return** to the return of alternative investment which is perceived to have a low risk. Top-rated Government bond yields, rated by rating agencies, are generally considered by most investors to be a **riskless asset**, due to their low probability to go bankrupt. As a result, investors set a bond yield as the minimum threshold of risk. Any other investment aside from a bond yield, like real estate, is perceived by investors to have a higher risk. The difference between investor's required return to invest in property and a bond yield derives the **property risk premium** or *spread*. In other words, the premium is the investors' reward to increase their risk exposure when they invest in real estate.

There is a broad consensus in real estate that the property premium is around 2 %. For example, A. Baum (2009, p.133) analysed the historical property risk premia, between 1921 to 2004, and he concluded that "a rounded mean value of 2.5 % with a tolerance of 1 % either way is supportable." This research has found that some investors have a risk tolerance within this range:

"Very honestly uh-, the risk premium must be at 2.50 at least... compared to the OAT." Q.6.2¹⁵ - Investor, Male

"The concept of a risk premium, of course in real estate and a..., you cannot go down too low, can you? When one is below 100, 150 basis points... things start to get very complicated." Q.6.1¹⁶ - Asset Manager, Female

The main European property markets are dominated by a strong capital inflow in 2017, property yields and bond yields at historical lows. Even property yields are low real estate is an appealing investment because bond yields are close to zero per cent. Nevertheless, investors have started wondering whether bond yields will remain low for some time. Bond yields might rise as long as economic growth strengthens in Europe.

¹⁵Answer to Question 6.2, page 265

¹⁶Answer to Question 6.1, page 265

However, investors don't feel comfortable about the idea of a rise in bond yields. From observing historical data, investors already assumed that an increase in bond yields may also raise property yields, and this will destroy property values.

Moreover, investors are concerned about the possibility that bond yields will become higher than property yields (i.e. spread becomes negative). This happened in France during the 90s and in 2007. An investor described the consequences of having a negative premium of 5 %, with respect to the OAT.

"So having a negative risk premium of 5 per cent... of 5 points is significant, and anybody who invested then, has messed up big time. Why? For two reasons. Firstly, because the prices... the market was at an extremely bullish point in the cycle, I mean it was really at its peak. And this differentiation of risk premium, due to the collapse of the real estate market, helped to reverse the trend completely and, and, and, and, and the premium differential was so great that..., investors were ruined for centuries." Q.6.1¹⁷ - Investor, Male

The world economic activity declined in the 90s. The US Stock market crashed in 1987, the Gulf war in 1991, and the real estate bubble in the US and Japan collapsed. The slowdown of economic activity also affected France. The 10-year OAT yield reached 9.9 %, and the Prime Net Yield in Paris CBD was 4.75 % (Source: PMA) in 1990. The high value of the OAT yield respect to property yields attracted investors. They sought to secure their money in a more liquid asset, and with low-risk perception. Moreover, French companies started to release office space in 1991. Rents and property values plunged, and some property investors and developers went to bankrupt, as they were unable to pay back their loans. The situation worsened as long as GDP growth lost momentum. Office Prime Yields in Paris CBD continue to increase. Between 1990 and 1995 rents and property values decreased 40 % and 50-60 %, on average, respectively (see, for example, Charpentier et al., 2014).

Today's reality is different from that of the 90s and 2007. Markets and risks change constantly and sometimes unexpectedly. Changes also provoke a change in market fundamentals. It is very difficult to outlook if current bond yields will continue to grow, and if property yields will follow. Likewise a possibility of a negative property spread. Investors will have to make their judgments before placing the money in property. This research warns economic agents to be careful when they use bond yields or bank rates to outlook future movements of property yield. They might tumble in a *representative bias*

¹⁷Answer to Question 6.1, page 265

as there is evidence that bond yields and property yields do not move in parallel.

Framing Bias

This research has found that some investors, fund managers, and asset managers use different approaches to calculate the **property risk premium** at asset level:

1. The difference between the *Internal Rate of Return*, **IRR**, and a 10-year bond yield

"So, the IRR is really useful, and... this result ... this rate of IRR should maintain, if at all possible uh-..., a spread, a spread of, of the order of 2 and a half per cent, with uh... 10-year bonds." Q.6.1¹⁸ - Investor, Male

2. The difference between the **Initial Yield** and a 10-year bond yield

"We will take the immediate rate of return either of the asset, or the rate, that is to say, the net rent .. either immediately if it is fully rented, or... that you can get on average over five or ten years on the asset... that is, without, without anticipating growth, uh-.. over the purchase price including everything. That is to say the yield or the rate of return on the thing. And so this rate of return.. I'd.. compare, for example, the 10-year treasury bond.., risk-free rate at ten years." Q.6.2¹⁹ - Investor, Male

3. A **Score System** that turns a score from 1 (good) to 5 (bad) to a risk premium

"The research team are effectively writing a system that has the risk premium embedded within it, and once an individual who can think about the score of this building, you know, its pitch from one to five, its tenant quality from one to five, and so on. Once they have then done that it populates the system with a risk premium." Q.6.1²⁰ - Fund Manager, Male

4. Other participants **don't calculate** the premium at asset level

In the first approach, the property premium derives from the difference between the *IRR* and a riskless asset return, also named the risk free rate. The *IRR* includes two

¹⁸ Answer to Question 6.1, page [265](#)

¹⁹ Answer to Question 6.2, page [265](#)

²⁰ Answer to Question 6.1, page [265](#)

components: (1) the *Expected Income Return*²¹, and (2) the *Expected Capital Growth*²². In the second approach, the property premium derives from the difference the *Expected Income Return* and a riskless asset. Some studies already denoted that changes in capital growth explain most changes in the property total returns (see, for example, Karakozova (2004)). The consequence of not including the component of capital growth in the latter approach reduces the required return to invest in property. The difference between the expected income required return and the 10-year bonds would lead to an inferior risk premium.

The third approach stands on the assumption that agents can't think about risk in isolation, although they can think about a number. Therefore, different real estate practitioners are asked to score a building against a market or city average between one (good) and five (bad). For example, "What do you think this location's score is?" Practitioners report a number and a system converts that to a risk premium that is aggregated up and that and has an impact on the appraisal.

Depending on the way investors calculate their required return or, in other words, how the information is presented, investors will obtain different risk perceptions or judgments. In case the expected property return is insufficient to compensate investors' required return for their increase in risk exposure, investors may probably decide not to purchase the building.

Analogously, framing appears when investors calculate the **IRR**. To calculate an IRR²³ investors take a (1) cash flow the building is expected to generate, a (2) theoretical selling price, (3) and a price investor are willing to pay to acquire the property. Investors will proceed with the purchase of the building in case the IRR reaches investors' *Required Target Return*. The investment period will depend on each strategy. For example, Opportunistic and Value-Added funds tend to hold properties between a relatively short and medium term, like 3 and 5 years respectively. Core funds tend to hold properties for a longer period, like 10 years or more. The issue about the IRR is that results can vary depending on data and hypothesis are used. This happens because the IRR is a very sensitive model. Small changes in data can considerably change the expected performance of a building, and affect investors' judgments.

²¹The *Expected Income Return* is obtained dividing the expected rental income in year t divided by the acquisition price

²²The *Expected Capital Growth* is obtained with the relative change between the theoretical selling price and the acquisition price

²³Investors also assess the impact of leverage in their objective of IRR. The more leverage, the higher the IRR will be because investors allocate less equity capital in the purchase of the asset

"But, the problem with the IRR is that we make it say whatever we want, don't we? It's... all the parameters we enter can be... up for discussion... etc. But it's still a decision-making tool. It's still a .. in, in any case, in the office sector ... it's an important part of the way we think." Q.6.1²⁴ - Investor, Male

To have an idea about the *Acquisition Price*, a first valuation is done by valuers and/or brokers that work for the investment management team. The appraisal is subject to change when the investment management team has access to the *data room*²⁵. The appraisal may not be sufficient to be selected in the *Bid Process*²⁶. The price investors have to pay to acquire a property will depend on the number of investors that pretend to buy the same building on the bid process. In case there is only one investor, the price is likely to be close to the appraisal value. But, in case twenty investors want to buy the same building, the final price is expected to be much higher than the appraisal value.

To assess the price the Buyer is ready to pay for the building, the Buyer takes as reference the *Required* or *Target Return* set in the business plan of the Fund Strategy. This rate is the minimum return the Fund would agree to invest in a property. The required return is compared to the two most widely approaches used in the real estate industry to appraise the value of a building: the (1) Sales Comparison Approach, the (2) Income Approach. The Investment Management team would be ready to pay a price that exceeds the *Required* or the *Target Return*.

Confirmation Bias

In the *Sales Comparison Approach* investors compare the office building they want to appraise with recent office building transactions that exhibit similar characteristics. This helps them to understand what's its position within the occupational office market. For example, characteristics in terms of location, size, year of construction, state of the building, etc. Prices (or yields) of transacted buildings are used as a reference, and prices are adjusted to appraise the value of the property investors want to acquire.

"Uh... so, we will look .. in the performance target set for us, for the funds we manage, uh... we will see if the building that interests us, corresponds to comparable real estate assets, i.e comparable geographically, comparable in terms of the level of risk, comparable in terms of the age of the building, ...

²⁴Answer to Question 6.1, page 265

²⁵For more information, please go to section 4.2.3

²⁶For more information please go to section 4.2.2

how old the building is, uh-... All this will help us to forge an opinion about the price." Q.8²⁷ - Investor, Male

"Now, the price is typically determined by transactional evidence. So, it would be based on comparables and somebody will say, "That city office building sold for four per cent. I think mine is a little better because my lease is a bit longer," or, "my tenants are better," or, "it's a slightly better location. So, I think mine is worth 3.75 per cent yield." [24:37] So, you put it on the market at a lower yield and you hope to sell it but you're basing it on those comparable evidences." Q.10²⁸ - Fund Manager, Male

The disadvantage of this method is that price adjustment is somewhat subjective. For example, investors may give more importance to some building characteristics than others to build up his/her conviction of price. They also can focus on a few recent building transactions to make price adjustments. However, the current market value of those transactions may be the wrong place to start thinking about the value of a building. The problem of defending a market price is that investors get drawn into the momentum of the market, as properties may be over-priced or under-priced.

Framing Bias

The *Income Approach* is based on the income (i.e. net rental income, a theoretical selling price, etc.), and costs (i.e. the acquisition price) the building is expected to generate during the holding period. But, different future income and costs occur in different periods of time. Investors bring them to present with a discount rate. The discount rate is the opportunity cost of capital, which means that the investor won't be able to use the capital invested in another investment. Investors generally use as a discount rate return of a secured Government Bond, plus a required risk premium to compensate for their risk exposure on investing in property. The risk premium is particular to each investor and depends on the tolerance for uncertainty. The sum of both components, Bond yield plus a risk premium, is known as the investors' *Required* or *Target Return*.

Different levels of required return lead to different levels of discount rate (in percentage terms). However, the discount rate that brings to present all the expected income and cost, and equals the present income to the present cost is the *Internal Rate of Return*,

²⁷ Answer to Question 8, page 265

²⁸ Answer to Question 10, page 265

IRR. In other words, the appraisal value of the building is equal to all the expected income the building is expected to generate during the holding period, and so the property looks about fair value. Beyond the *IRR*²⁹ the investment is likely to become unprofitable as the discounted cost of the investment would exceed the discounted income the building is expected to generate.

As long as the *IRR* of a building exceeds or equals the *Required* or *Target Return* of an investor, the Buyer will continue to stay in the bidding process till the Buyer gets the exclusivity of the building.

The *IRR* will also be affected by the holding period considered in the analysis. The investment plan is adapted to each property type. So, for example, investors that seek core office buildings to do a long-term holds, they generally project a 10-year future cash flow. The 10-year cash flow it is quite standard rule. Investors may decide either to sell the it before 10 years, or to hold it for a longer period of time. Other investors that seek Value-Added or Opportunistic buildings to do short-term holds, they generally project a shorter cash flow as their strategy is to do active management and conversion to sell the property in 3 or 5 years time. For the projected rental income used in the cash flow, investors generally use research forecast to have a view about how the Market Rental Value and yields will evolve in the market the office building is located.

"Because in fact, we, we must, we must, we are in a ... we are in a market that .. of conviction, that is to say that ... of course, we have the research that guides us on uh- the evolution of the markets, so the trend, the situation of the markets, uh-... uh- with a a certain time lag, because in general the research information is slightly out of date, whereas we are making our investment decision for the future, so we must have uh-... so, how should I put it, let's say intuition is ... that is maybe saying a lot , but we need to have conviction that investing in, in a given area, it is an area that will develop , which will attract tenants, etc." Q.17³⁰ - Fund Manager, Male

Modelling in real estate is not an easy task. Most models are influenced by economic and finance theory, and also by the availability and quality of data. Despite the influence, it is possible to build, with caution, property models that reasonably explain property fundamentals. Ball, Lizieri, and MacGregor (1998, p.252) "The difficulty arises when using these for forecasting. For this, forecasts of exogenous economic variables are necessary, and such forecasts are subject to well-known problems. Turning points are the

²⁹The Net Present Value of the asset becomes negative

³⁰Answer to Question 17, page 265

most difficult to forecasts, yet these are of most interest."

"In fact, it's very difficult, and I don't think any research department today can say where yields will be in eight years." Q.12³¹ - Fund Manager, Male

Among the different interview participants, only one (i.e. a fund manager) claimed he/she is not using yield forecasts.

"We don't believe you can forecast yields. In fact, we know you can't. [15:45] And we can demonstrate the proofs that that is a nonsense. [15:50] So we, we find that very, so we find it very difficult, and there's lots of work has been done about this, but people tend to ignore it, um, to suggests that one can't forecast yields. Um, so we don't." Q.7³² - Fund Manager, Male

Even investors know the difficulties of forecasting, they continue to use them in their IRR modelling. The issue about forecasts is when investors take them for granted. They introduce variables as the Expected Inflation growth, Market Rents and Yield forecasts, etc. in their cash flow model, without knowing the variables and hypothesis embedded in models used to obtain forecasts.

"My exit yield is wrong, and this we all forecast, you know, that yields are going to rise, but you don't know how far. [41:54] And no one forecasted the yields or interest rates. No one forecasts interest rates would be negative in Europe..[41:46] [...] everyone is wrong on their interest rate forecast. [...] Everyone has got their interest rate forecasted over the last, even though, you know, is wrong. [42:20] You can even play what's in front of you and what you're given, you cannot forecast the market accurately." Q.10³³ - Asset Manager, Male

Another issue is about variables considered, variables like: 'Take-up', 'Office Stock', 'Prime Rents', 'Prime Yields', to do market forecasts. Most relevant Real Estate Agencies (i.e. BNP Paribas Real Estate, CBRE, Cushman & Wakefield, JLL, Savills, etc.) have their criteria to define these variables. This explains why investors have different figures or views from the same variable, depending on the data they used among different Real Estate Agencies. Therefore, variables are **framed** by the criteria they used. This research points out that there is an urgent need to have common standard definition criteria of different property variables to reduce definition disparities in real estate.

³¹ Answer to Question 12, page 265

³² Answer to Question 7, page 264

³³ Answer to Question 10, page 265

Finally, market forecasts are not always aligned with investors' sentiment or believe. For example, an investor uses forecasts from a Real Estate agency which predicts a decline of prime rents in a particular market. However, the investor observes that rest of Real Estate Agencies outlook prime rents will continue to expand. The investor may feel more ease to accept that market consensus forecast as the majority continue to think that market conditions will continue an upward trend. In this case, the investor is driven by the market sentiment, and so the investor is reluctant to use the data that contradicts the market consensus. As a result, the investor will input the hypothesis of an increase in prime rents in their IRR modelling to get a particular performance. Two questions arise here. The first question: (1) why the investor feels more comfortable with consensus forecasts? The investor probably unknown the way forecasts are cooked, although he/she prefers to stay with the consensus forecast because it is less likely the majority will be wrong. The second question is, (2) which forecast is right, a decrease or increase of prime rents? As long as more Real Estate agencies reveal more evidence about a decline in the prime rents, more investors will change their beliefs and use a decline in prime rents in their IRR modelling. For some investors, it may take less time to change their believes or market perceptions. For others, it will take more time.

Overall, market forecasts are just numbers that represent different views and beliefs about the future at one point in time. Market conditions change in permanence, and projections are adjusted regularly to new and unexpected information that comes out. By observing forecasts, investors do their judgments, create their own beliefs, and take their own decisions. The problem is that different views about the future are build up using historical data. Try to model the present or future having constant regard in the historical data, already frames and biases the view we have about the present and the future. Besides, factors that explained what happened to yields in the past, for example, they are different to the factors that explain what is happening to yields today or in the future. The use of historical data or factors to forecasts the future leads to continuous forecast errors, and it evidences that it is not possible to forecast the future accurately. The risk real estate practitioners take when they use forecasts in the IRR modelling is that their expected results are framed or distorted by the historical data. Furthermore, biased forecasts can lead investors to regret the decision of buying or selling an asset, as long as market conditions don't contextualise as they expected.

Base-Rate Fallacy Bias

Due to uncertainty, investors make judgments and put their assumptions in a Monte Carlo Simulation to try the numbers. This simulation allows them to assess the potential things that can happen to the office building. However, the issue with investors' assumptions is that they already set up the starting point of their investment (i.e. the acquisition price). Subsequently, investors let the data show them where the potential outcome of the asset is going to come. For example, investors decide what is optimistic, base, and pessimistic scenario in their modelling. In each scenario, investors obtained different cash flows, the theoretical selling price, and exit yield.

"It is the whole investment experience that allows us to say: 'Right, we are going to make assumptions.' And then after that.. it's not an exact science, so afterwards it's..., you have to really have some..., how should I say..., some, some sensitivity analysis to see a little bit how .. it's going ... and the exit yield." Q.12³⁴ - Fund Manager, Female

"It's purely arbitrary, these assumptions are arbitrary, and the sale really depends on the market expertise we have. So it gets complicated, and that's why there is no expert who can, who will be able to tell you the truth. And that's why... in general, when we do real estate appraisals, we compare them with .., maybe several points of view and several experts." Q.11³⁵ - Investor, Male

With all possible combinations obtained in the simulation, investors must decide whether they buy or not the property. Results showed on table 4.4, on page 232, reveal that 7 investors and 3 fund managers, in general, they take their investment decision based on the base (or central) scenario as it is the most likely outcome. By doing this they neglect the rest of the scenarios. They justify their decision by considering that market conditions, between the purchase and the sale, will remain the same.

"That's the whole problem [of IRR] but ... we have to make assumptions. Uh- And the assumption is to say: we will locate the, the ... the sale in the same context as the acquisition." Q.10³⁶ - Investor, Male

Two common reasoning that helped them to justify market conditions won't change: (1)

³⁴Answer to Question 12, page 265

³⁵Answer to Question 11, page 265

³⁶Answer to Question 10, page 265

to consider that Market Rental Value is expected to increase every year at a percentage rate, for example, 1 %; and also (2) expect to sell the building at a higher price than that of the acquisition price. At the end of the investment period, they expect to get an exit yield equal to the initial yield.

"In general, the assumption we make, uh- is that... uh- the selling price is our exit yield uh- applied to the current rent at the exit. Suppose that we have... we are planning to hold an asset for five years, we are going to say: 'Right, we will have MRV [i.e. Market Rental Value] growth of 1 %, for example.' So, we will have... then we will make assumptions about relocation maybe over time, so that will give us our rent at the exit and we apply our cap. rate [i.e. capitalisation rate] at the exit to it. [...] In fact, we, we .. what we are saying is that our exit yield equals our initial yield." Q.10³⁷ - Fund Manager, Male

A consequence of this reasoning is that investors are not allowing to the IRR that any unexpected outcome or strange things may happen during the holding period of the asset. However, markets can be completely different in 10 or 20 years' time. For example, the decline of the property market in Paris CBD, in the early 90s, lead property yields to increase up to 6.75 % in 1996 (Source: PMA). The high level of yields and the reduced volume of investment increased investors' risk perception. As a result, some investors projected the expected selling price of office buildings with high exit yields. By doing this, investors didn't allow a decrease in property yields, or a decrease in risk perception, in the next years. In 2016, circumstances are completely different. The Parisian property market is expanding, and yields in Paris CBD decay to a historical low of 3.28 % (Source: PMA). The low level of yields, along with the belief of market yield reversion, give investors a hint that property yields may increase in the future. An increase of property yields will provoke a decrease in rents and/or in property values. When investors introduce these assumptions in the IRR they observe the exit yield is likely to be higher than the initial yield. The increase in investors' risk perceptions undermines their incentives of investing in property. To not discourage investors to invest in property, some investors and fund managers neglect the possibility of an increase of property yields in the future. And therefore, they elaborate the IRR assuming that the exit yield in 10 years time will remain at the same level of 2016.

"I analyze my market as I see it today and I have the project ... I project it forward 10 years! There is no reason to say that the office market in 10 years will be 'radically different' from today. '[...] But that's precisely the danger of

³⁷Answer to Question 10, page 265

an IRR, isn't it? Because, if on the contrary, we said: we can not live like this for long, and in ten years we are going to be in crisis, uh- no one would buy offices because the IRR, um .. If you do one, an IRR with an entry rate of 4, and then the exit rate is at 7 uh .. there is no point doing it... well... there is no point in investing." Q.12³⁸ - Investor, Male

Another reason that makes investors and fund managers tend to be conservative and maintain the same level of yield is *remuneration*. Investors may get a bonus in case they obtain a better IRR of an office building at the end of the investment period.

"We have a... remuneration beyond a certain threshold of IRR. So it is very important for us to calculate uh- correctly the IRR, because beyond a threshold, we go be paid a lot more, so we have a goal of getting the best IRR... IRR possible... because we want to do better uh- than our IRR... target of departure." Q.7³⁹ - Investor, Male

Table 4.4 also reveals investors' investment profile. The first 7 investors and 3 fund managers that claimed most of their investment decisions are based on the base scenario, they invest in Core and Value-Added properties. On the one hand, the secured long-lease offered core properties encourage investors to do long-term holds. On another hand, value-added buildings require more active management and conversion to increase rental income and the value of the building. In this case, generally, investors tend to sell a value-added building in the short-term to get the income and capital growth potential. Things are more difficult to predict as long as a property business plan extends beyond two years. A lot of things can happen regarding economic growth, inflation, lease breaks, tenants default, etc., that are impossible to predict, and which will have an impact in an IRR of 10 years. For this reason, this research expected some investors use heuristics in long-term core investments. To simplify, some investors tend to think that market conditions will remain the same in the future. This leads them to justify an exit yield equal to the initial yield. Nevertheless, this research didn't expect to find the 2 investors that invest in short-term value-added investments use the same exit yield assumption that in long-term core investments:

"We are very, very conservative We, we, we .. if you like, we can be very ambitious about works, very ambitious about re-negotiations etc. but we are never too ambitious about sale price! Because there, we say, we don't now what to say! Because for assets we hold one or two years, we know almost..."

³⁸ Answer to Question 12, page 265

³⁹ Answer to Question 7, page 265

An asset we hold four years or five years... sincerely, we don't know [...] I think it would be unreasonable to say: 'I'm going to make a 1 % rate of return because the market is going to go up;' and I think it would not be fair." Q.11⁴⁰
- Investor, Female

Generally, investors that invest in *value-added* expect a yield compression at the end of the business plan:

"Zero difference... We... our, our hypothesis is zero ... no difference, unless we buy projects that are forward purchases where on forward purchase we can benefit from some yield compression. Our central assumption is that we have 30 basis points of compression if we are on, on .. forward purchase." Q.12⁴¹
- Fund Manager, Male

This fund manager used heuristics (or shortcut) when he/she considers the same hypothesis of 30 bp of yield compression in different value-added business plans. It may be easy and quick to use the same hypothesis of yield compression. However, this research warns that it may not be a good practice to apply the same hypothesis in different value-added business plans. Each building is different from the rest of the buildings, and so the hypothesis of yield compression will depend on a case by case.

This research has also found that 4 investors, 3 fund managers and 2 asset managers proclaimed that the exit yield might differ or not from the initial yield:

"It mi-, it might, it might not. It might not. It might not. Unless you have a 25-year lease today that's going to be 20 years, is there like to be any difference? No. [28:57] But, if you have a, if you have a six-year lease, and it'll have one year left, it will be very different. Yeah." Q.12⁴² - Fund Manager, Male

"We try to stay optimistic, we say: 'in the CBD [i.e. Central Business District] it will always be worth four per cent.' Because there will always be short supply, there will always be an international investor who wants .. who will want to come here. [...] We think what building, that the market is not going to collapse so .. Maybe here I am at .. 3.5 %, 3.2 % but .. maybe if the rate goes up uh-... so in ten years I'll be up to 4 %, 4.5 % but .., but no one knows

⁴⁰ Answer to Question 11, page [265](#)

⁴¹ Answer to Question 12, page [265](#)

⁴² Answer to Question 12, page [265](#)

that. That's, it's .. completely hypothetical. " Q.12⁴³ - Investor, Female

The arguments used by investors to justify an exit yield vary depending on the type of property (i.e. core, value-added, and opportunistic), and the hypothesis embedded in the cash flow model. For example, in case investors that look for a high-quality core office building at 3.5 % in Paris CBD. Either the investor may anticipate that (1) prime market yields will remain at 3.5 % in 10 years time, or (2) prime yields will revert to their long-term average. In the first case, the investor may get drawn into the market. In the second case, the investor may prefer to be more conservative and take the average of long-term prime office yields in the CBD, which is around 4 %. This will reduce the final theoretical price of the building at the end of the investment period. As a result, a conservative investor may plan to do some capital expenditure and conversion to increase the value of the building and reduce the exit yield below 4 %. Another case, when investors plan to buy an empty office building, to reconvert a value-added building into a core building. As the building is empty, the investor exposes to a high rental income risk. The investor plans to carry out an active building management and search for tenants till the building is fully occupied. Once the building is occupied, the building will produce more rental income, and the value of the property will increase in value. Investors plant to sell the building, for example, in 3 or 4 years time. The assumption of an increase in the value of the building will lead investors to assume an exit yield compression at the end of the investment period.

Finally, this research also found a fund manager that does not calculate the IRR nor the exit yield. In this case, the fund manager cannot be affected by the **base-rate fallacy**. The fund manager thinks the IRR is a metric that is not extremely helpful as he/she thinks it is not possible to forecast yields. Most of the investment transactions followed by this fund manager are long-term core investments. The fund manager doesn't plan to sell any building. For this reason, the fund manager focuses on the potential income growth of the building, and the capital expenditure predominately. The fund manager does not appraise building to sell it in five or ten years time unless the fund manager makes an opportunistic investment.

⁴³Answer to Question 12, page 265

Table 4.4 – Base-Rate Fallacy. Participant Responses

ID	Individual Profile	Base-Rate Fallacy			Type of Office Building			
		Yes	Depends	No	Core	Core Plus	Value-Added	Opportunistic
1	Investor	x					x	
2	Investor	x			x		x	
3	Investor	x					x	
4	Investor	x			x	x		
5	Investor	x			x	x		
6	Fund Manager	x			x	x	x	
7	Fund Manager	x			x			
8	Fund Manager	x	x		x			
9	Investor	x	x		x	x	x	
10	Investor	x	x		x	x	x	x
11	Investor		x		x		x	
12	Investor		x					x
13	Asset Manager		x		x	x	x	x
14	Asset Manager		x		x		x	
15	Fund Manager		x		x		x	x
16	Fund Manager		x				x	
17	Fund Manager			x	x			x
Total (ID)		10	9	1				
Investors		7	4	-				
Fund Managers		3	3	1				
Asset Managers		-	2	-				

Aside from investors, valuers are also exposed to the **base-rate fallacy bias** when they calculate the *Present Value* of an office building. For example, when valuers build up a 10-year cash flow of a building, valuers use the hypothesis reported by investors:

the expected rental income the building will generate, the capital expenditure, lease breaks, tenant leaves, etc. The only thing valuers won't consider leverage. The Cash Flow is capitalized at a *Discount Rate*. The discount rate they used is a 10-year Bond rate plus a risk premium. The premium will depend on different factors like quality of tenant, building location, occupied space, the age of the building, etc. To calculate the theoretical selling price valuers use a *Market Capitalization Rate*, also known as *Market Income Yield*. Both, the *Discount Rate* and the *Market Capitalization Rate* are needed to obtain the *Present Value* of an office building. The problem appears when valuers consider the current *Market Capitalization Rate* to obtain the theoretical selling price. Intrinsically, they are assuming that market conditions will remain the same, and the building will maintain the same performance along the investment period.

"Most of the time we take the same one [...] Because we do the calculations uh-, then we do sensitivity analyses and we look at whether it matches the market or not. [...] But this is case by case, most of the time we take the same but it is not an obligation uh-... It is up to us to feel and depending on the type of asset to decide if uh- what exit yield we take." Q.11⁴⁴ - Valuer, Male

Once investors and fund managers are convinced that the office building seems appropriate for the fund, they will present it to the investment committee. In Europe, all property funds are regulated by the Alternative Investment Fund Managers Directive (AIFMD) or, in french, l'Autorité des Marchés Financiers (AMF). The AIFMD is a European law that regulates hedge funds, private equity funds, and real estate funds. This law seeks to protect investors. To this aim, the AIFMD requires fund managers how and what information is disclosed to their clients (i.e. investors). All the information - including the IRR analysis - is discussed among different members of the Investment Committee. In case the Committee decides the asset seem appropriate for the fund, the fund proceeds to make an offer.

⁴⁴Answer to Question 11, page 267

4.2.2 Final Bid

Asymmetric Information Bias

The Seller has engaged with the Investment Committee to sell the building at a particular price. Before the start of the bid process, the investment committee provides some instructions to prepare the building for sale. For example, instruct an Asset Manager and a legal team to launch an internal due-diligence, and prepare the *data room*⁴⁵. The **data room** is a virtual or physical location where all the office building technical information is stored. The kind of information stored in the data room comprise⁴⁶: the year of construction, location, history of the building, major changes, license, current use, tenant structure, lease contracts, etc. The internal due-diligence serves to know in advance the possible difficulties they will face during the sale.

After the internal due-diligence, the investment committee instructs the Seller to execute a pitch to select the sales agents or Brokers who are going to sell the property. The Seller asks them to give their proposals of asking price. Sales agents proposals are discussed with the investment committee. Generally, the Seller hires two sell-side Brokers to carry out the sale. The investment committee also outlines how they are going to approach in the sale, the strategy they would take, the fees sales agents are going to receive, and the investors they will go ahead with the transaction. Both sell agents tend to have a list of potential buyers, which eases the execution of the bid process. Before the bid process starts, sales agents execute a marketing strategy. It serves to put together a Teaser, and a brochure called the Info Memorandum. Both describe the main characteristics of the building. Once these documents are ready, both sell agents spread out investors each one is going to target, and they initiate the bid process.

When investors enter into a bid process, they have his/her conviction of price they would pay to acquire the office building. However, bids might differ among investors, depending on the information they have and the strategy they follow. The most difficult for investors is to know the price they have to bid to be selected by the Seller and, if possible, without overpaying the asset. To shed light on this, investors try to know who are the other bidders, the strategy they follow, and their level of bids. For instance, one bidder offers 100 million for the building. The bidder may ask: "are the rest of bidders going to bid 95 million or 105 million?" This question becomes an obsession for

⁴⁵More information about the data room on page 243

⁴⁶For more information, please see Just and Stapenhorst (2018, p.158)

investors in each bid process. In case the Buyer hires a buy-side broker, the broker will also try to inform their client about who are their competitors. Either the Buyer or a buy-side Broker speaks to sell-side Brokers and other investors, and try to clear up how many investment transactions rest of bidders have realised across the year, the number of bid process they have been rejected, the number of times competitors have visited the building, etc. This helps investors to have an idea about what competitors are more likely to make a more or less aggressive offer and to prepare their bids.

Analogously, the Seller needs to know who are different bidders because he/she needs some guarantee that bidders are capable of paying a certain price. Sell-side brokers support the Seller and provide all the information they have about bidders. For example, what are their strategy, their objective of IRR, the buildings they bought throughout the year, the level of leverage engaged in each transact, who are more motivated and capable of arriving till the end of the selling process. Another aspect brokers also consider what investors have some delay in their business plan. If this is the case, delayed investors must invest a certain amount of money before the end of the year. Sell-side brokers will put more attention into these investors than others, as they have more chances to get a better price.

"If .. you see an investor [...] in October, you know that the 300 million he had to invest he has already invested. After that, he takes a little time to chill and... he does not yet have visibility on his earnings of the year, of the following year. Uh- Analysis, the conclusion that, he is not necessarily the best buyer. And that his competitor, who is late, uh- and who has not invested his cash, uh- and absolutely needs to do so, is perhaps a better candidate who has to be followed .. followed much more closely." Q.6.2⁴⁷ - Broker, Male

With all the information gathered by sell-side Brokers, they will try to get the highest possible price in the sale. The Seller links part of brokers fees to the selling price they get. This way the seller ensures brokers will be motivated enough to get the highest price possible. To attain this goal, sell-side Brokers use objective and subjective elements to convince different bidders. *Objective* elements comprehend the intrinsic qualities of the building and property market data. *Subjective* elements entail psychological strokes, which are ways or techniques used by brokers to explain things to bidders to convince them to purchase the building at a particular price.

"The greatest difficulty for us is to define what the real price is at which he's

⁴⁷Answer to Question 6.2, page 266

certain to obtain the, the, the, the prod-, the price, the asset. [...] It is very different depending on the investors. It is much easier for an investor who has just lost ... two or three tenders one after the other, [...] he says to himself: 'I have to win the next one!' [...] Besides this investor, who thought he was going to win, there may be three others in the same situation, because there are not a lot of buildings up for sale, and all four of them need to buy. Because, at some point, they have to collect the money, they have to pay their unitholders a fee and, if there is no remuneration, uh- the money he has put in the bank, will cost him .. And then the shareholders will start to tell him: 'you have to buy something.'" Q.6.2⁴⁸ - Broker, Male

In case both sell-side Brokers do not attain the price agreed with the Seller, either because the bidders move away or the offers received are below the asking price, they risk to be penalised by the Seller. For example, the Seller won't contact them to carry out other building transactions. Besides, the Seller will have to give explanations to the Investment Committee, who undoubtedly will warn the Seller as he/she couldn't deliver what was agreed.

The lack of transparency in most property markets causes that bidders do not always succeed to know who are their competitors. Sell-side Brokers may benefit from this situation. *Subjective elements* used by brokers are also used to create competition with the aim to get the highest price possible for the Seller. For example, sell-side brokers speak to different bidders and explain to them that there are others that want to buy the same asset. The broker suggests bidders to increase their offer if they want to win the bid:

"Get investors to compete with each other because your role is to maximize the price for the seller. [...] If you have a sales mandate, you will never say to an investor: 'listen, you're fine, there's no competition, you're, you're all alone to answer there's no one else.' So every time it's a kind of a game of liar poker where you have to give the impression to the buyers that there is competition. Uh- It is necessary to stimulate their interest uh- without taking the risk of discouraging them." Q.6.2⁴⁹ - Broker, Male

This practice, to give false statements about competition, or inflate figures to try and push investors up to a higher price, it is still present in the real estate industry. In some countries, like in the UK, this practice is not legal. However, the UK law

⁴⁸Answer to Question 6.2, page 266

⁴⁹Answer to Question 6.2, page 266

permits the sell side to release real information and to give clear guidance to different bidders. Moreover, the higher transparency of the UK property market, with respect to the other European markets, enables real estate practitioners to have open discussions about different transactions. And it also reduces the level of asymmetric information between both the sell side and the buy side.

The information used by Sell-side brokers, when guiding different bidders, can also be disclosed in a way that may increase the chances to close the deal. For example, sell-side Brokers may focus more on the positive characteristics of the building than the negative ones. They may also communicate the highest offer they received. They do this to motivate and convince investors to increase their bids. Some bidders, depending on their circumstances and needs, may prefer to make an aggressive bid to increase the chances to get the exclusivity of the building. For example, an investor is forced to carry out a certain amount of investment every year, and so the investor doesn't want to spend time on bid processes. The investor may directly ask to sell-side Brokers the price he/she have to bid to be selected by the Vendor.

"So, it can be a type of investor [...] who has 3 billion of investments to manage, he will not necessarily waste his time, he will say: 'Right, tell me what price I must go for.' For me, the important thing is not to give him a price that we will set out to others, it is that he has the, the price plus something that will allow him to win. So in the end his committee says: 'Yes, he is right, we must offer this price because I have 4 billion euros to invest, I can not afford to start by wasting my time.'" Q.6.2⁵⁰ - Broker, Male

Not all investors follow the same strategy. In fact, most investors are aware that overpaying an asset can lead to a lousy investment. When Sell-side Brokers deal with less aggressive investors, they are aware that their capacity to create competition or to pressure up investors, with the aim to increase bids, has its limits. For example, an investor that should send the letter of intent at a specific date. However, the investor hadn't sent it yet. The sell-side broker may push up the investor to speed up in his/her bid as other fifteen bidders also want to buy the asset.

"The broker calls me saying: 'yes, you know ... you were supposed to, you were supposed to write your letter [i.e. letter of intent] by yesterday, for this morning by 11 o'clock, it's two o'clock ... we have nothing. I have 15 people who want this building, you must hurry.' etc. This broker always gives me

⁵⁰ Answer to Question 6.2, page 266

this story. [...] Everyone puts pressure on. That's what you are told: 'yes but then... you have to understand, this thing, you want to get out of this, this deal because you've found something .. Your reputation is shot .. Nobody will ever want to sell you anything.' [...] *And I said, "Well, after all I am not that keen on your building. You manage with them.'* *And they said: 'No, no, that's not what I meant,' [Smile] 'don't get me wrong.'* [Smile] *No; there is a lot of bluff!"* Q.15.2⁵¹ - Investor, Female

The cautious investor may inquire if that information is true. The investor is aware that the elasticity of price stretches through competition. As long as pricing increases, the asset price becomes less compelling to proceed with the purchase. Depending on circumstances, before taking the decision to continue or moving away from the bid process, the investor may also try to test the broker to verify if that information is true. In this quote, the argument used by the broker: "*Your reputation is shot .. Nobody will ever want to sell you anything;*" caused the investor to decide to move away from the transact. Investor's reaction caused the Broker to dose the discourse to avoid the exit. The Broker probably betrayed himself that the information he/she gave, about the number of bidders, was likely untrue.

Overall, sell-side Brokers have an interest that the deal closes. This is why their capacity of stretching competition is limited. At some stage of the bid, they have to dose their discourse to increase the probability to close the deal. In case one convince an investor to buy the asset, this one will get the 60 % of the fees. But in case it's the other sell-side Broker who closes the deal, the other sell-side broker will get the remaining 40 %.

"And then possibly explain to investors who are on your competitor's list that: 'Right, the building... is average and, I will have another more interesting one available in two weeks ,etc. But, we must be careful because people no longer have, are not idiots and they know that it's in your interest to prioritize your customers rather than your competitors. [...] Our power of persuasion is relatively weak, the real power we have is our power of nuisance, a negative power. [...] This nuisance power has a certain limit, because if I win I get 60 % of the fees, but if it is one of my competitor's investors, I get 40 % anyway; I do not get nothing at all. So this implies that anyway... I have to be careful about... the negative elements that I give to my competitor, because in the end... I still earn money if it's the other one, if it's my competitor who wins."

⁵¹Answer to Question 15.2, page 265

Q.6.2⁵² - Broker, Male

On the date set on the *Letter of Intent*, or LOI, the Vendor analyses the offers received from different Investors. The Seller will start to make judgments about the various proposals. For example: "I don't think those people have got the money. I don't think they've done enough diligence. Those don't have a good track record for closing deals, so I'm gonna cross those off the list. But I have two or three people who I think are good, potential buyers who have the resources and done the research to proceed." The Seller or sell-side Brokers may ask again selected investors to make a second round to increase the bids if they want to stay in the process.

"If we achieve, um, interest, and I, I, I won't go through the whole step-by-step process of selling an asset, but if we end up calling for bids and offers, and we achieve a pricing within that range, uh, we would normally, uh, maybe create a second round where we would push investors to pay the best possible price."

Q.19⁵³ - Broker, Male

Escalation of Commitment Bias

Transactions are time-consuming as they require plenty of analysis. At some stage, investors have to stop the analysis and take a decision. For example, two investors have been working on a deal for six months. A buyer has agreed with the Seller to pay €105 million for the building. Suddenly, the Seller comes back to the Buyer and says: 'Actually, I've changed my mind. I want 108'. In this case, the Buyer has to decide whether he/she maintains the price at 105 or pays a high price to avoid losing the transaction. Notwithstanding, the Buyer knows that it is contingent that the increase in price may drop below his/her investment criteria. But at the same time, the Buyer may have an urge to close the transaction. The Buyer might be tempted to pay a higher price to avoid spending time on the transaction.

"There is a temptation that if you've been working on a deal for a long time, you would always push the parameters as much as you can, because obviously, nobody wants to, to lose time o-, on transactions." Q.14⁵⁴ - Broker, Male

"We spent so much time analyzing the asset, doing all the work required ..

⁵²Answer to Question 6.2, page 266

⁵³Answer to Question 19, page 266

⁵⁴Answer to Question 14, page 266

and all that, that .. we say to ourselves: 'It's okay, let's pay a little more, but at least I don't have to trash all the work that I have done.' Because we worked for three weeks on the thing. If we don't do the deal, it means we've lost three weeks..., 'for nothing'..." Q.14⁵⁵ - Investor, Male

In case the analysis done by the Buyer shows that the fair price to pay for a building is €105 million, the most rational is to maintain the bid at that level. Of course, this may not be an easy task when the Buyer has missed other bids, and he/she has compromised with the shareholders of the fund to invest a certain amount of money before the end of the year. However, push the IRR parameters to justify an increase of the bid, to avoid losing the transaction, and so all the work they've done, not only it is dangerous, but it also seems far away of being rational as it may compromise the state of the fund.

This kind of behaviour shows that some investors are willing to take higher risks when they invest others' money but not with their own money. As they do not risk their own money, they reduce their loss aversion, and they are more willing to overpay for an asset.

"It is quite different too if you do something for a third party or for yourself. [...] I was at [Note. He refers to a Real Estate Agency] and that uh..., the people, they rise, well, they bring you money to invest in real estate ... Well, there comes a time when you have to invest. You can't keep it, you don't earn anything if you keep it so... So, even if you say to yourself: 'Well, maybe it's a bit expensive,' you still do it because the people who brought in the money want to do it, so even if it's not the deal of the century you do it, don't you?" Q.14⁵⁶ - Investor, Male

In addition, when individuals make a decision on behalf of others, for example, an institutional fund that manages the pensions fund of million people; and the decision implies a higher risk, the intensity of regret for the fund manager is less emotional intense than the feeling of regret of persons that really risk their own money (see for example Wagner et al. (2012), Mengarelli et al. (2014), and Tripathi (2016)).

Familiarity Bias

At the end of the bid process, the Vendor has to decide the investor who will get the exclusivity to analyse the building in the *Detailed Due Diligence*. To simplify, let's

⁵⁵ Answer to Question 14, page 265

⁵⁶ Answer to Question 12, page 265

assume the Seller is against two investors. In case there are two well known national investors, both with a good track record for closing deals. The Seller feels confident that both will execute the transact. Here, the selection process is straightforward: the investor that pays the highest price, which is also above the Seller's expected price, would get it.

In another case, the selection process may not be so evident. The Seller is against a well known national investor versus an unknown international investor, who tries to execute his/her first investment deal in the country. Let's also assume that both Buyers have a good track record in their respective countries. The national investor priced the property at €105 million, a value the Seller feels is acceptable. On the other hand, the international investor offers €115 million, which is above the price range of the Seller's asking price. Despite the appealing offer of €115 million, the Seller still doesn't feel confident because he/she doesn't know how the foreign Buyer will transact.

"You have ... you know, it's a job uh- where personal relationships are very important." Q.15.2⁵⁷ - Investor, Male

In case the Seller accepts the highest offer he/she needs a guarantee that the international investor will execute the transact at the end of the *Detailed Due Diligence*. Sell-side Brokers, who are in permanent contact with bidders, try to investigate how both they are going to finance their operation, and also which one has fewer chances to move away during the *Detailed Due Diligence*.

"Listen, that one has 2 million months... but he will go to the end of the process, because he needs to buy, because his teams are credible, all the same reasons. The other made you the best price but .. his specialty is to make the best price for exclusivity and rework the price behind." Q.6.2⁵⁸ - Broker, Male

The two million mentioned in the quote above does not correspond with the figures exposed in the latter example. What is important here is the recommendation. An investor with a good reputation in closing deals, and who is also known by the Seller, has more chances to get the exclusivity even though is not the highest price:

"He [i.e. The Seller] knows that if he works with a French insurer, [...] with uh-... a French management company, we will not do it, because we are all in the same market ... We need to be around for a long time, so [...] after just two weeks we aren't going to say: 'after all, ... we are not interested in

⁵⁷ Answer to Question 15.2, page 265

⁵⁸ Answer to Question 6.2, page 266

the asset... we make a mistake ... Sorry!' [...] A foreign investor can, can do that, because he has no reputation to defend, which is what can happen in some cases." Q.13⁵⁹ - Investor, Male

New entrants, like the foreign investor, have a disadvantage because they have to build up a reputation in the market. Generally, it takes some years to build up a reputation and to familiarise with different real estate practitioners that operate in a local market. The cost of entrance may lead the foreign investor to make a higher offer to convince the Seller that he/she is a serious candidate.

The Seller has to do a judgment call: to select the highest offer or stay with the known investor. To have a good relationship with the Seller can be determinant in the decision to choose a Buyer. The Seller may prefer to select the known investor as he/she feels more comfortable that he/she will transact at the end of the *Detailed Due Diligence*.

"We are generally happy to buy a building, even more if we beat a competitor especially if we think we bought at a good price. [...] Sometimes uh-... we may have maybe we had an element in the underwriting where... others did not notice or, uh-? Uh- sometimes it's because we had a better relationship with the seller." Q.14⁶⁰ - Fund Manager, Male

⁵⁹ Answer to Question 13, page [265](#)

⁶⁰ Answer to Question 14, page [265](#)

4.2.3 Detailed Due Diligence

Cognitive Dissonance

The *bid process* is quite intensive for bidders as only one can get the exclusivity⁶¹. Once the Seller communicates who will accompany him/her throughout the *Detail Due Diligence*, the selected Buyer may ask if he/she has made a mistake in the underwriting by proposing a price which is 5 or 10 % above their competitors. This situation can cause the Buyer a mental stress between the satisfaction of being elected, and the risk of having offered more than they should.

"We are not proposing a price that would be 5 or 10 % higher than our competitor. So... that's... It's really in terms of... the, the, the, the, the investor always wonders. [...] In the preliminary phase one says to oneself: it really is the building we want .. [...] and so we must go forward with this transaction, so we do everything to get it, and once we get the exclusivity .. we ask ourselves the question: 'but finally might we not have made a mistake [Note. in the underwriting]?' So we're a little schizophrenic sometimes." Q.14⁶² - Fund Manager, Male

An underwriting is a binding agreement between the Seller and the selected Buyer to purchase the building at a certain price upon a future date. The price agreed is an indicative offer which might change depending on how the Detail Due Diligence will go.

Asymmetric Information Bias

When the selected Buyer initiated the *initial due-diligence* he/she only disposed of some information about the building. For example, its size (in square meters), the name of tenant(s), and the level of rent(s). Once the Buyer got the exclusivity, the Buyer has access to the *data room*⁶³ which contains the technical and legal building documentation.

At this stage, the Buyer principally relies on three pillars to go through the *detailed due-diligence* process⁶⁴:

⁶¹In some cases the Seller may propose two or three bidders to have co-exclusivity, although this is not usual. The high monetary cost and amount of work involved in a detailed due-diligence cause most bidders prefer to have a single exclusivity

⁶²Answer to Question 14, page 265

⁶³A definition of data room can be found on page 234

⁶⁴The role of brokers is less important here. They check that negotiations are going in the right

1. The Asset Management team, which executes a **technical due-diligence** to check if there is any technical issue with the building: they break down the seller's title deeds, to review the construction permits, if the building was restructured, etc.
2. An External Legal Consultant carries out a **legal** and a **tax due-diligence**. The external agency revises that all the lease contract(s) are fine, and file taxes are filed and paid. In case the Buyer attempts to buy a company that owns an office building, aside from the building, they will also prepare an **accounting due-diligence** to study the state of the company: the balance sheet, the level of debt, etc.
3. An External Valuer will go along with the Buyer throughout the detail due-diligence. The role of the valuer is to approve the due-diligence and to provide an independent opinion of the value of the building

The entire analysis permits the Buyer not only to know more about the asset, but also to identify risks the Buyer will face, and the income potential the building is expected to generate.

For approximately a month, they are going to analyse the available documentation with a red flag system. So, if anything comes up, it will be discussed with the vendor during negotiations. The quality of information contained in the data room is critical. In case all the building documentation is in it, and it's well classified, the Buyer and the external consultant feel safe, and they restate that the building is a good deal. On the contrary, when the Buyer and the external consultant corroborate that some documents are missed or not updated, they feel unsafe. For example, (1) The original lease contract of a tenant is lost. (2) The building was built on land where the soil is contaminated with lead and/or asbestos. (3) Whether or not it's major capital expenditure coming up in a period of time, which may not be recoverable from tenants. Or (4) the building has more square meters than what was registered in the building permit.

As long as the Buyer recovers new information about the state of the building, the Buyer enters into negotiations with the Seller. In every negotiation, there might be 20 persons around a table, the Buyer and the Seller along with their respective advisors. The Buyer points out the unexpected risks that have appeared in the *detail due-diligence*, and expose the estimated cost of dealing with those risk. The Buyer would try to negotiate for a lower price to compensate for the additional risks.

"We say to ourselves: 'Well, these people worked well, it's clear, it's obvious,

direction, and they advise their clients when they need

we have had a good exchange.’ We feel safe. The minute we see there are holes, that there really are things that are missing [...], then we say to ourselves: ‘well... how much is a risk like that worth? What is the price of the risk? That is to say we start to lower the price.’ Q.14⁶⁵ - Fund Manager, Female

At the same time, the independent Valuer that works for the Buyer has to provide an opinion of the value to aid in the completion of the transaction. To do this, the Valuer makes a physical inspection of the building, analyses its location, and revises the building technical documentation contained in the *data room*, including the lease contracts. The Valuer investigates the covenant strength and ascertains how the rental income stream will rise or fall going forward in time. The performance of the income stream will depend on the lease contract itself (i.e. rent review or expiry dates, provisions) and on how the occupational market conditions will evolve.

The Valuer corroborates the building information with information about the market. The valuer looks to property research reports, to know more about the market rents, yields, trends, and check different surveys to know more people’s opinions. For example, surveys about the condition of the building, environmental, and the appetite of investors towards investing in a commercial real estate building.

The information mentioned so far helps the Valuer to have some repairs that will help him/her to form an opinion of value of the building he/she tries to appraise. Nevertheless, the Valuer needs to have more information at asset level. For this, the Valuer looks at different building transaction databases. The data is a bit delayed respect to the latest building transactions, and so the Valuer decides to contact institutional investors and brokers to update the information available. In these conversations, institutional investors and brokers may try to ask the Valuer about the building that he/she tries to appraise. In case the valuation is strictly confidential, the Valuer is not allowed to speak them out about the building. If this is the case, the Valuer would speak about the area the building is located. The Valuer asks them what they think about the level of yields, vacancy, rents and incentives in that area. On the other way, if the Valuer can speak out about the building he/she is trying to appraise, the Valuer may ask investors and brokers to give specific information about the building. In some occasions, the Valuer finds out that, for example, a Broker that is involved in the transaction of the same building. This would allow the Valuer to have access to more information. However, this could also lead to changes in the parameters used in the valuation that would affect to the appraisal value.

⁶⁵ Answer to Question 14, page [265](#)

"And if in the conversation with the broker we learn that there is... it is finalizing, even if it is not yet signed the transaction, and that we have the terms of this transaction, it can actually lead us to..., I would say to... overweight some elements in the market study compared to others, that's it. It is, I think that's where we can have facts brought to light." . " Q.8.2⁶⁶ - Valuer, Male

To minimise the impact on the valuation, the Valuer would cross different sources of information from all the conversations he/she had. Moreover, the Valuer also picked up signals from their opinions and views about the latest market dynamics. For example, to know the level of price per square metre of the most recent buildings transacted, and how rents will evolve. This is especially helpful in case the building is located in a very dynamic market. The market information change regularly. Then, the Valuer needs to be closer to real estate practitioners to know more about their view of the market. For example, if their view of the market is more pessimistic or optimistic. On the contrary, if the building is located in a very stable market, the Valuer can form a firm opinion of value with more ease as market transactions would fluctuate less frequently.

The Valuer also talks to his/her client, the Buyer, to have more reliable information of the building. The Valuer asks if the Buyer has planned to apply an incentive (for example, rent-free periods or capital contributions) into the headline rents⁶⁷, or to move forward any expenses (i.e. CAPEX) during the holding of the asset. The information exchanged between the two is crucial as the Valuer needs to understand how cash flows are going to behave going forward. In case the Buyer misses to report any information, like a keen interest for the property that would lead him/her to pay a higher price for the building, this would surely have an impact on the valuation. Nevertheless, even Valuer ask good questions to his/her client from the start of the valuation process, the Valuer does not always succeed to get this information.

"There are factors of personal suitability... Factors of personal suitability [...] because the building you bought allows you... to have a stronger position on the market... [...] It's very hard, it's very hard because..., we can guess but we can not know if the client does not tell you! [...] He may be induced to pay a little more... to win, to buy the building." Q.12⁶⁸ - Valuer, Male

The Valuer inputs all the different elements into *discounted cash flow* model to bring cash flows to present with an appropriate capitalisation rate, and to obtain an

⁶⁶ Answer to Question 8.2, page 267

⁶⁷ A headline rent is a rent paid by the tenant under a lease before the Landlord concedes any incentive

⁶⁸ Answer to Question 12, page 267

appraisal of the building. As valuation is not an exact science, the Valuer confronts the estimated appraisal with at least another other valuation method ⁶⁹, like the *comparison approach*. In the comparison approach, the Valuer observes recent building transactions that are similar to the building wants to appraise to have comparable evidence about how the market is behaving. If there is a small difference between the two methods, the Valuer feels more comfortable about the valuation. But if there are significant differences, the Valuer will have to make a judgment call to decide which appraisal he/she retains. For example, property reports show that the market where the building is located is expanding. If the market is very stable, the Valuer may tend to select the higher appraisal or take an average of the two. But if the market is very dynamic, valuations may change between the start and the end of the valuation process, and it would be more difficult to select between the two appraisals. The Valuer would have to report a valuation at one stage. The most important is to justify how the Valuer formed a firm opinion of value of the building.

⁶⁹See more on page [222](#)

4.2.4 Closing the Transaction

After three weeks working on the deal, the Buyer has more information about the asset. The buy-side investment team feeds back their estimates into their analysis to assess risks, and observe whether they have any impact on the price they are prepared to pay.

Endowment Effect

The Buyer will use the appraised value as a reference to renegotiate the price with the Seller. The Seller also commissioned to another valuer a valuation of the building that wants to sell. Evaluation is an opinion that is rationalised on every step of the valuation process. Two different valuers valuing the same property wouldn't come up with the same appraisal. This would happen even as they consider the same relevant factors, and they follow the definitions of value set out in the RICS Red Book that valuers have to adhere to. So, there is never a definitive right number.

The RICS also requires to Valuers to meet their clients before the validation of their valuation report. In this meeting, they discuss the appraisal value. Report an appraisal is not an easy task, especially when the client doesn't agree with the valuation. For example, the Buyer would like to have a valuation low to negotiate the price low, and the Seller that wants it high to get the highest price. This research has found that valuations are challenged quite frequently. The scrutiny can be uncomfortable to Valuers when a client complains that the valuation is proved to be too high or too low.

"And uh- it happens relatively often!" Q.19⁷⁰ - Valuer, Male

"Of course, it happens every day!" Q.19⁷¹ - Valuer, Male

"And that is not a pleasant experience but, but it is about justifying your approach and, and making it clear that they are our numbers. And, you know, for, uh, yeah, people fall into two categories. Some people, some people shout and rant. Some people go quiet. Some people, uh, uh, are very nice and try and coax. You know, it's, it's life." Q.19⁷² - Valuer, Male

⁷⁰ Answer to Question 19, page [267](#)

⁷¹ Answer to Question 19, page [267](#)

⁷² Answer to Question 19, page [267](#)

Valuers feel uncomfortable because they put a lot of professionalism and care on the things that they do. One reason that leads some investors to influence a valuation is that they tend to value more their assets than other people's assets. This bias is known as the **endowment effect**.

"People are always trying to influence a valuation. I mean, it, it, you know, it's, it's human nature. Um, if, if [laughs] you know [laughs], most people, uh, well, everybody loves their kids more than they [laughs], more than, more than other people's kids. And you know, people tend to love their own assets more than other people's assets. [29:35] Um, and therefore they, there, there's a natural tendency to think their assets are worth more.[29:40] Um, you know, we are very used to that. We're very hardened to that." Q.20⁷³ - Valuer, Male

The *endowment effect* can appear on both sides, the Buyer and the Seller. On the *buy-side*, the Buyer wants to avoid spending time on a bid process, so the Buyer ends to buy the building at a much higher price. Moreover, the Buyer may have in mind to ask a Bank for a credit to finance the transaction. The Buyer may have the interest to push the value up of a valuation of a building. The valuation will determine the amount of money the Bank put in. The more money the bank puts in, the less money the Buyer uses from the real estate fund. This way the Buyer will have more money to invest in other properties. On the other side, the *sell-side*, the Seller wants to get the maximum price for his/her property. For example, the bonus of a fund manager depends on the value derived from the sale. The fund manager would have the interest to have a valuation high. Back up by a high valuation, the fund manager may get a bonus in case he/she sells the property at a higher price.

When a client disagrees with a valuation, both the Valuer and the client revise all the information used at each step of the valuation. The Valuer must justify how did he/she get to the appraisal value. Let's assume a Valuer that works on the buy-side. The Valuer obtained an appraisal value of 6.55 %, and the Buyer is willing to pay an Initial Net Yield up to 6.25 % for the building. During this conversation, it the Valuer may realise that the client didn't report to the Valuer sensitive information that might impact on the valuation. For example, the lease of a tenant expires in two years time, and the tenant has a lot of chances to stay in the office at the end of the lease. The Valuer accepts to revise the valuation. The Valuer inputs the new information into a *discounted cash flow* model. Small cash flow changes would tend to change the valuation marginal rather than

⁷³Answer to Question 20, page 267

structural. The Valuer obtains an appraised value of 6.50 %. The difference between this valuation and the price the investor is willing to pay for the property is 0.25 per cent. The 0.25 per cent is within the uncertainty and acceptable appraisal value range⁷⁴ obtained by the Valuer in the different appraisal methods⁷⁵. In this example, the client used some rational evidence to convince the Valuer that the scenario of the valuation changed, and both arrived at the same conclusion. In the end, the Valuer is responsible for the valuation, not the client. If the Valuer accepted to change the valuation is because the Valuer felt comfortable with it. Otherwise, the Valuer won't accepted to sign off the valuation.

"Instead of setting a rate of 6.50 we will put 6.25 So, [...] You see, for me there is this possible margin... of negotiation, this margin of appreciation, [...], it is pressure but... on me, but just up to a certain point. [...] One commits personally [...] you have the... uh- the RICS, the, all the .. all the certifications, I, I do not want to lose them [Smiles] so ... You see, you let go, after a time, finally, you, you, you stop! [...] And, and in spite of everything the customers respect you..., when he sees that you .. your reasoning makes sense, that you will not go further... than such and such modification of the value... well, uh- everything stops." Q.20⁷⁶ - Valuer, Female

Sellers can also challenge a valuation when the valuation is lower than they expected. This research exposes two cases that appeared in the interviews. Two investors that threatened two valuers when they observe that the appraisal is below an expected value. Both threaten appeared in periods where the property was in a recession.

"People who say to you: 'Well, if you are... you are, your values are too low, and if I sell at a much higher price, I will sue you.'" Q.20⁷⁷ - Valuer, Male

Despite the uncomfortable situation, the Valuer said that he didn't change the appraisal. It happened around the 90s when the French property market prices collapsed, and there were almost no comparables in the market. A lot of property owners that wanted to sell their buildings disagreed with valuations at that time. They were not willing to accept a loss in the value of their properties.

"I was in this case, you see, where the person who puts pressure on you ... uh-

⁷⁴Generally, the appraisal value range is around 0.10 %. But in very dynamic markets the appraisal value range can even oscillate between 10 to 30 %

⁷⁵See more on page [222](#)

⁷⁶Answer to Question 20, page [267](#)

⁷⁷Answer to Question 20, page [267](#)

at one point you let go and in the end you say...: 'call my boss, whatever!'"

Q.20⁷⁸ - Valuer, Female

The second case happened in 2008, after the fall of Lehmann Brothers. A property fund had to sell some buildings, and a fund manager risked to lose his/her job in case the buildings lose a certain value. Also, in this case, the valuer resisted the pressure that the investor exerted on her.

In any circumstance, valuers feel very uncomfortable when investors put pressure on them because they don't agree with a valuation. Valuers are paid by their clients to give an independent opinion of value, and for this reason, they resist to change their opinions easily. But being paid to do their job doesn't mean that Valuers have to consent any threaten. When valuers are firm in their opinion of value they minimise the appearance of the *endowment effect*. The more they are firm in their opinion, their independence would be less biased to the client's interest.

Both buy-side and sell-side valuations are discussed during negotiations, and the Buyer and the Seller try to come together to form a price.

Asymmetric Information Bias

Once the *detailed due-diligence* process is concluded and approved by the external valuer. The investment team would go back to the investment committee to present all the information they have about the building. Although the team would recommend whether to exit or proceed with the transaction, this decision depends on the investment committee. The committee comprises several people, like Investors⁷⁹, Fund Managers, Asset Managers, Research, etc. Based on the evidence that is in front of them, they all are giving their opinions, their views, and putting in the benefit of their experience to arrive at a conclusion. So, when the investment committee is on that tipping point, most of their arguments are based on objective facts and their experience. In case there is something the investment committee thinks is a major deal breaker, for example, the price seems not to meet a target return, or they found something in the building that carries too much risk, the investment committee will go for a majority vote to decide to stop the process and exit from the transact. Otherwise, they will decide whether they get sign-off for sale.

⁷⁸Answer to Question 20, page 267

⁷⁹Including the CEO of the Real Estate Agency that manages the property fund

This research has found that some investors don't rely on gut feelings, and they prefer to use a rational-type approach. Especially the investment committee, that generally tries to be neutral and objective when making decisions.

"Intuition must be rationalized. Intuition is not... a reality in our profession. Reality is the building, it is economic data and technical, etc. [...] On the other hand, yes, it has happened that we have had to give up an acquisition because... we found during due diligence, we found things that we do not, we, that we consider prohibitive. Really, it was not possible to go ahead." Q.17⁸⁰
- Fund Manager, Female

This fund manager first explains that the intuition should be rationalized, and then she neglects the use of intuition in the real estate investment. This contradiction confirms the use of the intuition. Besides, this affirmation is supported by other investors statements collected in the interviews. They explained that intuition is more present at the outset, when they select the office buildings they feel match investment criteria. The intuition also helps them to initiate the direction of analysis when they are analysing the property. This research has also found investors also use *intuition* throughout the entire investment process, even when they participate in the investment committee.

"Well, I think gut feelings do always come into it because in, in any acquisition, there is so much uncertainty. [...] You can do the sensitivity analysis, but at the end of the day, I think there is a certain element of experience, of gut feeling, that might sway you one way or another." Q.17⁸¹ - Fund Manager, Male

Nevertheless, the investment committee would generally not consider an opinion or view based on an intuitive perception, or gut feeling, to take an investment decision. This is why the investment committee is like the second line of defence. They tend to be neutral and to avoid bring emotions into it. The first line of defence is the investment team that approaches the investment committee. As mentioned above, the investment committee exchanges their views putting in the benefit of their experience. They discuss all the information they obtained in the due-diligence, and how negotiations have gone. They arrived at the end of the detailed due-diligence, and no red flag came up so far. Most members of the investment committee working on the buy-side are convinced that the building is a good deal. The asset meets the investment requirements, and so they are ready to vote for sign-off for the sale. However, one investor that intervenes in the

⁸⁰ Answer to Question 17, page [265](#)

⁸¹ Answer to Question 17, page [265](#)

investment committee reiterates that sometimes there is something bizarre in the way the Seller and their advisers are negotiating the sale. When they asked questions, sometimes they gave an evasive reply, without a precise answer. The investor also adds he/she didn't feel comfortable during negotiations as he/she perceived these people are hiding something or lying. Despite the difficulty to prove it, the investor voted for non-execution of the sale and required to do another technical due-diligence to verify again in case they overlook something.

"I ask that we do another technical audit because I really do not like them [...] uh- anyway, I did not like them? [...] Way to work .. perception of the people who had bought... the building he had bought with very complicated dossiers [...] .. hm-, hm- I felt ... it smelled fishy." Q.17⁸² - Investor, Female

After the latest technical due-diligence, they found a severe pollution problem under the building. The building was built on a land where there used to be a service station in the past. The soil was not cleaned before the construction of the building. The investor that gave a negative notice felt very satisfied with the result. With the new information, they only option they have is to demolish the building and to build up a new one. However, this was not aligned with the strategy of their fund, as it entails too much risk. After all, the investment committee decided to exit from the transact.

It's true that intuition is something subjective. But this doesn't mean that is less relevant than the objective analysis. With the previous example, this research showed that gut feelings are also helpful on negotiations, especially when investors deal with situations where there are asymmetrical information problems. Here is where gut feelings can make the difference. They can also help to lead to make optimal investment decisions.

⁸²Answer to Question 17, page [265](#)

4.2.5 Investment Hold

Framing Bias

The last section jumps onto a situation where a real estate fund has been holding an office building for some time. The manager of the fund has been monitoring the performance of the building since they purchased it. The property may either outperform or underperform an established required return, throughout the holding period. At this stage, it is important to point out a consequence that results from the analysis carried out by investors and fund managers before they purchased the office building. Even they assessed how different scenarios would impact on the performance of the building, investors are aware the one thing they would never deliver is their investment plan.

"It is, it is all completely theoretical... It is... the reality of the life of a building that never matches up... If, if now I sort of, of... of cash flow that it was done ten years ago it does not correspond at all to what is happening now. So that... it's, it's completely theoretical, but it is necessary at a given moment... to... build a... a plan... and... but, but it's the same for everyone, isn't it?" Q.12⁸³ - Investor, Female

"Every property, every property that we ever bought and we've sold, the exit yield is different to the one that we put in the business plan, without a shadow of doubt, and if anyone says, anyone tells you that they get them all right, they're lying." Q.20⁸⁴ - Fund Manager, Male

The investment plan is never achieved because it is based on conjectures about the future. Conjectures are based on a prospect view investors have about the market and the building at one point in time. Views are rationalised with facts and objective data, and so directly or indirectly they influence the analysis carried in the building investment plan. But views can change dramatically even in the short-term, and so they are not reliable because something else unexpected will always happen during the life of a building.

To foresee most of the things will happen is not going to work in offices, in all likelihood, unless the fund has a more value-added or opportunistic strategy. In which cases, funds generally plan to resell the building in three, four or five years. The relative short investment hold reduces the level of uncertainty but increases risk due to the amount of

⁸³ Answer to Question 12, page [265](#)

⁸⁴ Answer to Question 20, page [265](#)

capital set aside for the repositioning of a building in a short period. Uncertainty would gradually increase whenever funds extend their hold-term strategies more than five years. Investors that tend to hold a property for more than five years, they counterbalanced the increase of uncertainty by investing in core properties that have a more stable and secured cash flows. But having secured cash flow doesn't guarantee that the building will be capable of sustaining a level of cash flow throughout the entire holding period. As a result, to use a discounted cash flow method in long-term investments would have less sense because there's plenty of room for manoeuvre. Regardless of uncertainty, investors with a long-term strategy insist on using techniques like the discounted cash flow as it helps them to justify their investment decision. They will adapt to unexpected circumstances, and they will make any decision to attain a required return.

Disposition Effect

Let's focus on the case that a fund manager observes that the building they are holding is **underperforming** the fund's required return. This especially happens when a market is in decline. For example, the building is less resilient, and it is not able to generate an expected cash flow. Or another case, the building has become technically obsolete, and so it is less attractive to tenants and for potential buyers. The difficulty of some investors in accepting buildings are underperforming leads funds to adapt to an **unexpected scenario**. Depending on the situation, the fund may decide: (1) to sell the asset quickly stop a loss, or (2) to continue to hold it for some time. This section focuses on the second option to analyse the *Disposition Effect*.

When investors are not eager to sell an asset is generally because they are not able to get the price they are prepared to sell it. For example, the price offered by a buyer is below the appraisal of the Valuer that works for the seller. Or the offer is below the price they paid for the property. In both examples, fund managers risks of not attaining a level of required return he/she engaged with their investors. In this case, some fund managers decide to postpone the selling and hold it longer because they believe they are capable of reversing the situation.

"But uh-... when I, when we see that we have... obviously wrong on the assumptions uh-... at the same time of the price or on the security tenant .., uh- the first thing is in... then for the building itself, it is necessary to roll up the sleeves and try to find a solution." Q.15.1⁸⁵ - Investor, Male

⁸⁵Answer to Question 15.1, page 265

"We're going to look at the IRR... we're going to say: 'well, uh- if we resold today, we'll... have a weak or negative IRR.' But we'll talk it over in an arbitration committee. We'll say: 'Well, we're not going to sell.' That's it, we're going to wait for better days, we're going to wait until we've done the work, or we'll wait until the rental situation has improved and we will wait for the market to become... attractive... for investors again." Q.20⁸⁶ - Investor, Male

The fund manager asks the Asset Management team to do active management of the building. The Asset Management initiates some works to recover the quality of the building. For this, the Asset Management team will also try to occupy the office space with new tenants to increase the rental income and the value of the building. The fund manager expects to sell the building when the market cycle rebounds, and at least at a price that equals the appraisal value.

"Well, we're trying to recover returns, we're trying to implement asset management actions, to renegotiate, to renegotiate leases, to do, sometimes to do work that was not planned. to improve the quality of the building." Q.20⁸⁷ - Asset Manager, Female

The initiative to do active management is a necessary condition to recover the value of the building, but it's not sufficient. The performance of the asset will also depend on external factors that are independent of the building. For example, the building is located in a market that has not redeemed yet, due to weak economic growth. The Asset Management team is taking more time to rent the office space, and market rents are still below historical values. The most prominent threat is that the building may not be capable of generating enough cash flows to recover its value. The fund manager may underestimate the upside of the property cycle. If this situation doesn't revert soon, and the Fund Manager persists on his/her decision of holding it⁸⁸, he/she risks to generate more losses and not being able to sell it at the desired price.

⁸⁶Answer to Question 20, page [265](#)

⁸⁷Answer to Question 20, page [265](#)

⁸⁸This kind of behaviour is related to the **escalation of commitment** bias. See more on page [177](#)

4.3 Summary

Making investment decisions in the commercial real estate can be very complex. Property investors need to consider a large number of factors before purchase an office building, including unknown future market conditions. This chapter analyses how cognitive and emotional biases affect investors judgments, decisions and behaviours when buying or selling office buildings. The final decision to buy or sell a property depends on an Investment Committee. However, Local Agents, working in different domains, also contribute to the decision of buying or selling a property. The interaction between Investors and Local Agents in the initial due diligence is Key to be acquaintance about the reality of a local market and the property they intend to buy. However, this acquaintance is **framed** by the information and visions offered by Local Agents. All actions they follow, like searching for investment opportunities, are conditioned or **anchored** to their objectives of target return set in the Fund Strategy.

Investors and Fun Managers sometimes exhibit their preference to look for local investment opportunities, and so they are **familiarity biased** because they are reluctant to search in other markets that are unknown. As a result, they risk missing other investment opportunities that perform well and do not involve an extra risk. The same occurs for Investors that sells a property. They must select the bidder that will have the exclusivity to renegotiate the price of the property during the *detailed due diligence*. Some Sellers prefer to work together with a known investor rather than a new entrant. Investment opportunities like Core property assets have become very popular among real estate investors in the last few years. This has caused a **herd behaviour bias** as long as the number of investors that wanted to buy the same type of asset increased.

Some investors believe that an increase in government bond rates will lead to an increase in property yields. This belief is **representative biased** as there is evidence that they do not always move in parallel. Besides, investors use different approaches to assess property risk premia, which leads to a **frame bias** as they have a different risk perception depending on they way they calculate it. Likewise, when investors do the IRR analysis of a building. Their results of investment performance will differ depending on assumptions, scenarios, and forecasts they use. Besides, the purchase price of the building is confirmed (i.e. **confirmation biased**) with comparables considered in the appraisal. Although they consider different scenarios, their decision is mainly based on the base scenario. In other words, they assume that market conditions won't change (i.e. the exit yield equals the initial yield) and this causes a **base-rate fallacy**. Despite all the analysis

and hypothesis considered in the IRR, investors are aware that the thing they will never deliver is their investment plan.

When investors enter in a bid process there is an **asymmetric information** between bidders and the Seller. Bidders have their conviction of price, but they unknown the price offered by other bidders. Brokers may benefit from this situation to create competition with the aim to get the highest price possible for the Seller. Analogously, the Seller needs to know who are different bidders because he/she needs some guarantee that bidders are capable of paying a certain price. In case individuals have more information about the rest, they will use it in their interest to attain their own goals.

Transactions are time-consuming as they require a lot of analysis. This can conduct Bidders to offer a high price for a property to avoid losing the transaction. This decision, known as **escalation of commitment**, can lead investors to take higher risks with the money of the fund, risk than they wouldn't take it with their own money. When the Seller has elected a Bidder, this situation may cause the selected Buyer a mental stress. The psychological stress is a **cognitive dissonance** between the satisfaction of being elected and the risk of having offered a price which is above their competitors.

The **asymmetric information** problem is also present when a Bidder gets the exclusivity of the building. The Bidder must proceed with a detail due diligence to get more information about the building. This process is also helpful to buy-side Valuer that need to get more information from his/her client before reporting a valuation. This may not be an easy job as valuations are challenged quite frequently. This happens because investors tend to value more their assets than other people's assets (i.e. **endowment effect**). In the end, the Buyer decides to buy it or not. In case the Buyer proceeds with the Closing of the Transaction, the Buyer is exposed to get acquaintance of a building issue. The Buyer may not have proceeded with the closing in case he/she was aware of a building issue.

Finally, some investors are reluctant to sell a property they hold, and which is under-performing below a required return. This behaviour, known as **disposition effect**, guide investors to investors carry out active asset management to recover the value of the building until they achieve the required return. But in case they are not able to recover the building, the consequences of persisting to hold the property will cause the fund to undertake more losses.

4.4 Annex

4.4.1 Interview Guideline

Informed Consent Form for Participation in This Research

Important Notice This academical research is **completely independent** and **unrelated to any project organisation**. The investigator confirms he is not receiving any commission for this research

Main Points Covered in this Document

Interview Guideline	<ul style="list-style-type: none"> I. Investigator of this Research II. The Purpose of this Research III. Procedures IV. Confidentiality V. <u>Participant</u> Requirements VI. Risks of Taking Part in this Research VII. Benefits of Taking Part in this Research VIII. Compensation and Costs IX. Information about the <u>Participant</u> X. Participation Consent
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I. Investigator of this Research

Research Title	Analysis of How Real Estate Practitioners Take Decisions in Office Property Investment
<u>Investigator</u>	Pau Blasi
Position	PhD Candidate
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University Department	DRM Finance
Department's Website	http://www.drm.dauphine.fr/fr/
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Teacher Support's E-mail	fabrice.larceneux@dauphine.fr

II. The Purpose of this Research

The general purpose of this study is to learn more about how real estate practitioners take decisions in Office Property Investment

This research has three specific purposes:

1. To observe what **triggers the investment decision of buying or not buying an office building**
2. To see **who is involved** in the investment decision
3. To see how practitioners in real estate **determine the value** of an office building

These goals are **general**, and **questions** to be asked in the interview will be related to these **topics**.

The participant was **selected** because he/she can **help the investigator to understand the way he/she takes his/her decisions in the real estate market**

The investigator's role is:

- To **put questions** to the participant, and to **follow-up** questions in case the investigator considers it's pertinent for his research
- To **record the interview** and **loyalty transcript** what has been said into text
- The **transcription** will be **analysed** and **used by the investigator** for his research purposes

III. Procedures

- | | |
|----------------------|--|
| 30 minutes | <ul style="list-style-type: none"> The interview is estimated to last around 30 minutes |
| Research Period | <ul style="list-style-type: none"> Research Period and Publications The investigator expects to terminate his research, on December, 2017. However, this is an approximate date Once the investigator ends his research he will notify to the participant. At that date, the investigator warns the participant that he will proceed to destroy the tape and all text transcriptions used in his research |
| Research Publication | <ul style="list-style-type: none"> The participant can select in Section IV. "Confidentiality," the information the investigator can use for his research in case the investigator has the possibility to publish his research in an Academic Journal, for example: "Real Estate Economics", or similar |

IV. Confidentiality

- | | |
|---|---|
| Required | <ul style="list-style-type: none"> This section, delimits the use the investigator can do with the information shared by the participant The participant can select the option he/she prefers to preserve his/her identity |
| Option A

The participant participates in the interview | <input type="checkbox"/> <ul style="list-style-type: none"> Only participant's name (not surname), contained in Box A, can be used and published by the investigator
See Section IX. "Information about the Participant" for more details The participant allows the investigator <ul style="list-style-type: none"> to use information contained in Box B for his research (See Section IX. "Information about the Participant") to use only participant's name in the transcription of the interview from voice to text In case the participant mentions the name of any organization in the interview, the investigator will replace it
For example: in case the participant refers to "United Nations", the investigator will replace it by "Company A" to include a PART of the transcription of the interview in the investigator's research paper, and to publish it in ONLY in an Academic Journal to share (not publish) ONLY the PART of the tape used in the transcription of the interview with <ul style="list-style-type: none"> the Collaborators of this research (See Section I. Investigator of this Research) an Academic Journal in case they required (by email) to validate the investigator's research Aside from the participant, in case the identity of any other person is mentioned in the interview: <ul style="list-style-type: none"> the investigator will replace it for a pseudonym when he transcribes the interview from voice to text In any circumstances, the investigator is not allowed to share a part of the tape that compromise participant's identity, or any other person, and neither the name any organization |
| Option B

The participant participates in the interview | <input type="checkbox"/> <ul style="list-style-type: none"> The identity of the participant, contained in Box A, can't be used or published by the investigator
See Section IX. "Information about the Participant" for more details The participant allows the investigator <ul style="list-style-type: none"> to use information contained in Box B for his research (See Section IX. "Information about the Participant") to use a pseudonym in the transcription of the interview from voice to text in case the identity of the participant appears in the tape In case the participant mentions the name of any organization in the interview, the investigator will replace it
For example: in case the participant refers to "United Nations", the investigator will replace it by "Company A" to include a PART of the transcription of the interview in the investigator's research paper, and to publish it in ONLY in an Academic Journal to share (not publish) ONLY the PART of the tape used in the transcription of the interview with <ul style="list-style-type: none"> the Collaborators of this research (See Section I. Investigator of this Research) an Academic Journal in case they required (by email) to validate the investigator's research Aside from the participant, in case the identity of any other person is mentioned in the interview: <ul style="list-style-type: none"> the investigator will replace it for a pseudonym when he transcribes the interview from voice to text In any circumstances, the investigator is not allowed to share a part of the tape that compromise participant's identity, or any other person, and neither the name any organization |
| Option C

The participant withdraws in the interview | <input type="checkbox"/> <ul style="list-style-type: none"> The identity of the participant or any information shared can't be used, shared or published under any circumstances. This includes the information contained in Box A and Box B
See Section IX. "Information about the Participant" for more details The investigator destroys any document shared by the practitioner with the investigator The investigator is bound with the participant to keep all the information said in strictest confidence The interview cannot be repeated again to the same participant |

V. Participant Requirements

- The participant of this study should have **18 years old or more**
- The investigator **promised** the participant he has been **transparent, honest and sincere** since the moment he contacted the participant
- The investigator **needs** the participant to be **transparent, honest, sincere** during the entire meeting

VI. Risks of Taking Part in this Research

1. During the **transcription of the interview**, our **voices will be transformed into text**

The are **some risks to misunderstand** the messages given by the participant

For example, a phrase has different meaning depending on the intonation of a word:

I **didn't** do it" (bold text -> strong intonation)
I didn't **do** it"

VII. Benefits of Taking Part in this Research

1. The participant can **select the option** he/she prefers to **preserve his/her identity**
See Section IV. "Confidentiality" for more details
2. The participant will **contribute** to **understand how real estate practitioners take decisions** in real estate investment
3. At the end of this research, the participant will have **access to the results**

VIII. Compensation and Costs

- The participant won't receive **any compensation or cost** from participating in this interview

IX. Information about the Participant

- This information will be used by the Investigator **only for research purposes**
- The participant **delimits in Section IV. "Confidentiality"** the use the investigator can do with the following information
See Section IV. "Confidentiality" for more details

Box A

Name	_____
Surname	_____
Pseudonym (To be used in case the participant selects Option B) See Section IV. "Confidentiality" for more details	_____
Company	_____
Current Job Position	_____
Professional E-mail	_____ _____
Professional Phone	_____
Contacted through..	_____

Box B

Gender (encircle the option)	Male	Female
Years old	_____	
Nationality	_____	
Years of Experience Working in Real Estate	_____	
Profile	_____	
Years of Experience (According to participant's profile)	_____	
Department	_____	
MRICS Certification (encircle the option)	Yes	No

X. Participation Consent

Notice | • In this section the **participant agrees on the Informed Consent document**

Notice | • **To guarantee the rights** covered in this Informed Consent (see Section IV. "Confidentiality" for more details), **this document needs to be signed by both the participant and the investigator**
Do not forget to select Option A, B, or C in Section IV

• Both signatures also imply **commitment to respect and follow** all the **points covered** in the Informed Content **until this research is finished**

Interview _____
 Date _____

Required • **The participant agrees that both the investigator and the participant have read and checked together the Inform Consent document, and both agree all the conditions covered in this document**
 (Select the square)

Date _____
 (of the agreement)

Investigator _____

Participant _____

Name **Pau** _____

Name _____

Surname **BLASI NAYA** _____

Surname _____

Signature _____

Signature _____

Date _____
 (of signature)

Date _____
 (of signature)

Location _____

Location _____

Notice | Date _____
 At the end (The **investigator terminated his research**)
 of this research

Date _____
 (The **investigator notifies the participant that his research is finished**)

Witness (Only in case there is a third person in the interview) _____

Name _____

Surname _____

Company _____

Signature _____

E-mail _____

Date _____
 (of the interview)

Phone _____

Location _____

4.4.2 Interview Questions

Common questions

Investor FM AM	Broker	Broker
1	1	1
2		
3.1	4.1	
3.2	5	
4	7	7 & 8
5.1		
5.2		
6.1		
6.2		
6.3		
7		
8	8	3
9	10	11
10		
11		
12		
13	13	
14	14	
15.1	15.1	
15.2	15.2	
16		
17	16	
18.1	17	
18.2		
19	18	
20		

Interview Questions Profile: Investor, FM and AM

Topic One To observe **what triggers the investment decision of buying or not buying an office building**

Topic Two To see **who is involved** in the investment decision

Topic Three To see **how** practitioners in real estate **determine the value** of an office building
























- To Buy
1. Can you briefly describe what is your **role** during the **sale** or **purchase** of an office building?
 2. What **kind of office buildings** are you interested the most? Why?
 3. 1 What **motivates** you in the **purchase** of an office building?
2 Can you describe how you **proceed to purchase** an office building?
 4. Who do you **contact** to help you in this process? Why?
 5. 1 Can you describe your **strategy** to purchase an office building?
2 How does your **strategy** change when you invest in your **local country** or **abroad**?
 6. 1 What is for you the **right property risk premium** when you want to purchase an office building?
2 How do you **calculate** it?
3 What are the **main factors** you use to determine the premium?
 7. Can you describe how you **calculate** the **IRR** of an office building?
 8. What are the main **factors** you use to **determine the value** of an office building?
 9. How you **determine the value** of the building in case you have a very **limited number of comparables**?
 10. Can you describe the **assumptions** you use to set the **selling price** in the **IRR**?
 11. How do you **build** these assumptions?
 12. How do you calculate the **exit yield** of your investment? And how does it differ from the initial yield?
 13. Can you describe how you **proceed** when you are **close to a deal**?
 14. Can you describe the **feelings** or **emotions** you have before the acquisition of an office building? And can you explain how they **appeared**?
 15. 1 What do you do in case an **asset is not responding to your expectations**?
2 Have you ever **pressured** to a fund manager or broker at some stage? Why? An example please?
 16. How have you managed **conflicts of interests** in your funds when you want to **buy** an office building?
 17. Have you ever **stopped a purchase** because of your **gut feelings**? **Why**? Can you give me an **example** please?
 18. 1 How do you **react** when you know the **investment deal is completed**?
2 Can you describe how do you **feel**? Do you **show off**?
- To Sell
19. Can you describe how you **proceed to sell** an office building?
 20. What do you do when the **exit yield** is **different** from the **exit yield you expected**? Can you give me an **example** please?

Interview Questions Profile: Broker

Topic One To observe **what triggers the investment decision of buying or not buying an office building**

Topic Two To see **who is involved** in the investment decision

Topic Three To see **how** practitioners in real estate **determine the value** of an office building

- | | | | |
|---|---|---|--|
| |  | 1. | Can you briefly describe what is your role during the sale or purchase of an office building? |
| |  | 2. | Do you much buy-side or sell-side work? |
| |  | 3. | Would you question a client about their office investment criteria ? Why? |
| To Buy |  | 4. 1 | What motivates you in the purchase of an office building? |
| | | 2 | Do you have any influence to negotiate your commission? |
| |  | 5. | Can you describe how you proceed to purchase an office building? |
| |  | 6. 1 | How do you prepare a pitch to get a mandate to buy an office building in a location with a certain risk profile? |
| |  | 2 | How you convince your client? |
| |  | 7. | Who helps you in this process? Why? |
| |  | 8. | What are the main factors you use to determine the value of an office building? |
| |  | 9. 1 | Who do you contact to help you to determine the value of the office building? |
| |  | 2 | Do they affect to your valuation? How? |
| |  | 10. | How you determine the value of the building in case you have a very limited number of comparables ? |
| |  | 11. | Do you recommend your client a price to pay for an office building ? |
| |  | 12. | How do you include risk in the pricing of the asset? |
| |  | 13. | Can you describe how you proceed when you are close to a deal ? |
| | To Sell |  | 14. |
|  | | 15. 1 | What do you do in case an asset is not responding to your client's expectations ? |
|  | | 2 | Does any investor or fund manager pressured you at some stage? Why? An example please? |
|  | | 16. | Have you ever stopped a purchase because of your gut feelings ? Why ? Can you give me an example please? |
|  | | 17. | How do you react when you know the investment deal is completed ? Can you describe how do you feel ? Do you show off ? |
|  | 18. | Can you describe how you proceed to sell an office building? | |
|  | 19. | How do convince your client to sell the building at a specific price ? | |
|  | 20. | Does any valuer asks for your opinion to value office buildings? Can you describe how you proceed ? | |

Interview Questions Profile: Valuer

Topic One To observe **what triggers the investment decision of buying or not buying an office building**

Topic Two To see **who is involved** in the investment decision

Topic Three To see **how** practitioners in real estate **determine the value** of an office building

1. Can you briefly describe what is your **role** during the **sale or purchase** of an office building?
2. To whom you **report your valuations**? Why? Are they your clients?
3. What are the main **factors** you use to **value** an office building?
4. Can you describe the **process** you follow to **obtain the market value** of an office building?
5. What **information you need** to obtain the market value?
6. Do you also consider your **gut feelings**? **Why**? Can you give me an **example** please?
7. Who do you **contact** to help you in this process?
8. 1 Do you also contact to **brokers or someone else**? **Why**?
2 Do they **affect to** your valuation? How?
9. On average, **how many comparables** you use on your valuations?
10. At which **stage** you have the feeling that your **market value is formed**? So you **stop the research** for comparables?
11. How do you **proceed on your valuation** when you have a very **limited number of comparables**?
12. How do you **set the market value** of the office building **in this case**? Can you give me an example please?
13. Have you ever reported a **valuation** of an office building you were **not comfortable** with?
14. At that moment, what goes through your **mind**? Do you remember any **feeling** you had? Can you give me an example please?
15. What are the **risk factors you consider** in your **valuation report** of an office building? How risk factors they affect to your valuation?
16. How do you proceed when you have a very **short-time to value** an office building?
17. Have you ever used the **valuation of another expert** to value a building? Why you used it? Can you give an example please?
18. Do you remember if there was much **difference** between **expert's value** and the final value you reported?
19. What do you do when your client **don't agree with** your valuation? Can you give me an example please?
20. Have you ever had the **impression** that someone **affected somehow in your valuation**? And can you give me an example please?

CHAPTER 5

Scale to Measure the Base-Rate Fallacy Bias in Real Estate

This chapter examines the validity of a psychological schema when real estate practitioners assess the future resale price of a property investment. Institutional Investors generally plan to buy a property, hold it for some time, and to resale it at the end of their business plan. In most cases, they use the traditional Discounted Cash Flow analysis, as the Internal Rate of Return (IRR), to assess the performance of the property. However, the IRR analysis is carried out under deterministic assumptions. For example, investors expect to sell a property at a price which is, at least, the same as the acquisition price. This practice leads some investors to assume that the exit yield of their investment will equal the initial yield. By making this assumption, they expect that market conditions won't change during the time they hold a property. Also, their investment decisions are based on the base/central scenario at its "the most likely" outcome. Therefore, they tend to ignore other scenarios that can also potentially happen. This decision leads to a bias known as the base-rate fallacy. After this bias is defined, this research carries out a quantitative research to develop a scale to measure it. Different groups of latent variables form aspects that represent the base-rate fallacy. The relationship between the aspects considered not only helps to understand the way real estate practitioners think when they assess the future resale price of a property investment; They are also helpful to explain their tendency to this bias.

Keywords. Real Estate Investment, Quantitative Research, Base-Rate Fallacy, Scale of Measurement

5.1 Literature Review

The value of any real estate property today is determined by the income and costs the property is expected to generate throughout the holding period (Hoesli and MacGregor, 2000). Discounted Cash Flow (DCF) methods, like the Income Approach or the Gordon growth model, are widely accepted in the real estate industry, and it is used (1) to appraise the value of a commercial building, and (2) to see whether a property is under or over-priced (Brown and Matysiak, 2000). But this method has some limitations. Hoesli, Jani, and Bender (2006, p.102) evokes three: (1) when a property is financed by debt, the value of the asset is required to assess the investment cost of capital¹ - both debt and/or equity - but the value of the property is what is looking for; Also, (2) the discount rate is assumed that it will remain constant through the entire holding period, when in fact it changes over time (see Fama and K. R. French (1989) and Ferson and Harvey (1991)). (3) traditional DCF analysis is performed under deterministic assumptions, but the analysis degrades when forecasts and assumptions do not materialise, and inputs are manipulated (see Kelliher and Mahoney (2000) and Weeks (2003)). Hoesli, Jani, and Bender (2006) claim the third criticism mentioned before is especially criticised in real estate valuation. The terminal value of the property depends on the latest forecasts of cash flow which also depend on the expected rental growth and a discount rate.

Modelling in real estate is not an easy task, notably when forecasting. Ball, Lizieri, and MacGregor (1998, p.252) claims that "forecasts are subject to well-known problems. Turning points are the most difficult to forecasts, yet these are of most interest." Besides, models are influenced by the availability and quality of data (L. H. Li, 2000). Investment Managers put their assumptions in a projected cash-flow and try the numbers. For example, they may observe historical yields to find a sort of historical volatility. Volatility is then applied to the cash flow to assess the potential things that can happen in the cash-flow. The DCF methods are very sensitive, and small changes in the assumptions can lead to significant changes in the theoretical Selling Price (Kelliher and Mahoney, 2000). Hoesli, Jani, and Bender (2006, p.103): "If such parameters are not determined very rigorously, the estimated value of a property can be very far off its market value." Having an accurate estimate of the property value at the end of the holding period should be evident, especially for Investment Managers that plan to do long-term holds (i.e. five years or more). Kelliher and Mahoney (2000, p.45) describes that real estate practitioners use several ways to deal with uncertainty and risk: "[1] Ignore it and use single, best guest point estimates. [2] Assess it subjectively using naïve methods (increase of the discount

¹It is the Weighted Average Cost of Capital (WACC)

rate and use expected values). [3] Perform sensitivity or "what if" analysis. [4] Assess it qualitatively, using a Monte Carlo Simulation."

The main problem of estimating a terminal price at the outset of the investment is that Investment Managers have already chosen the starting point: the acquisition price. Some investors are more comfortable to think about the price in terms of (1) monetary units, or monetary units per square meter (or feet), and/or in terms of (2) Initial yield (%)². The latter is obtained from the ratio of net income received in the first year to the acquisition price (in monetary units).

Some practitioners are favourable to make Monte Carlo Simulations in a software, like Argus. They create different scenarios³ and consider inherent uncertainty. Monte Carlo Simulations look like the most "realistic" and "rational" way to make long-term investment decisions as it somehow considers uncertainty when estimating the terminal price. Nevertheless, the difficulty here is that Investment Managers decide what is high, medium, and low in their cash-flow model. Investment Managers can't accurately know which of these scenarios is going to be. For example, they make subjective probability judgments about a scenario that will be more likely, on a probability basis. For example, applying 50 % of probability the scenario is going to be somewhere here; applying 70 % of probability it is going to be in here. The reason investors do that way round, is that they let data show them where the potential outcome is going to come. They are effectively not allowing that any wired thing that can happen during the holding period. And whatever they plan, the one thing they would never deliver is their business plan. Something else unexpected would always happen.

Having an accurate estimate of the property value at the end of the holding period should be more evident for investors that have a short-term hold strategy. This is the case of Value-Added or Opportunistic investors that seek for properties that require active management and/or conversion. They intend to sell them, for example, in 3 or 4 years time. However, the situation changes for investors that buy properties to do long-term holds. They generally project a 10-year future cash flow, which is a quite standard rule. Investors may decide either sell it before 10 years or hold it for a more extended period. It will depend on how future market conditions evolve. The longer the holding period is, the broader range of possible values the theoretical selling price will take. Inevitably, this increases uncertainty and risks of not getting an accurate estimate of the exit price.

²The advantage of the yield is that the price can easily be compared with other types of investment (Brown and Matysiak, 2000, p.210), like bonds and equity

³i.e. Pessimistic, Conservative, and Optimistic Scenarios

To reduce risk, some real estate investors tend to invest in high-quality properties that are in a great location, like core properties. They believe these properties have more chances to maintain the value of the property in case market conditions decline. But neither core properties are exempted from uncertainty. Indeed, markets can change dramatically in 10 years. Due to the complexity to determine the theoretical selling price accurately at the outset of any investment, especially for long-term investors, leads Investment Managers sometimes to use heuristics (or mental shortcuts) in their modelling of the IRR. The shortcut that leads Investment Managers to the **base-rate fallacy bias** is when they assume an exit yield that equals to the initial yield. By doing this they presume market conditions will remain the same. This practice can have significant consequences for investors. For example, in case the property is not sold at the expected selling price, for many reasons, this can prevent the property fund to attain shareholders' required return.

The objective of this paper is to assess a psychological schema when real estate practitioners assess the future resale price of a property investment. As thoughts happen in the mind, they cannot be observed directly. Most hints were obtained throughout a previous qualitative analysis⁴, and some were complemented with the literature review. In this qualitative analysis 9 Institutional Investors, 6 Fund Managers, 2 Asset Managers, 5 Valuers and 5 Brokers were interviewed. The interview content was analysed and categorised. Categories are used to form questionnaire questions (i.e. items) which will help to find out different aspects of the base-rate fallacy. Questionnaire questions, or items, were ordered to analyse it before, at the moment it appears, and its consequences. The goal of this scale serves to assess how real estate practitioners can have more or less tendency to the base-rate fallacy bias.

The remainder chapter is organised as follows. Next section describes the steps followed to develop the scale of the base-rate fallacy bias. It first specifies the domain of construct. It continues by explaining the variables or items that are used to measure each aspect of the construct. Then, the article describes the sample of participants that judged items in a questionnaire. With answers reported by participants, the article describes the ways used to obtain factors that represent a different group of items. Finally, the paper ends with a description of the reliability of the scale, and a summary of conclusions.

⁴See Chapters 3 and 4

5.2 Scale Development to Measure the Tendency to the Base Rate Fallacy

To develop the scale measurement this research takes into account traditional scale procedures (see Churchill Jr, 1979), and the latest procedures that enhance reliability and validity measures (see Peter (1979) and Rossiter (2002)). From the specification of the domain of construct to the validity of the scale, five stages were followed to build up the scale.

5.2.1 1st Stage. Specify Domain of Construct

Bar-Hillel (1980, p.211) defines the **base-rate fallacy** as "people's tendency to ignore base rates of e.g. individuating information (when such is available), rather than integrate the two." In other words, when individuals dispose of different information, they order the information from high to low-relevance. The bias appears when more relevant information prevails to less relevant information. The base-rate fallacy is the phenomenon of theoretical interest (Rossiter, 2002) of this research, so it's going to be the **construct** of the scale. The base-rate fallacy appears in real estate when practitioners give more relevance to a central scenario than other scenarios, like the optimistic or pessimistic. Despite investors unknown accurately how property markets will evolve in the future, they tend to think that the central scenario is the "more likely" outcome. Furthermore, the cash flows assumptions embedded in the central scenario lead to a performance which is closer (or more aligned) to investors' target return.

Rossiter (2002, p.310) specifies that any construct needs to have (1) an *Object*, *Attribute*, and *Rater entities* that are going to rate the construct. The **object** being rated in this research is the tendency to the base-rate fallacy. This object is classified as an *abstract collective object*. According to Rossiter (2002, p.311) "abstract collective objects are objects that are heterogeneous in the eyes of the raters, that is, they are seen as separate constituents, but form a set at a higher categorical level in the eyes of the Researcher." In real estate, every property, independently of the sector⁵, it has unique physical characteristics, location and it offers different levels of cash flow stream. Different characteristics lead each property to have its own appraisal and to be unique. Despite the heterogeneity of properties, most investors use the Internal Rate of Return

⁵i.e. Office, Logistics, Residential, Retail, etc.

(IRR) to calculate the performance of the property. To calculate the IRR investors must consider factors like the acquisition price, a cash flow, which is capitalized with a capitalisation rate, and a theoretical selling price. Different assumptions lead to different future scenarios. The tendency to the base-rate fallacy is classified as *abstract collective object* because reasons that lead to this bias go beyond the type of property.

The tendency to the base-rate fallacy includes "sub-objects [i.e. **constituents**] that are parts of an abstract collective object" (Rossiter, 2002, p.310). A qualitative research, with semi-structured interviews, was used to explore constituents that explain the phenomena of the base-rate fallacy. Interviews were addressed to 9 investors, 6 fund managers, 2 asset managers. Researchers asked them the same questions with the aim to know:

1. How they calculate the IRR
2. How they value a commercial property
3. Assumptions embedded in their cash flow analysis
4. How they calculate the exit yield of their investment, and if it differs from the initial yield
5. Describe how they sell a property
6. How they proceed when the exit yield is different from the exit yield they expected

Results obtained in the qualitative research reveal that the tendency to the real estate base-rate fallacy starts when they set the acquisition price or the initial yield. The value of the property they pretend to buy is confirmed with market transactions which served as appraisal references. So, for example, if core properties are being transacted, on average, at 3.5 % in a CBD market, some investors will set an initial property yield around that level. At the same time, they will start making subjective judgments about how the performance of the property will evolve during the holding period. In addition, results also reveal two judgment processes followed by some Investment Managers that lead to the base-rate fallacy:

- In markets where property yields are low, compared to their historical average, some investors expect that market conditions will remain the same: Rents and property values will continue to grow. As a result, some investors assume in their cash flow that an increase in rental income will increase their property value. Therefore, they

expect an exit yield to be equal to the initial yield

- As long as property yields continue to decrease, some Investment Managers think that yields will sooner or later revert to its long-term average. Let's assume the prime yield of a property market is currently at 3.5 %, and the long-term prime market yield average is at 4 %. In this case, some Investment Managers may expect that the yield of the property will increase by 50 bps with respect to the initial yield. However, Investment Managers warn that an increase of the prime yield will cause a discount on property values. This will dissuade investors to invest in that property. Despite their evidence, some Investment Managers prefer to be optimistic about the future. They assume in their cash flow that rents will continue to grow along with capital values. And so, they tend to think that market conditions won't change in the future. Therefore, they set an exit yield equal to the initial yield

The qualitative research also found evidence the assumption of taking exit yield equal to the initial yield is not only used by long-term core investors. Some value-added investors that do short-term holds of three or four years, also tend to consider the same yield assumption. The way these two judgment processes mentioned above are formed can have important implications in real estate. They give evidence that some Investment Managers model their cash flow in a way that the exit yield of the property does not differ from investors' target return (i.e. the initial yield). In this case, the exit yield is strongly influenced by the initial yield because their judgments are **anchored bias** (Tversky and Kahneman, 1974) to the acquisition price. Insufficient price adjustments are also present in property valuation. Property appraisals are strongly influenced by historical cost and transaction information (Ibbotson and Siegel, 1984). This causes that appraisals are insufficient adjusted to previous valuations (Diaz and M. L. Wolverton, 1998).

Ten **sub-objects** (i.e. constituents) resulted from the qualitative analysis. Sub-objects are classified into three temporal perspective: (I) Precedent, (II) State, and (III) Consequences; The reason to consider a temporal perspective is to analyse the whole judgment process, from the start to the end, and to assess when and how real estate practitioners tend to the base-rate fallacy. This tendency is analysed in ten dimensions. The first two constituents - (1) impossibility to anticipate the sale price, and (2) the difficulty to thinking about resale - try to unveil the first judgments that are made by real estate practitioners. This is why both are classified as (I) precedent constituents of the base-rate fallacy. These two aspects appear because investors unknown precisely how markets will evolve in the future. As a result, they are challenged due to the difficulty to

accurately know what will be the resale price at the end of the investment period.

Then, real estate practitioners start making conjectures about the resale price. For this (3) they get acquaintance about the situation of the property market and the building they are interested to buy. Then, (4) they define a holding period, and (5) they make assumptions about how the market will evolve. Future assumptions can be affected by investors' reluctance to foresee a depreciation in property value. For this reason, the scale also considers the (6) anticipation of negative affects. Despite the information and assumptions considered, (7) uncertainty about the future can lead investors very uncertain about what will be the resale price. Conjectures (3) to (7) are aspects underneath the practice of real estate practitioners that try to set a "likely" resale price. For this reason, these are classified as (II) state of the base-rate fallacy. Depending on these conjectures real estate practitioners will justify an exit yield that might differ or not from the initial yield.

The complexity to accurately estimate a future resale price lead some practitioners to three consequences: (8) hypothesis of constant income yield or price, (9) the difficulty to accept a real loss in value, and (10) the lack of credibility of financial calculations.

5.2.2 2nd Stage. Generate Sample of Items

An abstract collective object requires **attributes** (i.e. items) that represent the main constituents (Rossiter, 2002). Attributes are going to be judged, with an ordered-category (Likert-type), by real estate experts (i.e. **raters**⁶) participated in a questionnaire. Drolet and Morrison (2001) make an emphasis on the risk of increasing the number of items to measure a particular constituent. They found evidence raters' behaviour can be affected when they have to answer a lot of questions (i.e. items) in a questionnaire. Also, Gardner et al. (1998, p.912) state that "if a participant fatigue might be an issue." For instance, it increases the error term correlation across-item and undermines reliability (Drolet and Morrison, 2001). The researcher of this thesis agrees with Gardner et al. (1998, p.2): "one 'good' item can be better than many 'bad' items." However, the problem with the base-rate fallacy is that it's an imprecise concept. This is reflected on results obtained in the quantitative analysis. Seven investors (out of nine) and three fund managers (out of six) generally assume an exit yield equal to the initial yield. But among these, two investors and one fund manager also stated that the assumption of considering a different yield could also be possible. It depends on each property investment. To

⁶Raters sample is described in section 5.2.3

clarify when and how real estate practitioners tend to assume the same yield, different interview statements were selected with excessive care. Interview statements, which cover different stages of the investment process, form items that represent each constituent. As the tendency to the base-rate fallacy can vary across different investment properties and sectors, researchers of this research decided to take multi-items (i.e. multi-interview statements) instead of relying on a single item. This way it would be possible to know which judgments have more tendency to the Base Rate Fallacy. When the object of the construct is an *abstract collective object*, as it's the case, "a multiple-item sample of representative constituents [...] would provide safer generalization of the results" (Rossiter, 2002, p.312). Let's see different items that represent each constituent.

I. Precedent

Sub-Object 1. Believe about the possibility or not to anticipate the resale price of a property asset in the long-term (10 years)

- 1.1 Try to Know the price of an asset when we resell it in 10 years is absolutely impossible
- 1.2 Try to forecast the resale price in 10 years is a waste of time
- 1.3 To anticipate the resale price in 10 years, based on serious arguments or accounts, is unfeasible

Before making any investment decision, investors make assumptions and assess possible cash flow scenarios, and also the price they expect to obtain when they resale the property in the future. However, any unexpected outcome is likely to appear during the holding period which will impact the resale price property. In fact, markets can be completely different in five, ten or twenty years time. As a result, not only some investors may think that it doesn't make sense try to know what will be the resale price. They may also be aware that the resale price cannot be estimated with cash flow projections because they aren't completely reliable.

"It's absolute nonsense. [...] You know, so we are trying to buy buildings that we want. That's what we do. So we are not appraised on the base of the sell in five year's time." [...] We don't calculate an exit yield." - Fund Manager, Male

"Perceptions of worth, in time, may turn out to be correct or they may turn out to be wrong. But, they form the basis of people making a decision." - Fund Manager, Male

Sub-Object 2. The Difficulty of thinking about resale

- 2.1 It is difficult to think about resale because it takes a lot of time
- 2.2 Estimating the possibility to resale is complex and laborious
- 2.3 Thinking about resale is disturbing because a lot of aspects need to be considered

The assessment of the opportunity for resale in the future it may be laborious, as it requires a lot of analysis. Real estate practitioners must handle many arbitrary parameters which can be complicated, disturbing and cognitive overwhelmed. This especially happens when the analysis must be reported to the investment committee in a short period of time.

"The resale price is the hardest thing to determine. That's why said to you: intellectually, it is not normal to see the resale price, uh, under the prism of the acquisition value." - Investor, Male

"There are plenty of factors to take into account to justify the hypothesis of an exit yield. Justify in a sense .., that we have a reasoning that makes sense [Smile]." - Asset Manager, Female

"You are limited in time. And that .. you have to try to ... because you commit yourself to your investment committee eh. So you have better not to get wrong on your analysis. E- So, if you skip over some key points of .. the data room is .., it can be very annoying eh. It's also your post and your .., [smile] at your reputation that's at stake." - Investor, Male

Sub-Object 3. Untrust in the market information available

- 3.1 When I resell a property asset, the information I have is not as complete as I would like
- 3.2 By reading the real estate press I have all information I need (INV)
- 3.3 I think that market information is not trustful enough

These items try to reflect the degree of confidence (which is different from distrust) that real estate practitioners have about information they dispose to make an investment decision.

"We have websites that allow us to visualise companies in an area, intra-zone movements or outside areas. So, it allows us to identify the movements of tenants to see if a city area will develop or rather a city area will be underdeveloped. Those websites also allow us to have an idea about the future, what can become a city area. And the information afterwards is all the public information on the development of, infrastructures, that is to say .., the installation of a station, the creation of a tram, a subway line .., a major urban centre that will be created. E- So, all that is: how do we anticipate .. the real estate vision of tomorrow." - Investor, Male

"Information, it comes ... so it is not necessarily public. There is some information that is public, you have it in the professional press, but this information is often incomplete." - Valuer, Male

Sub-Object 4. To set a minimum holding period of an asset

- 4.1 When we buy a property asset, it is better to set a minimum holding period before reselling it
- 4.2 Buying in real estate only makes sense when we hold assets during some time
- 4.3 Decide to resell a property asset earlier than expected can be perceived as a failure

Real estate practitioners generally set a minimum holding period in their business plan. It is especially required when they use the DCF method to do the appraisal and to assess the future performance of the property. After having set a holding period, investors may decide to sell the property earlier than expected, or they may hold it for longer. This decision will depend on "market conditions at the time of the sale and investors' wealth considerations" (Gau and K. Wang, 1994, p.83).

"We are estate agents. We hold properties for ten, fifteen, twenty years so... even we elaborate business plans for ten years... it is likely that we keep buildings for a longer. So we do cash flows for twenty years, twenty-five .. but beyond it's crazy..." - Investor, Female

"The reason for that is, that if you buy or sell properties in the course of one year, it has a such a big impact.. on the overall performance of that asset. It's very difficult to, to meet performance targets, because, to buy an asset and sell it, is, is going to be seven, eight percent costs. So, you have to exceed that cost before you generate any real performance. So, normally funds look at it on a rolling three-, or four-, or five-year basis." - Fund Manager, Male

Sub-Object 5. Belief in the economic steadiness of the real estate market

- 5.1 When I buy a property asset, I think that I might resell it at least at the same market conditions as today
- 5.2 At the end, real estate markets tend to progress in the long-term
- 5.3 Generally, real estate investment allows to preserve the value of the asset

Many empirical studies have already investigated the cyclical fluctuation of real estate markets (see, for example, McGough and Tsolacos (1995) and Davis and Zhu (2011)). Nevertheless, these cycles are not explicitly considered by traditional valuation models. Born and Pyhrr (1994, p.455) stress that those models are "biased toward trend analysis and often assumes constant annual changes in rents and expenses and constant terminal value capitalisation rates over a seven-to-ten-year projection period." This fact has also be found in the previous qualitative analysis. Some investors tend to assume that real estate markets progress in the long-term.

"We are buying assets at the market price, but given the situation we are in the economic cycle, we believe that rents will continue to increase. As a result, we think we'll sell properties with relative substantial increase in capital values."
- Investor, Male

"We say that in ten or five years the market will have evolved according to current macroeconomic trends. So, we do not know. It's purely hypothetical and... nobody can define it realistically." - Investor, Male

Sub-Object 6. Anticipate negative affects while thinking about resale asset

- 6.1 For some property assets I like, I think it will be hard to sell them
- 6.2 Sometimes I become attached to a property I hold, and so I'm reluctant to sell it
- 6.3 Generally, I try not to get attached to the real estate assets I hold (INV)

Hidalgo and Hernandez (2001) measured the degree of attachment individuals have to a house, neighbourhood, and city. Their results show that (1) the degree of attachment is less bounded to the neighbourhood, (2) the social attachment is more significant than the physical attachment, and (3) the degree of attachment varies with age and gender. Also Salzman and Zwinkels (2017) suggests that corporate and private investors can be biased towards their investment decisions. Putting aside if the asset is performing well or not, investors get emotionally attached because they just like the asset, its location, building characteristics, etc.

"There is also.. we like the property, and we .. we appropriate the asset. We say to ourselves: 'That's exactly what we need. It fits into our strategy, and it's exactly what my fund manager needs.'" - Investor, Female

"Real estate is a physical matter. [...] We can be attached to a building. We can be attached to its aesthetics, to the fact that it's an opportunity, to the fact that we love this building." - Investor, Male

The idea of anticipation a negative affect arises from the effect that when investors are attached to a property, they might be reluctant to sell it, and especially when the asset is under-performing.

Sub-Object 7. Uncertainty about the expected resale price

- 7.1 The price we will obtain when we resell a property asset is always uncertain
- 7.2 We try to forecast a resale price, although the price I obtained is always different
- 7.3 The selling price forecasts, that we obtain with our financial tools or analysis, leave us very uncertain about the real outcome of the transaction
- 7.4 Even consulting the most experienced people, I'm far away from being convinced by the resale hypothesis we set

Real estate practitioners use market trends or make sensitivity analysis about potential scenarios to forecasts property yields. However, there is no expert in the industry that can illustrate with certainty where property values will be in the future.

"In fact, it's very difficult, and I don't think any research department today can say where the yield will be in eight years." - Fund Manager, Male

"But.. well, nobody [Smile], well, I think that in the industry, well, it happens huh, but, what I mean is that the performance you obtain is always different from the underwriting performance. They can be very close, but they will never be exactly the same." - Fund Manager, Male

Sub-Object 8. Hypothesis of constant income yield or price between the acquisition and the resale of an asset

- 8.1 When we invest in a property asset, the most reasonable hypothesis is to consider that we'll resell it for a price equal to its acquisition price, indexed to a rental growth
- 8.2 The performance of a real estate investment is driven by rents
- 8.3 When I buy an asset, I consider that the property value will increase proportionally to its rents (i.e. in case rents increase in 10 %, the property value will increase in 10 %)

The impossibility to illustrate with certainty what will be the resale price of a property in the future lead some real estate practitioners to assume that there will be no difference between (1) the initial and exit (income) yield, and/or (2) the resale price is expected to be similar to that of the acquisition price. Therefore, they hope that future market conditions will remain the same as today.

"In general, the assumption we make, uh- is that .. uh- the selling price is our initial yield uh- applied to the current rent at the exit." - Investor, Male

"I analyse my market as I see it today and I have the project ... I project it forward 10 years!" There is no reason to say that the office market in 10 years will be "radically different." - Investor, Male

Sub-Object 9. Difficulty to accept a real loss in value of a building

- 9.1 As long as we haven't sold it, we haven't lost any value
- 9.2 Usually, when a market is in decline, we just need to wait some years to resell without any loss
- 9.3 In case my property is undervalued I can carry out some works to be able to sell it without any loss

Kahneman and Tversky (1979) describe in the *Prospect Theory* the **loss aversion** behaviour, in which losses are psychologically more difficult to accept than gains. Any prospect, either is positive or negative, is judged with respect to a *reference point*. Investors also tend to hold properties that dropped in value too long respect to the acquisition price because they believe they will perform better in the future (see, for example, Odean (1998a) and Crane and J. C. Hartzell (2010)).

"But uh ... when I, when we see that we have .. obviously wrong on the assumptions heu ... at the same time of the price or on the security tenant..,

e- the first thing it's in... then for the building itself, it is necessary to roll up the sleeves and try to find a solution." - Investor, Male

"we're going to look at the IRR ... we're going to say, 'well, uh- if we resold today, we'll ... have a weak or negative IRR' But we'll talk it over in an arbitration committee. We'll say, "Well, we're not going to sell." That's it, we're going to wait for better days, we're going to wait until we've done the work, or we'll wait until the rental situation has improved and we will wait for the market to become ... attractive ... for investors again." - Investor, Male

"The advantage we have is that we are a long-term investor, so .. even if our business plan is not accomplished we are not in a hurry to sell it... We will wait until the building is revalued." - Investor, Female

Sub-Object 10. Lack of credibility of financial calculations

- 10.1 The real performance of a property investment is always different from the hypothesis we set at the outset
- 10.2 Everybody makes financial calculations, although in the end nobody really believes in them
- 10.3 In fact, we make performance calculations to reassure ourselves, even if we know that it will be necessary to correct them later on

Finally, the objective of these items is, first, to confirm that investors are aware that what they planned in their business plan will inevitably be different to what was set at the outset. And second, to get some evidence about reasons they continue to use financial calculations, like the DCF methods, which are based on forecasts that are wrong. This requires Investment Managers to re-adapt constantly their business plan to an unexpected outcome that comes in. They may continue to use financial calculations because they are widely used in the real estate industry, and so they are not put into question. If everybody follows the same reasoning, this increases the chances that more practitioners undertake the same make mistakes or biases.

"You know, and, and technically, you know, in some cases we do still produce forecasts, but it's simply because the clients sort of expect us to do that, but we, we would typically preface the comments about the forecast as it's in all likelihood they are, they are going to be wrong and we don't really use them." - Fund Manager, Male

"Every property, every property that we ever bought and we've sold, the exit

yield is different to the one that we put in the business plan, without a shadow of doubt, and if anyone says, anyone tells you that they get them all right, they're lying." - Asset Manager, Male

"We know in any case that numbers will never be realized." - Fund Manager, Male

"One hundred per cent of a scenario is never anticipated at the outset. So the exit yield... that's part of it." - Investor, Male

5.2.3 3rd Stage. Collect Data

This social research attempts to measure how real estate practitioners tend to the base-rate fallacy bias. To analyse this tendency, researchers elaborated a questionnaire that includes the 31 items mentioned in the previous section. Items are going to be judged by expert rates with an ordered-category (Likert-type). The questionnaire, initially build up in French language, it was translated in two languages (i.e. English and Spanish) to enlarge the number of participants. Translations were done with extremely care to guarantee there is an exact correspondence between items across questionnaires. This way, questionnaires answers can be used to develop the scale measurement.

This research believes answers reported by participants can be affected if expert raters get acquaintance of the real purpose of this research. Participants might try to eliminate their own conscious biases (Yow, 1994, p.91) while they answer the questionnaire. To avoid this happens, researchers of this study decided to give, at the outset of the questionnaire, a general explanation of the purpose of this study: "This research aims to study the principles and practices of the real estate investment." Besides, the general purpose researchers inform participants the questionnaire takes around ten minutes to fill it out. There are no correct or incorrect answers, and only their perception as specialists is required. Finally, researchers also inform participants that their answers will be rendered anonymous and used only for research purposes. Answers are stored in a secured computing environment, and they are not shared with third parties.

The search to find participants was undertaken in five ways. Researchers contacted (1) the European Real Estate Society (ERES)⁷, (2) the Society of Property Researchers (SPR)⁸, (3) the Urban Land Institute (ULI)⁹, and (4) the directory members of the RICS, in France. The selected RICS members are involved in real estate advisory, commercial real estate, property valuation, finance and real estate investments. (5) We also contacted people we know in the real estate industry. Participants that participated in this questionnaire are **expert rates** who are involved in investment transactions. With a Scale Response (e.g. Likert-type), they all rated their degree of agreement they have respect to different attributes that represent constituents of the object.

At the end of the questionnaire, participants are asked to give some information about them. The information is used to make statistics about the sample: (1) Name and

⁷The ERES has a network real estate academics and professionals across Europe

⁸The SPR is a professional association with over 500 property researchers

⁹The ULI is the oldest and largest network of cross-disciplinary real estate and land use experts in the world

Surname; (2) email; (3) Gender; (4) Nationality; (5) Company or Organization Name (Optional); (6) Profile; (7) Investment Preferences; (8) Years of Experience Working in Real Estate; (9) Current Job Position and Work Location; and (10) Years of Experience Working in Current Job Position; This information is asked at the end of the questionnaire because participants know already the questions and answers they reported. This way they have more control of the information they report (see Yow (1994, p.85)).

*Qualtrics software*¹⁰ was used to undertake the survey. The survey period lasted one month (from mid-March to mid-April 2018). During this time a total of 429 individuals participated in the questionnaire. Nevertheless, only 211 participants answered the 31 questions of the questionnaire and, among these, 191 participants filled out the participant details mentioned before. Two reasons lead researchers to keep the sample of the 191 participants. First, researchers use participants e-mail address to guarantee that each participant participated only once. Fortunately, no doubled e-mails were found, and researchers were able to use data of the 191 participants to proceed with the analysis of the scale. The second reason to keep the 191 participants is that researchers can use the variable (7) **Investment Preference** (i.e. control variable) to distinguish participants that tend to be more conservative¹¹ from those that take more risk¹² in real estate investment.

¹⁰For more information, please go to <https://www.qualtrics.com>

¹¹Conservative investors prefer to receive high and regular rents

¹²Risk-taking participants prefer to obtain an important added-value in the resale

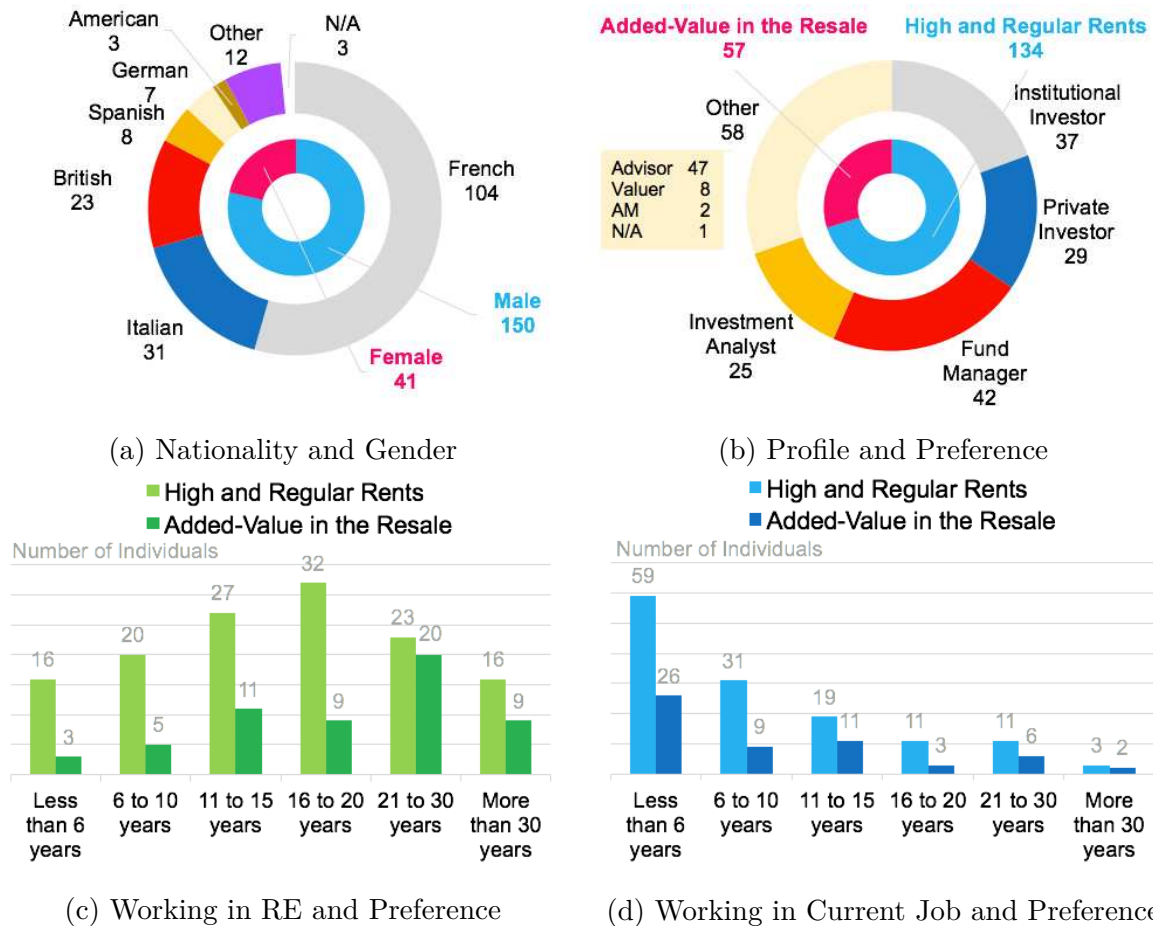


Figure 5.1 – Quantitative Research Sample

The majority of participants that participated in the questionnaire are French (52 %), followed by Italian (18 %), British (12 %), Spanish (4 %), German (4 %), American (2 %), and other nationalities¹³. Of the 191 participants, 150 are male, and 41 are female.

There is a varied proportion between profiles: 37 Institutional Investors, 29 Private Investors, 42 Fund Managers, and 25 Investment Analysts. The rest of profiles comprehend 47 individuals with a Consultant/Advisory role, 8 Valuers, 2 Asset Managers, and 1 not specified profile. Among these profiles, 70 % proclaimed they generally look to receive **high and regular rents** when they invest in a real estate property, and 30 % prefer to obtain an important **added-value in the resale**. Income-oriented investors tend to invest in *Core properties* as they characterised to have income durable and secure income streams. On the other side, capital-oriented investors look for *Value-Added*, or *Opportunistic properties*, that require re-development to allow for rental growth and capital

¹³The rest of nationalities include 1 Austrian, 1 Belgian, 1 Canadian, 1 Dutch, 1 Estonian, 2 double nationalities (1 French and British, and 1 French and German), 1 Greek, 1 Irish, 1 Lithuanian, 1 Nigerian, 1 Swedish, and 3 individuals that didn't specify their nationality

value. According to INREV, Value-Added funds have performed better than Core funds before 2007, but Value-Added-Funds were also more affected during the downturn. Overall, Core funds have performed much better than Value-Added funds over the last ten years. The durable and secured income streams offered by Core properties explain why there is a large proportion of income-oriented investors, over capital-oriented investors.

On one hand, the preference for high and regular rents is maintained throughout the years working in real estate and in the current job position. On the other hand, the preference to seek an important added-value in the resale increases as long as individuals accumulate more experience. However, there is little evidence that the preference for the added-value in the resale increases whereas they remain more time in their current job position.

The following two sections cope the steps followed to purify and validate the scale measurement.

5.2.4 4rd Stage. Purify Measure

In behavioural and social science some things need to be measured, but they cannot be accessed directly. This is why they are known as latent variables. To unveil what happens in individuals mind when they think about the resale price of a property, we need underlying variables (i.e. sub-objects) which are aspects of the abstract collective object (i.e. the tendency to the base-rate fallacy). There are techniques that identify a group of underlying variables, like the Factor Analysis, and Principal Component Analysis (PCA). Both techniques identify variables that correlate high with other variables, and they form a group of underlying variables. These techniques "aim to reduce a set of variables [i.e. items or questions] into a smaller set of dimensions (called 'factors' in factor analysis and 'components' in PCA)" (Field, 2017, p.779). The variance for a variable that is explained by the variance of other variables is known as the *common variance*. Factor Analysis uses the common variance within the data, to find out the underlying factors; whereas PCA assumes that all variance for each variable is common (so it assumes unique variance) with other variables, and so "there is no random variance at all" (Warner, 2008, p.788). As a result, the way each technique obtains underlying variables is different. "PCA we predict components from the measured variables, but in Factor Analysis we predict the measured variables from the underlying factors" (Field, 2017, p.783). See, for example, Field (2017) and Dunteman (1989, Ch.8) for differences between the procedures.

The choice of using one method or another varies. It really depends on what researchers want to apply their findings (Field, 2017, p.787). The **PCA** uses a linear equation to combine the original variables and to form a set of linear components. The equation does not include an intercept and neither an error term. The PCA just transforms correlated measured variables to linear components, and so it does not estimate unmeasured (or latent) variables. Therefore, components should not be interpreted as unmeasured variables (Field, 2017, p.780). Also, the PCA is used to explore data or to test a specific hypothesis in a specific sample. They are *descriptive*, and conclusions are retrained to the sample collected. Results needed to be cross-validated with different samples to be generalised. On the other hand, **Factor Analysis** uses identified underlying factors to predict measured variables. Then, Factor Analysis estimates equations that describe them. Each equation is formed by (1) the mean of correlated (measured) variables, plus (2) a common factor between those variables (i.e. it explains the relationships between high correlated variables and their factor), plus (3) any *unique factor* that cannot explain the correlations between variables (see Field (2017, p.783) for further details). The third component of this equation is the error term. This equation tries

to find out what questionnaire participants are thinking (i.e. the latent variables) while they are answering the questionnaire questions (i.e. measured variables). This permits to do *inferential analysis* to generate future hypothesis from data, and results obtained from a sample can be generalized to a population. This explains why the identification of factors is more extended in social science.

This research decides to use the **Principal Axis Factoring**¹⁴, PAF, to reduce the number of 31 items (or questions) considered in the questionnaire into a smaller set of dimensions (i.e. factors). This scale aims to assess the structure of the base-rate fallacy and to generalise sample results. To reckon, factors are identified with correlations between variables. Variables that correlate high between each other are going to load to a factor. So, those variables are going to be around the estimated linear equation that use a factor (or underlying variable) to predict those measured variables. Let's consider we have two perpendicular coordinate axes. Each axis is the estimated linear equation that represents a factor. Both axes can be rotated in different ways so that variables can load maximally to their respective factor. The axis can rotate perpendicularly (i.e. orthogonal), or independently in different directions (i.e. oblique). In both cases, it is possible to discriminate factors, and relationships between variables and factors are more clear. In the *orthogonal rotation*, the two factors are independent before and after the rotation, and so their correlation is zero. In the *oblique rotation*, as long as both axes rotate in different directions, they do not remain perpendicular, and this allows factors to correlate with each other. On a theoretical ground, social researchers tend to use the oblique rotation to analyse aspects of human behaviour. It is hard to believe that any psychological construct is not correlated "in any way with some other psychological construct" (Field, 2017, p.794). This research also uses the **oblique rotation** (i.e. Direct Oblimin) to analyse different aspects considered by individuals when they think about the resale price. Items or questionnaire questions used to describe different sub-objects are different aspects real estate practitioners confront to assess a property resale price. Therefore, we expect factors, or underlying dimensions, to correlate to a different degree.

To interpret the extraction of rotated factors easily Stevens (2002) recommends to use factor loadings (i.e. correlations between items and factors) which are above absolute value of 0.4. Other researchers opt to display correlations that are above 0.3. The approach is subjective so we tried both cases. However, factors are better displayed with correlations that are above 0.4. Table 5.1 displays items hold. **Items coloured in red** do not correlate enough with factors, and so they are removed from the scale. Items

¹⁴The PAF is the most widely used method in factor analysis (Warner, 2008, p.784)

3.2, 5.1, 6.3¹⁵, and 9.3 do not load enough to factors that represent their underlying variables: **Untrust**, **Economic**, **Affects**, and **Loss**, respectively. These items correlate low with the rest of the items that represent their underlying variable. Although these items come from a verbatim of an interview carried out in the qualitative study, their formulation should not be appropriate to represent the underlying variables. Besides, none of the three items, 4.1, 4.2 and 4.3, load enough to the factor that served to explain the underlying variable named **Holding**). This aim of this dimension was to capture whether the need to hold an investment property for some time to make it profitable should have an impact on the assumption of a theoretical selling price. These items may not be homogeneous enough as we perceived them in the qualitative research. And so, they were removed from the scale. The rest of the variables (or items) retained load highly to their respective factors.

¹⁵The Cronbach's Alpha, which is a common measure to check the reliability of a scale, suggested to delete this item in order to increase the reliability of the scale

Table 5.1 – Items Hold after the Scale Measure is Purified

I. Precedent		
Sub-Object 1. Believe about the possibility or not to anticipate the resale price of a property asset in the long-term (10 years)		
Q.1	1.1	Try to Know the price of an asset when we resell it in 10 years is absolutely impossible
Q.2	1.2	Try to forecast the resale price in 10 years is a waste of time
Q.3	1.3	To anticipate the resale price in 10 years, based on serious arguments or accounts, is unfeasible
Sub-Object 2. The Difficulty of thinking about resale		
Q.4	2.1	It is difficult to think about resale because it takes a lot of time
Q.5	2.2	Estimating the possibility to resale is complex and laborious
Q.6	2.3	Thinking about resale is disturbing because a lot of aspects need to be considered
II. State		
Sub-Object 3. Untrust in the market information available		
Q.7	3.1	When I resell a property asset, the information I have is not as complete as I would like
Q.8	3.2*	By reading the real estate press I have all information I need (INV)
Q.9	3.3	I think that market information is not trustful enough
Sub-Object 4. To set a minimum holding period of an asset		
Q.10	4.1	When we buy a property asset, it is better to set a minimum holding period before reselling it
Q.11	4.2	Buying in real estate only makes sense when we hold assets during some time
Q.12	4.3	Decide to resell a property asset earlier than expected can be perceived as a failure
Sub-Object 5. Belief in the economic steadiness of the real estate market		
Q.13	5.1	When I buy a property asset, I think that I might resell it at least at the same market conditions as today
Q.14	5.2	At the end, real estate markets tend to progress in the long-term
Q.15	5.3	Generally, real estate investment allows to preserve the value of the asset
Sub-Object 6. Anticipate negative affects while thinking about resale		
Q.16	6.1	For some property assets I like, I think it will be hard to sell them
Q.17	6.2	Sometimes I become attached to a property I hold, and so I'm reluctant to sell it
Q.18	6.3	Generally, I try not to get attached to the real estate assets I hold (INV)
Sub-Object 7. Uncertainty about the expected resale price		
Q.19	7.1	The price we will obtain when we resell a property asset is always uncertain
Q.20	7.2	We try to forecast a resale price, although the price I obtained is always different
Q.21	7.3	The selling price forecasts, that we obtain with our financial tools or analysis, leave us very uncertain about the real outcome of the transaction
Q.22	7.4	Even consulting the most experienced people, I'm far away from being convinced by the resale hypothesis we set
III. Consequences		
Sub-Object 8. Hypothesis of constant income yield or price between the acquisition and the resale of an asset		
Q.23	8.1	When we invest in a property asset, the most reasonable hypothesis is to consider that we'll resell it for a price equal to its acquisition price, indexed to a rental growth
Q.24	8.2	The performance of a real estate investment is driven by rents
Q.25	8.3	When I buy an asset, I consider that the property value will increase proportionally to its rents (i.e. in case rents increase in 10 %, the property value will increase in 10 %)
Sub-Object 9. Difficulty to accept a real loss in value of a building		
Q.26	9.1	As long as we haven't sold it, we haven't lost any value
Q.27	9.2	Usually, when a market is in decline, we just need to wait some years to resell without any loss
Q.28	9.3	In case my property is undervalued I can carry out some works to be able to sell it without any loss
Sub-Object 10. Lack of credibility of financial calculations		
Q.29	10.1	The real performance of a property investment is always different from the hypothesis we set at the outset
Q.30	10.2	Everybody makes financial calculations, although in the end nobody really believes in them
Q.31	10.3	In fact, we make performance calculations to reassure ourselves, even if we know that it will be necessary to correct them later on
Notes		
(1)	Principal Axis Factoring Direct Oblimin Rotation	
(2)	The Item is: Included Excluded	
(3)	(INV)	Reversed-phrased items Researchers expect participants rate opposite the item respect to other items that are used to describe the same Sub-Object Scores of Reversed-phrased items were reversed before conducting the Factor Analysis and Reliability

5.2.5 5th Stage. Reliability

Once factors are identified, this research conducted a second **Principal Axis Factoring** with oblique rotation (direct oblimin) on the items retained. As all items considered in Sub-Object 4 are removed, the new extraction identified nine factors. Items retained load to the same factors they load on the first-factor extraction. As factors have been purified in the first Factor Analysis, in the second Factor Analysis we opt to display factor loadings that are above 0.3 to interpret the extraction of rotated factors.

Correlation coefficients between variables and factors change particularly in small samples, and less in large samples. Therefore, "the reliability of factor analysis depends on sample size" (Field, 2017, p.797). The **Kaiser-Meyer-Olkin** (KMO) test measures (between 0 and 1) the proportion of variance that is shared with other variables. This test verifies the sampling adequacy to assess how the data is suited to do Factor Analysis. The KMO value is 0.70 and it is displayed in table 5.2. This value is above the minimum criterion of 0.5 and falls into the 'middling' range of sample adequacy according to Kaiser and Rice (1974)).

We expected questionnaire questions or items to correlate, at least theoretically, because they measure the same underlying variable. The inter-item Correlation Matrix (i.e. the correlation matrix of items that explain a related sub-object) shows that correlations are between 0.3 and 0.7, which are moderate correlations. Low inter-item correlations (i.e. they are below 0.3) do not appear because low correlated variables were removed in the second Factor Analysis. The maximum correlation appeared in the inter-correlation matrices of items retained is 0.7. Therefore, there are no signs that variables might collinear.

We also considered Bartlett's measure and the determinant of the R-Matrix to do an objective correlation test overall items retained. The **Barlett's test** tests, in the null hypothesis, whether the correlation matrix is an identity matrix. In other words, it tests whether variables in the correlation matrix correlate too low. As we observe in table 5.2, this test is significant, so variables do not correlate too low. The **determinant of the R-Matrix** tests the opposite problem; when variables correlate too high. To avoid extreme multicollinearity problems "the determinant of the R-Matrix should be greater than 0.00001" (Field, 2017, p.799). The determinant of the R-Matrix is 0.01 is greater than 0.00001, so we conclude there are no multicollinearity problems.

Table 5.2 – KMO and Barlett’s Test

Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy		0.701
Barlett’s Test of Sphericity	Approx. Chi-Square	1,354.762
	Degrees of Freedom	276
	Significance	0.000

There are many factors as variables. However, factors retained from Factor Analysis do not explain all the variance in the data because factors represent items or measured variables. Some information have discarded, and factors retained "do not map perfectly onto the original variables" (Field, 2017, p.790). Each factor has an associated **eigenvalue**. Eigenvalues represent the amount of variance in the data explained by a factor. The larger an eigenvalue is, the more important a factor will be because it explains more variation in the data. The **Kaiser’s criterion** (see Kaiser (1960) and Kaiser (1970)) is generally used to retain the number of factors. This criterion suggests to keep factors with eigenvalues that are above 1. Those are the most significant factors as they explain the most variation in the data. Table 5.3 exhibits the eigenvalues associated with each factor before and after the extraction of factors, and after rotation. Before the extraction in the second Factor Analysis, 24 factors are identified. The first eigenvalue (i.e. 4.40) explains 18.35 % of the total variance in the data. Especially the first two factors explain large amounts of variance in the data, and then the proportion of variance explained by factors decreases. The first 9 factors are extracted because their eigenvalues are greater than 1. The nine factors explain the 69.79 % variation of the total variance in the data. The eigenvalues associated with the nine extracted factors are displayed in column labelled 'Extraction Sums of Square Loadings' and their percentage of variance explained. The eigenvalues show the relative importance of each factor. The column labelled 'Rotation Sum of Square Loadings' lists the nine eigenvalues after rotation. Rotation optimizes the factor structure because variables load maximally to factors. After rotation, the relative importance of the nine factors is adjusted. Because we assumed that factors are correlated, it is not possible to compare the percentage of variance in the data explained by the factors before and after the rotation.

Table 5.3 – Total Variance Explained (N=191)

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings (a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.40	18.35	18.35	3.98	16.58	16.58	2.83
2	2.44	10.17	28.53	2.00	8.34	24.93	1.36
3	2.06	8.60	37.13	1.59	6.66	31.59	1.55
4	1.57	6.57	43.70	1.22	5.08	36.68	1.80
5	1.44	6.00	49.71	1.03	4.28	40.96	2.59
6	1.43	5.95	55.66	0.98	4.07	45.03	1.51
7	1.28	5.33	60.99	0.85	3.55	48.58	1.91
8	1.07	4.45	65.45	0.66	2.76	51.34	1.44
9	1.04	4.34	69.79	0.53	2.23	53.57	1.17
10	0.83	3.44	73.23				
11	0.79	3.28	76.51				
12	0.72	2.98	79.49				
13	0.67	2.78	82.28				
14	0.61	2.55	84.83				
15	0.55	2.30	87.13				
16	0.47	1.96	89.08				
17	0.44	1.85	90.94				
18	0.39	1.65	92.58				
19	0.35	1.46	94.05				
20	0.34	1.43	95.47				
21	0.32	1.32	96.79				
22	0.29	1.21	98.00				
23	0.25	1.02	99.02				
24	0.23	0.97	100.00				

Note

Extraction Method: Principal Axis Factoring

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance

As explained in section 5.2.4, the variance for a variable shared (i.e. explained) with other variables is known as the *common variance*. The proportion of variance of a variable explained by other variables is known as **communality** (see Field (2017, p.788)). This proportion goes from 0 to 1. So, for example, when the variance of a variable is entirely explained by the variance of any other variables, this variable would have a communality of 1 respect to the other variables. And, when the variance of a variable is not explained by the variance of other variables, the communality of this variable is 0. Communalities can be estimated before and after the extraction of factors. Before the extraction of factors communalities is the proportion of variance of a variable explained by other variables. But after the extraction, communalities is the proportion of variance of a variable explained by retained factors. Communalities before and after the extraction are displayed in table 5.4. Communalities before the extraction are listed in the 'Initial' column, and communalities after the extractor of factors are listed in the 'Extraction' column. Both columns show that communalities are less to 1. Despite that some information is discarded after the extraction of factors, communalities, what is interesting to see is that, except for question 26, communalities are higher after the extraction. This happens because the estimation of communalities is more accurate once

factors have been extracted. For example, before the extraction of factors, 50.4 % of the variance associated with question 1 is explained by the variance of other variances in the original data. Once factors are extracted, the variance of question 1 explained by the factors retained increases up to 62.7 %. Besides, communalities obtained after extraction are important indicators to see how much information has been lost. "The closer the communalities are to 1, the better our factors are explaining the original data" (Field, 2017, p.790). Eighteen out of twenty-four communalities are above 0.4, and among these fourteen are above 0.6, which indicates that factors fairly explain the variations of the original data.

Table 5.4 – Communalities (N=191)

Question	Item	Initial	Extraction
Q.1	1.1	0.504	0.627
Q.2	1.2	0.501	0.615
Q.3	1.3	0.471	0.493
Q.4	2.1	0.367	0.605
Q.5	2.2	0.380	0.484
Q.6	2.3	0.272	0.300
Q.7	3.1	0.296	0.639
Q.9	3.3	0.276	0.307
Q.14	5.2	0.394	0.455
Q.15	5.3	0.430	0.757
Q.16	6.1	0.548	0.697
Q.17	6.2	0.541	0.697
Q.19	7.1	0.337	0.348
Q.20	7.2	0.455	0.514
Q.21	7.3	0.631	0.699
Q.22	7.4	0.589	0.634
Q.23	8.1	0.310	0.534
Q.24	8.2	0.261	0.305
Q.25	8.3	0.248	0.414
Q.26	9.1	0.304	0.275
Q.27	9.2	0.359	0.887
Q.29	10.1	0.421	0.408
Q.30	10.2	0.511	0.621
Q.31	10.3	0.450	0.723

Note

Extraction Method: Principal Axis Factoring

The identified underlying factors are going to serve to estimate different aspects of the effect of the tendency to the base-rate fallacy. To validate scale measurement of the base-rate fallacy we need to look at the reliability of the scale. According to Field (2017, p.821) "**reliability** means that a measure (or in this case questionnaire) should consistently reflect the construct of that is is measuring." The idea of consistency here means that persons or raters that think similar they will report similar scores. So, the reliability of the scale would depend on the degree of agreement of participants across different questions of this questionnaire.

The correlation between items generally measures the degree of agreement. The most widely used technique to measure reliability of a scale is the **Cronbach's Alpha**. Cronbach (1951) suggests to divide randomly a pool of items in half, and compare the correlations for each split. The degree in which the two sets of items correlate is what Cronbach refers as *coefficient of equivalence*. In other words, the coefficient of equivalence "shows how nearly two measures of the same general trait agree" (Cronbach, 1951, p.298). The coefficient of equivalence (i.e Cronbach's Alpha) ranges from 0 to 1. A alpha coefficient of 0, means there is no agreement between participants across different questions of the questionnaire. Therefore, the scale has a poor reliability. An Alpha coefficient of 1, means there is a complete or perfect agreement between participants across items. In this case, the scale will have an excellent reliability. Although this only happens when the number of items approaches to infinity. Most researchers use alpha coefficients that range from 0.7 to 0.8. Alphas below that range would indicate that the scale is not reliable. Kline (2013) also recommends to use that range of alphas, but he also says that alphas below 0.7 can be expected for psychological constructs that use several aspects of the same thing. Nunnally (1978) even suggests that alphas of 0.5 will suffice in the early stages of a research. Nevertheless, these values are general guidelines to consider when developing a scale measurement. The choice to use a level of alpha will depend on the context of each research that is undertaking.

Cortina (1993) and Pedhazur and Schmelkin (1991) find two issues in interpreting the alpha coefficient: The first issue, (1) *alpha increases as long as the number of items or questions in the scale increase*. This can cause researchers to increase the number of items to increase the alpha, but this doesn't mean that the scale will be more reliable; The other issue, (2) *alpha is not a measure of unidimensionality*. In other words, the alpha obtained from a scale measure not always represents one underlying factor. This issue was studied by Grayson (2004). He obtained three scales with the same alpha of 0.8. The problem is that one scale achieved that alpha with one underlying factor, another scale obtained it with two correlated factors, and the last scale obtained with two uncorrelated factors.

If a questionnaire has different sub-scales Cronbach (1951) recommends to calculate the alpha for each different sub-scale. Depending on the level of Cronbach's Alpha of different sub-scales, it will confirm if researchers that design this scale were correct in considering a collection of items to measure the object of construct.

The second extraction of factors with an oblique rotation (i.e. assuming that factors are correlated) leads to obtain two different set of **factor loadings**¹⁶ (see Field (2017, p.784)). The first set of loadings are the regression coefficients or weights applied to identified underlying factors to predict measured variables. These are displayed in the *pattern matrix* (see table 5.5) and are comparable to the factor loadings obtained in the Factor Matrix (i.e. in case we applied an orthogonal rotation). However, the Pattern Matrix does not take into account the correlations between variables and factors. The correlation coefficients between each variable and a factor are gathered in the second set of loadings. These are available in the *structure matrix* (see table 5.6) and it contains the correlation coefficients between each variable and a factor. Both tables, 5.5 and 5.6, only display factor loadings with absolute coefficients above 0.3 to make ease the interpretation of factors. Gorsuch (1983) and Graham, Guthrie, and B. Thompson (2003) recommend to interpret both as a double-check. As Gorsuch (1983, p.208) specifies, a "proper interpretation of a set of factors can probably only occur if at least S [the factor structure coefficient matrix] and P [the factor pattern coefficient matrix] are both examined."

As mentioned above, the regression coefficients displayed in the **Pattern Matrix** (see table 5.5) reveal the common factor used to estimate the measured variables. In other words, each factor seems to represent variables that measure different aspects of a sub-object. Therefore, each factor is tagged with the name of the sub-object:

I. Precedent

- *Factor 5* represents *Sub-Object 1*: the **believe** about the possibility or not to anticipate the resale price of a property in the long-term (10-years)
- *Factor 3* represents *Sub-Object 2*: the **difficulty** of thinking about resale

II. State

- *Factor 9* represents *Sub-Object 3*: **untrust** in the market information available

¹⁶When the orthogonal rotation is used both factor loadings, (1) the regression coefficient and (2) the correlation coefficients, are the same

- *Factor 6* represents *Sub-Object 5*: the belief in the **economic** steadiness of the real estate market
- *Factor 4* represents *Sub-Object 6*: the anticipation of negative **affects** while thinking about resale
- *Factor 1* represents *Sub-Object 7*: the **uncertainty** about the expected resale price

III. Consequences

- *Factor 2* represents *Sub-Object 8*: the **hypothesis** of constant income yield or price between the acquisition and the resale of an asset
- *Factor 8* represents *Sub-Object 9*: the difficulty to accept a real **loss** in value of a building
- *Factor 7* seems to represent *Sub-Object 10*: the lack of **credibility** of financial calculations

Following the recommendation given by Cronbach (1951), the **Cronbach's Alpha** is calculated in each sub-scale. The more than acceptable levels of alpha of 0.77 and 0.73 in **Factors 5** and **3**, respectively, reveal that real estate practitioners agree with the impossibility of trying to know what will be the resale price of a property. The structure matrix in table 5.6 shows that items 1.1, 1.2, and 1.3 that load highly to factor 5 ('Believe') also load highly to Factor 1 and Factor 7, which represent 'Uncertainty' and 'Credibility,' respectively. This confirms that the belief about the possibility to anticipate the resale price of a property in the long term is affected by the unexpected things can happen in the future, and they challenge the credibility of financial calculations (i.e. the Discounted Cash Flow methods). Both aspects lead real estate practitioners to agree that it's difficult to think about a theoretical selling price in the early stages of a property investment.

We intuited that difficulties in thinking about the resale might be caused by **Factor 9**. This factor represents the untrusting degree in the information available, which sometimes is incomplete (please, read the quote on page 279). However, in this aspect, the level of agreement between real estate practitioners decreases up to 0.49 across. This level of alpha is below the alpha coefficients 0.7 and 0.8 that most researchers use. As a result, items 3.1 and 3.2 were removed, and the scale was reexamined again. Items retained loaded to the same factors they load on the second-factor extraction, except

for item 10.1 that incomprehensible loaded to the factor that represents Sub-Object 7: 'Uncertainty' instead to Sub-Object 10: 'Credibility'. For this reason, we decided to reintroduce items 3.1 and 3.2 to the scale. We then analysed the *Structure Matrix* displayed in table 5.6. In this table, we observed that item 2.2, which loads highly to Factor 3 ('Difficulty'), it also loads to Factor 9 ('Untrust'). This evidence confirms our initial intuition that the difficulty of thinking about the resale is caused by some untrusting degree in the information available. Although further research is needed to unveil the relationship between these two underlying variables. As this is the first scale that tries to measure the base-rate fallacy in real estate, we decided that an alpha of 0.5 will suffice to confirm that there is some agreement between real estate practitioners about this topic.

The alphas of 0.72, 0.83, and 0.79 show that there are high levels agreement among real estate practitioners in aspects like **Factor 6**, the belief real estate markets will continue to grow (so they believe properties will preserve its value); **Factor 4**, the level of attachment to a property; and **Factor 1**, the uncertainty about the future resale price of a property, respectively. These three aspects, along with the aspect of an untrusting degree in the information available, set the basements of the *base-rate fallacy*. An explanation of this is shown below.

All previous aspects lead real estate practitioners to agree, with an alpha of 0.57, **Factor 2**. This is, in general, they set in their business plan a hypothesis that the exit yield of a property investment will be the same as the initial yield in that property. The tendency to assume the same level of yield leads to the **base-rate fallacy bias**. Their investment decisions are based on the central scenario because it is the "more likely" outcome. Therefore, they discard other possible scenarios, and they assume that market conditions will remain the same.

This practice has important implications for investors. The most evident is that investors are not allowing that any unexpected thing happens during the holding period. The undesired scenario is when investors decide to resale the property in the future, and they receive an offer which is below an expected selling price, which it is usually the acquisition price. Their difficulty in accepting a real loss in the value of the building (i.e. **Factor 8**) will cause investors to be reluctant to sell the property. Some investors will decide to hold it for some time because they believe they are capable of reversing the situation. They will start doing active management to recover the value of the property, and they will hold it on until they can sell it at a "more acceptable" price. This implication is quite accepted by real estate practitioners with an alpha of 0.58. What it's also interesting is to see is the structure matrix in table 5.6. The item 9.2 that load highly to factor 8

('Loss') also loaded highly to Factor 2 ('Hypothesis'). This confirms that investors that are reluctant to accept a possible real loss in the value of the building, they tend to set a hypothesis of constant income yield at the outset of a property investment.

Finally, real estate practitioners agreed, with an alpha of 0.70, **Factor 7**, whatever they plan or the financial calculation they do at the outset of an investment period would never deliver. Something else unexpected would always happen, and so they would need to re-adapt their business plan to new market conditions.

The explanation about why several variables (or items) loaded highly on more than one factor in the structure matrix - see table 5.6 - is because factors are related to each other. The relationships between factors mean that the latent variable, the base-rate fallacy, is represented by factors which are related. This also confirms that the oblique rotation used to extract factors is the appropriate option to assess the underlying variables and to measure the tendency of the bias. The correlation between factors is displayed in table 5.7. To make it more easy to read this table, only high correlated factors are displayed in figure 5.2 along with Cronbach's Alphas obtained in table 5.5.

The Cronbach's Alpha of 0.77 obtained in Factor (F5) reveals real estate practitioners '**believe**' that it's impossible to know what will be the resale price of a property in ten years' time. The relation of Factor (F5) with Factors (F1) '**uncertainty**' and (F7) '**credibility**' confirms that the impossibility to know the resale price is due to the uncertainty they have about the future. Even they try to forecast it, they admit, with a Cronbach's Alpha of 0.70, that they are probably will get a different resale price from the theoretical resale price they set at the outset. In case the difference between the two prices is quite substantial, this will affect the credibility of their financial calculations.

Also, real estate practitioners find '**difficult**' to think about the resale price (i.e. Factor (F3)). This difficulty is related to Factors (F9) and (F2). With a Cronbach's Alpha of 0.49, some investors state that it's more difficult to think about a theoretical resale price when there is unavailable or '**untrustworthy information**' of some information available (i.e. Factor (F9)). Both the difficulty and the lack of confidence leads some real estate practitioners to agree, with a Cronbach's Alpha of 0.57, that in general they tend to set an '**hypothesis of constant income or price**' between the acquisition and the resale of an asset (i.e. Factor (F2)).

The '**difficulty**' to think about the resale price (i.e. Factor (F3)) is also related to a negative '**affect**' investors may have when they think they might not get a price they are

ready to sell their property (i.e. Factor (F4)). As was referenced in a citation of page 249, investors tend to value more their assets than others assets, especially when they have some level of attachment to their properties. Therefore they are reluctant to sell their assets below the price they paid for it due to their difficulty to accept a real 'loss' of value of their building (i.e. Factor (F8)). As a result, investors tend, in general, to set an '**hypothesis**' of exit yield that equals the initial yield (i.e. Factor (F2)). This leads to the **base-rate fallacy bias**.

Table 5.5 – Summary of the Factor Analysis for the Base-Rate Fallacy: All Sample (N=191) - Pattern Matrix

I. Precedent				F1	F2	F3	F4	F5	F6	F7	F8	F9
Sub-Object 1. Believe about the possibility or not to anticipate the resale price of a property asset in the long-term (10 years)												
Q.1	1.1	Try to Know the price of an asset when we resell it in 10 years is absolutely impossible						0.73				
Q.2	1.2	Try to forecast the resale price in 10 years is a waste of time						0.75				
Q.3	1.3	To anticipate the resale price in 10 years, based on serious arguments or accounts, is unfeasible						0.64				
Cronbach's Alpha								0.77				
Sub-Object 2. The Difficulty of thinking about resale												
Q.4	2.1	It is difficult to think about resale because it takes a lot of time				0.76						
Q.5	2.2	Estimating the possibility to resale is complex and laborious				0.58						
Q.6	2.3	Thinking about resale is disturbing because a lot of aspects need to be considered				0.48						
Cronbach's Alpha						0.63						
II. State												
Sub-Object 3. Untrust in the market information available												
Q.7	3.1	When I resell a property asset, the information I have is not as complete as I would like										0.77
Q.9	3.3	I think that market information is not trustful enough										0.48
Cronbach's Alpha												0.49
Sub-Object 5. Belief in the economic steadiness of the real estate market												
Q.14	5.2	At the end, real estate markets tend to progress in the long-term							-0.66			
Q.15	5.3	Generally, real estate investment allows to preserve the value of the asset							-0.85			
Cronbach's Alpha									0.72			
Sub-Object 6. Anticipate negative affects while thinking about resale												
Q.16	6.1	For some property assets I like, I think it will be hard to sell them					-0.83					
Q.17	6.2	Sometimes I become attached to a property I hold, and so I'm reluctant to sell it					-0.84					
Cronbach's Alpha							0.83					
Sub-Object 7. Uncertainty about the expected resale price												
Q.19	7.1	The price we will obtain when we resell a property asset is always uncertain		0.54								
Q.20	7.2	We try to forecast a resale price, although the price I obtained is always different		0.72								
Q.21	7.3	The selling price forecasts, that we obtain with our financial tools or analysis, leave us very uncertain about the real outcome of the transaction		0.71								
Q.22	7.4	Even consulting the most experienced people, I'm far away from being convinced by the resale hypothesis we set		0.70								
Cronbach's Alpha				0.79								
III. Consequences												
Sub-Object 8. Hypothesis of constant income yield or price between the acquisition and the resale of an asset												
Q.23	8.1	When we invest in a property asset, the most reasonable hypothesis is to consider that we'll resell it for a price equal to its acquisition price, indexed to a rental growth			0.48							
Q.24	8.2	The performance of a real estate investment is driven by rents			0.52							
Q.25	8.3	When I buy an asset, I consider that the property value will increase proportionally to its rents (i.e. in case rents increase in 10 %, the property value will increase in 10 %)			0.65							
Cronbach's Alpha					0.57							
Sub-Object 9. Difficulty to accept a real loss in value of a building												
Q.26	9.1	As long as we haven't sold it, we haven't lost any value									0.42	
Q.27	9.2	Usually, when a market is in decline, we just need to wait some years to resell without any loss									0.93	
Cronbach's Alpha											0.58	
Sub-Object 10. Lack of credibility of financial calculations												
Q.29	10.1	The real performance of a property investment is always different from the hypothesis we set at the outset		0.42							-0.3	
Q.30	10.2	Everybody makes financial calculations, although in the end nobody really believes in them						0.35			-0.57	
Q.31	10.3	In fact, we make performance calculations to reassure ourselves, even if we know that it will be necessary to correct them later on									-0.81	
Cronbach's Alpha											0.70	

Table 5.6 – Summary of the Factor Analysis for the Base-Rate Fallacy: All Sample (N=191) - Structure Matrix

I. Precedent			F1	F2	F3	F4	F5	F6	F7	F8	F9
Sub-Object 1. Believe about the possibility or not to anticipate the resale price of a property asset in the long-term (10 years)											
Q.1	1.1	Try to Know the price of an asset when we resell it in 10 years is absolutely impossible	0.40				0.75				
Q.2	1.2	Try to forecast the resale price in 10 years is a waste of time					0.76				
Q.3	1.3	To anticipate the resale price in 10 years, based on serious arguments or accounts, is unfeasible	0.31				0.68		-0.30		
Sub-Object 2. The Difficulty of thinking about resale											
Q.4	2.1	It is difficult to think about resale because it takes a lot of time			0.76						
Q.5	2.2	Estimating the possibility to resale is complex and laborious			0.61						0.33
Q.6	2.3	Thinking about resale is disturbing because a lot of aspects need to be considered			0.52						
II. State											
Sub-Object 3. Untrust in the market information available											
Q.7	3.1	When I resell a property asset, the information I have is not as complete as I would like									0.76
Q.9	3.3	I think that market information is not trustful enough									0.50
Sub-Object 5. Belief in the economic steadiness of the real estate market											
Q.14	5.2	At the end, real estate markets tend to progress in the long-term						-0.66			
Q.15	5.3	Generally, real estate investment allows to preserve the value of the asset						-0.85			
Sub-Object 6. Anticipate negative affects while thinking about resale											
Q.16	6.1	For some property assets I like, I think it will be hard to sell them				-0.83					
Q.17	6.2	Sometimes I become attached to a property I hold, and so I'm reluctant to sell it				-0.83					
Sub-Object 7. Uncertainty about the expected resale price											
Q.19	7.1	The price we will obtain when we resell a property asset is always uncertain	0.56								
Q.20	7.2	We try to forecast a resale price, although the price I obtained is always different	0.69								
Q.21	7.3	The selling price forecasts, that we obtain with our financial tools or analysis, leave us very uncertain about the real outcome of the transaction	0.79				0.40				
Q.22	7.4	Even consulting the most experienced people, I'm far away from being convinced by the resale hypothesis we set	0.75				0.35		-0.34		
III. Consequences											
Sub-Object 8. Hypothesis of constant income yield or price between the acquisition and the resale of an asset											
Q.23	8.1	When we invest in a property asset, the most reasonable hypothesis is to consider that we'll resell it for a price equal to its acquisition price, indexed to a rental growth		0.53							
Q.24	8.2	The performance of a real estate investment is driven by rents		0.53							
Q.25	8.3	When I buy an asset, I consider that the property value will increase proportionally to its rents (i.e. in case rents increase in 10 %, the property value will increase in 10 %)		0.64							
Sub-Object 9. Difficulty to accept a real loss in value of a building											
Q.26	9.1	As long as we haven't sold it, we haven't lost any value								0.47	
Q.27	9.2	Usually, when a market is in decline, we just need to wait some years to resell without any loss		0.37						0.92	
Sub-Object 10. Lack of credibility of financial calculations											
Q.29	10.1	The real performance of a property investment is always different from the hypothesis we set at the outset	0.52				0.34		-0.42		
Q.30	10.2	Everybody makes financial calculations, although in the end nobody really believes in them					0.54		-0.69		
Q.31	10.3	In fact, we make performance calculations to reassure ourselves, even if we know that it will be necessary to correct them later on							-0.83		

Table 5.7 – Factor Correlation Matrix (N=191)

Factor	1	2	3	4	5	6	7	8	9
1	1.000	0.079	0.080	-0.123	0.345	0.046	-0.216	0.017	0.200
2	0.079	1.000	0.224	-0.206	0.043	-0.122	-0.073	0.196	0.055
3	0.080	0.224	1.000	-0.096	0.075	-0.136	-0.062	0.012	0.194
4	-0.123	-0.206	-0.096	1.000	-0.120	0.161	0.104	-0.049	-0.112
5	0.345	0.043	0.075	-0.120	1.000	-0.065	-0.305	0.183	-0.072
6	0.046	-0.122	-0.136	0.161	-0.065	1.000	0.134	-0.205	0.093
7	-0.216	-0.073	-0.062	0.104	-0.305	0.134	1.000	-0.195	-0.055
8	0.017	0.196	0.012	-0.049	0.183	-0.205	-0.195	1.000	-0.128
9	0.200	0.055	0.194	-0.112	-0.072	0.093	-0.055	-0.128	1.000

Note

Extraction Method: Principal Axis Factoring

Rotation Method: Oblimin with Kaiser Normalization

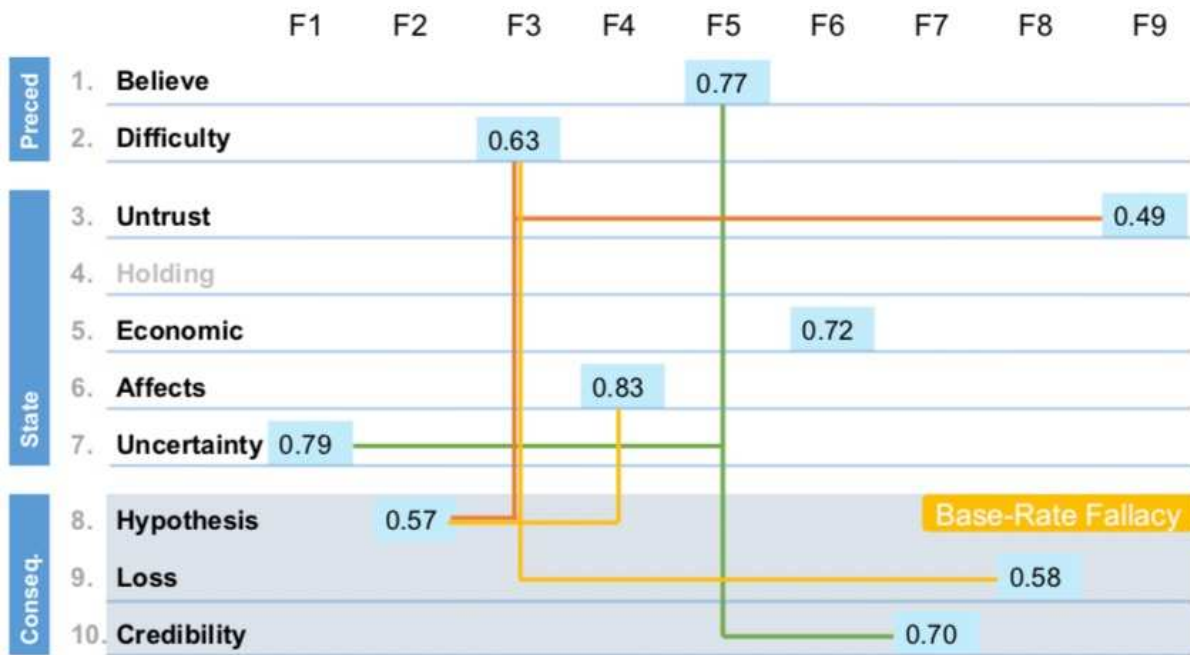


Figure 5.2 – High Factor Correlation Scores along with the Cronbach's Alphas obtained in table 5.5

5.3 Summary

The level of agreement between participants, measured by the Cronbach's Alpha, in the nine sub-scales, confirms the reliability of the scale is quite acceptable to assess the way real estate practitioners think (i.e. psychological schema) when they assess the future resale price of a property investment. This confirms items used to design this scale are appropriate to measure different aspects of the resale price. The psychological schema is represented by *nine factors* (F) that describe the judgment process (see table 5.5). The judgment process starts when practitioners start thinking about a possible theoretical price. This stage is known as precedent because it precedes theoretical assumptions of resale price that might lead to the base-rate fallacy. This early stage is described by factors (F5) - the **believe** about the possibility or not to anticipate the resale price of a property in the long-term (10-years); and (F3) - the **difficulty** of thinking about resale. Then, the judgment process continues, and it takes assumptions to estimate the resale price. Factors (F9) - the **untrust** in the market information available; (F6) - the belief in the **economic** steadiness of the real estate market; (F4) - the anticipation of negative **affects** while thinking about resale; and (F1) - the **uncertainty** about the expected resale price; describe some assumptions they consider to estimate the resale price. It is at this stage of the judgment process when real estate practitioners decide if their investment decision is based on the base, optimistic or a pessimistic scenario. Then, the base-rate fallacy risks appearing at this stage, and this is why this phase is named as State.

The consequences of making investment decision based on the base scenario are gathered in factors (F2) - the **hypothesis** of constant income yield or price between the acquisition and the resale of an asset; - (F8) - the difficulty to accept a real **loss** in value of a building; - and (F7) - the lack of **credibility** of financial calculations.

Besides, several variables (or items) loaded highly on more than one factor in the structure matrix - see table 5.6 - because factors (F) are related to each other. Table 5.7 confirms that factors F5-F1-F7, F3-F9-F2, and F3-F4-F8-F2 are high correlated. The relationship between items and factors help to understand the way real estate practitioners think when they assess the future resale price of a property investment; They also explain their tendency to the **base-rate fallacy bias** (i.e. F2). Moreover, The acceptable level of agreement between practitioners (see table 5.5), confirms items used to describe this psychological schema are appropriate to measure this bias.

Conclusions and further work

How real estate investors bias?

Globalisation is offering investors the possibility to increase investment opportunities that could provide higher returns and reduce portfolio risk through diversification. Motivated by these two factors, institutional investors have opened up by increasing their level of cross-border property investment outside their home markets. Make international property investments is complex as a large number of factors need to be considered, including unknown future market conditions. Besides, it takes time to know and understand new markets. Although the final decision of investing in international markets depends on an Investment Committee, they need local agents to have local information and advice, The interaction between Investors and Local Agents in the initial due diligence is key to define an appropriate strategy, assess risks, and take appropriate decisions. Then, local agents also contribute to the investment decision. However, the information obtained from local agents is **framed** by the information they use and their visions. Besides, actions follow by local agents, like searching for investment opportunities, are conditioned or **anchored** to the objectives of target return set in the Fund Strategy.

Despite the opportunities offered by a global economy, some investors prefer to invest locally because they feel more comfortable when they operate in a known market. Their reluctance to search in unknown markets causes the **familiarity bias** because they are missing other investment opportunities that might perform well and do not involve an extra risk. Something similar happens when the Seller must select the bidder that will have the exclusivity of the property during the *detailed due diligence*. Even though the price offered by the known investor is not the highest price, some sellers prefer to give the exclusivity to a known investor rather than a new entrant. Sellers tend to feel more comfortable with a known investor as they are more sure he/she will transact at the end of the process. This causes a disadvantage to new entrants who must build up a reputation in the market. The issue is that this takes some time, and forces foreign investors to make a higher offer to convince the Seller that he/she is a serious candidate to transact.

The excellent location, high quality, and secure income streams of core office buildings explain why they are so popular among property investors. The elevated “tail” risks of continued low economic growth, the low interest rates and top-rated government bond yields, among others, have unleashed a **herd behaviour bias** as more investors want to buy core offices in the last few years. The high demand has caused a scarce of buildings available, and it leads prime yields to historic lows. The low level of property yields lead some investors to start thinking that yields will sooner or later increase, especially

with the expectation of an increase in the European interest rate and Bond rates. Some investors believe that an increase in government bond rates will lead to an increase in property yields. This belief leads to a **representative biased** as there is not enough evidence that they always move in parallel. However, their concern is the possible increase in government bond yields. If they increase above property yields there is a risk that capital investment flows will displace from property to bonds; in this case, investors will have the opportunity to get a higher yield by investing in bonds. This explains why investors are constantly looking at the risk premia.

This research also illustrates, on page 220, that investors use different approaches to calculate the property risk premium at the asset level. Each approach will provide a different level of risk perception or judgment. One may give a higher risk premium which will increase investors' required return to invest in real estate. In case the expected property return is insufficient to compensate investors' required return¹⁷, investors won't proceed to purchase the building. However, other investors use another approach which gives a lower risk premium. The sum of the risk-free asset return and the risk premium results in a required return that attains the expected property return, and so they decide to purchase the building. Therefore, investors are **framed** by the approach they use, and their investment decisions will be affected by how the information is presented. Likewise, when investors do an IRR analysis of a building. Depending on the data used (i.e. assumptions, scenarios, and forecasts) this will lead investors to get different levels of investment performance. For example, the purchase price of the building is confirmed (i.e. **confirmation biased**) with comparables considered in the appraisal. This can be the wrong place to start valuating a property as they may be over-priced or under-priced. Besides, one of the deterministic assumptions some investors use in the IRR is that they expect to get a resale price similar to the acquisition price. This leads some investors to make their investment decisions based on the base/central scenario and neglect other scenarios that differ from it. This causes the **base-rate fallacy bias**.

The lack of transparency in most property markets causes an issue of **asymmetric information** when investors enter in a bid process. Bidders do not always succeed to know who are their competitors, and brokers may benefit from this situation to create competition to get the highest price for the Seller. Analogously, the Seller needs to know which bidders are going to proceed until the end of the selling process. The time and cost spent on building transactions can lead bidders to take more risks and offer a high price to avoid losing the transaction. This decision, known as **escalation of commitment**. In case this happens, and the Seller selects the bidder, the latter may have a mental

¹⁷See more on page 136

stress, known as a **cognitive dissonance**, between the satisfaction of being elected and the doubt in case they overpaid for the asset.

The issue about the *asymmetric information* is also present during the detailed due diligence. The Buyer has one month to analyse the documentation contained in the data room. So, if anything comes up that implies a risk for the Buyer, it will be discussed with the vendor during negotiations to reduce the price. The Seller may not be eager to sell an asset when its price decreases below a price he/she is prepared to sell it. For example, the price offered by a buyer is below the appraisal of the Valuer. This sometimes happens because some Sellers tend to value more their assets than other people's assets (i.e. **endowment effect**). They prefer to hold it and do active management because they believe they are capable of recovering the value of the building. The problem appears when a building is under-performing and the economic situation is flattering. If investors persist on their decision to holding it until they get a desired priced, the holding might last too long. They risk to have more losses and not being able to sell it at the desired price.

Why real estate investors do the base-rate fallacy bias?

When Institutional Investors want to purchase an office building, they generally plan to hold it for some time, and to resale it at the end of their business plan. In most cases, they use the Internal Rate of Return (IRR) to assess the performance of the property. This model requires investors to consider (1) an acquisition price, (2) a cash flow the building is expected to generate, and (3) a theoretical selling price. Due to uncertainty about the future, some investors make judgments and put their assumptions in a Monte Carlo Simulation to assess potential things that can happen to the office building. Different assumptions lead to different scenarios, like optimistic, central/base, and pessimistic scenario. Each scenario leads to different levels of cash flow, resale price, and an exit yield. The issue with investors' assumptions is that they already set up the starting point of their investment, the acquisition price. In other words, they expect to sell a property at a price which is, at least, the same as the acquisition price. In fact, they assume the market Rental Value will increase every year at a percentage rate, for example, 1 %; and they expect to sell the building at a price slightly higher than that of the acquisition price. Therefore, they assume that, at the end of the investment period, they'll get an exit yield equal to the initial yield. The problem appears when investment decisions are based on the base/central scenario as it's "the most likely" outcome. The implication is that other scenarios, like the optimistic or pessimistic scenario, are ignored

though they can also happen. This leads to a bias known as the **base-rate fallacy**. When their investment decision is based on the base/central scenario, they assume market conditions won't change during the time they hold the building. And so, they are not allowing that any unexpected outcome or strange thing happen during the holding of the asset.

An example of why some investors base their investment decision on the base/central scenario is shown on page 229. The current level of prime property yields in the Parisian property are at historic lows. Investors ask if yields will stay low for a long time. They think that sooner or later the yields might revert towards its long-term average. An increase in property yields will cause a decrease in rents and property values. Then, some investors see there is a potential risk of depreciation of rents and capital values. When investors introduce these assumptions in the IRR, they observe the exit yield is likely to be higher than the initial yield. This undermines the incentives of investing in property. To not discourage other investors to invest in property, some investors neglect the possibility of an increase in property yields in the future. Anyway, there is not enough evidence that says market conditions can be completely different in 10 or 20 years time. And if they change, they will adapt to unexpected circumstances with the aim to attain investors' required return. And so, they elaborate an IRR assuming that the exit yield in 10 years time will remain at the same level of 2016. Otherwise, there is no point in investing in real estate.

Which aspects lead investors to the base-rate fallacy?

The level of agreement between participants, measured by the Cronbach's Alpha, validates the way real estate practitioners think (i.e. psychological schema) when they assess the future resale price of a property investment. The *nine factors* (F) obtained in this schema (see table 5.5, describe the judgment process. It begins when practitioners start thinking about a possible theoretical price. This early stage is referred as precedent, and it is described by factors (F5) - the '**believe**' about the possibility or not to anticipate the resale price of a property in the long-term (10-years); and (F3) - the '**difficulty**' of thinking about resale.

Then, the judgment process continues, and it takes assumptions to estimate the resale price. The assumptions are based on factors (F9) - the '**untrust**' in the market information available; (F6) - the belief in the '**economic**' steadiness of the real estate market;

(F4) - the anticipation of negative '**affects**' while thinking about resale; and (F1) - the '**uncertainty**' about the expected resale price. It is at this stage when real estate practitioners decide whether they stay more with a base, optimistic or a pessimistic scenario to make their investment decision. Then, the base-rate fallacy risks appearing at this stage. This is why this stage is labelled as State.

Finally, factors (F2) - the '**hypothesis**' of constant income yield or price between the acquisition and the resale of an asset; (F8) - the difficulty to accept a real '**loss**' in value of a building; and (F7) - the lack of '**credibility**' of financial calculations; they comprehend the consequences of ignoring the optimistic or pessimistic scenarios that they can potentially happen.

Several variables (or items) loaded highly on more than one factor in the *structure matrix* - see table 5.6 - because factors (F) are related to each other. The relationship between factors (i.e. F5-F1-F7, F3-F9-F2, and F3-F4-F8-F2) is confirmed in table 5.7. Factors '**Believe**' (F5), '**Uncertainty**' (F1) and '**Credibility**' (F7), explain that the belief to anticipate the resale price of a property in the long term is affected by both the unexpected things that can happen in the future and the credibility of financial calculations.

On one hand, the '**difficulty**' to think about the resale price (F3) is due to the '**untrust**' of some information they have available (F9). This leads real estate practitioners to set, in general, the '**hypothesis**' of exit yield equal to the initial yield (F2). On the other hand, this '**difficulty**' (F3) is also related to factors '**Affect**' (F4), '**Loss**' (F2) and '**Hypothesis**' (F2). The correlations between these factors confirm that investors are reluctant to accept a possible real loss in the value of the building, especially when they have some level of attachment to the property. Therefore, some investors neglect the possibility of an increase in property yields in their business plan because this will mean a decrease in their capital values. As a result, some make their investment decision based on the central scenario where the exit yield equals to the initial yield. Again, this leads some investors to expect market conditions to remain the same as today¹⁸.

The relationship between items and factors helps to understand the way real estate practitioners think when they assess the future resale price of a property investment. These findings are also helpful to explain their tendency to the base-rate fallacy bias in factors (F2), (F8) and (F7). The acceptable level Cronbach's Alpha obtained in these three factors (see table 5.6), 0.57, 0.58 and 0.70, respectively, also confirms items used to design

¹⁸See more on pages 177 and 180

this scale are appropriate to measure this bias.

Further work

This thesis developed a reliable *scale* to understand the way real estate practitioners think when they assess the future resale price of a property investment, and their tendency to the **base-rate fallacy bias**. The idea of the reliability of the scale not only depends on the degree of agreement of participants across different questions of this questionnaire. It also needs to be confirmed by other participants in another questionnaire. The scale will be more reliable if participants report similar scores in another questionnaire. Then, further research is needed to carry out another questionnaire to test-retest reliability (see Field (2017, p.821) and confirm the reliability of the scale.

The *reliability* of the scale can also be assessed in other ways. For example, elaborate a factor analysis for each stage of the psychological schema (i.e. Precedent, State, and Consequences) and see if items correlate (i.e. load) to the same factors obtained in the scale that considers the entire psychological schema. It is also possible to split the sample according to investment Preference. For instance, investors that look to receive high and regular rents vs investors that want to obtain an important added-value in the resale. Once the sample is split into two parts, carry out a factor analysis for the entire psychological schema and see if items load to the same factors between samples. In case items of both samples load to the same factors, this means they follow the same reasoning to assess the future resale price of a property investment. However, this researcher intu-its that the reasoning may be different between investors that look to receive high and regular rents and investors that want to obtain an important added-value in the resale.

As it is referred on page 229, on the one hand, investors that look to receive high and regular rents, they generally look for Core and/or Value-Added buildings to do long-term holds (like 10 years or more). These type of assets require some redevelopment and active management. On the other hand, investors that want to obtain an important added-value in the resale, they generally look for value-added or opportunistic buildings to sell them in a short-term (e.g. between 3 and 5 years). These type of assets require development or conversion, and active management to increase rental income and the value of the building. As things are more difficult to predict beyond two years, this research assumes that investors that do long-term holds will tend more to the *base-rate fallacy bias* than investors that do short-term holds. And so, the way they think when they assess the

resale price will be slightly different.

Further research can be carried out once the psychological scale is revalidated. It is possible to do a **structural equation modelling** and construct a theoretical model. The theoretical model will define the latent variable of the base-rate fallacy in real estate with one or more observed variables. A structural model will follow to explain the relationships between variables. The relationships can be estimated with independent regression equations.

Shiller (1999) and R. H. Thaler (2010) highlight the need to consider models of human behaviour to improve current economic and financial models. Another line of research is proposed by Roig Hernando (2015). He carries out an **Econometric Model from a Behavioral Perspective**, EMBP, to estimate the price of new residential properties in Spain. The model includes three variables: (1) the market trend, (2) the market cycle, and (3) a psychological variable which is considered only when the market exhibits periods of irrational exuberance. For example, when residential prices are over-priced or under-priced. The latter variable is a conditional behavioural function of variables that are susceptible to affect the behaviour of real estate practitioners. For example, the changing world economic situation, positive or negative property market expectations, the occupancy rate, interest rates, and the volatility of oil prices. This model, estimated by using both a linear and non-linear regression, allows investors to detect when residential prices are over or under-priced due to an irrational exuberance like euphoria or gloom. This type of econometric models can be developed to assess how biases affect real estate fundamentals, like yields, rents, or the property risk premium.

Conclusions et Poursuite de travaux

Comment les investisseurs immobiliers font-ils des biais ?

La mondialisation offre aux investisseurs la possibilité d'accroître les opportunités d'investissement susceptibles de générer des rendements plus élevés et de réduire les risques liés au portefeuille grâce à la diversification. Motivés par ces deux facteurs, les investisseurs institutionnels recourent de plus en plus aux investissements immobiliers internationaux. Cependant, réaliser des investissements immobiliers internationaux est complexe car un grand nombre de facteurs doit être pris en compte, y compris l'incertitude liée aux conditions futures des marchés. En outre, il faut du temps pour connaître et maîtriser de nouveaux marchés. Bien que la décision finale d'investir sur les marchés internationaux dépende d'un comité d'investissement, ils ont besoin d'agents locaux pour obtenir des informations et conseils. L'interaction entre les investisseurs et les agents locaux dans la due diligence initiale est un élément clé pour définir une stratégie appropriée, évaluer les risques et prendre les décisions appropriées. Les agents locaux contribuent également à la décision d'investissement. Cependant, les informations obtenues des agents locaux sont **encadrées** par les informations qu'ils utilisent et leurs visions. En outre, les actions suivies par les agents locaux, telles que la recherche d'opportunités d'investissement, sont conditionnées ou **ancrées** aux objectifs de rendement cible définis dans la stratégie de fonds.

Malgré les opportunités offertes par une économie mondiale, certains investisseurs préfèrent investir localement car ils se sentent plus à l'aise et en sécurité lorsqu'ils opèrent sur un marché connu. Leur réticence à effectuer des recherches sur des marchés inconnus entraîne le **biais de familiarité** car ils manquent d'autres opportunités d'investissement qui pourraient donner de bons résultats et ne comportent pas de risque supplémentaire. Quelque chose de semblable se produit lorsque le vendeur doit sélectionner l'acquéreur qui aura l'exclusivité de la propriété au cours de la *due diligence détaillée*. Même si le prix proposé par l'investisseur connu n'est pas le prix le plus élevé, certains vendeurs préfèrent donner l'exclusivité à un investisseur connu plutôt qu'à un nouvel entrant. Les vendeurs ont tendance à se sentir plus à l'aise avec un investisseur connu, car ils sont plus sûrs qu'il effectuera les transactions à la fin du processus. Cela désavantage les nouveaux entrants qui doivent se faire une réputation sur le marché. Le problème est que cela prend du temps et oblige l'investisseur étranger à faire une offre plus élevée pour convaincre le vendeur qu'il est un candidat sérieux pour traiter.

L'excellent emplacement, la haute qualité et les revenus locatifs sécurisés des im-

meubles de bureaux Core expliquent les raisons de leur popularité parmi les investisseurs immobiliers. Les risques de perte extrêmes (c.-à.-d. « tail risks ») liés à la faible croissance économique continue, les faibles taux d'intérêt et rendements des obligations d'Etat les mieux classés, entre autres, ont déclenché un **biais de comportement troupeau** car de plus en plus d'investisseurs ont acheté des bureaux Core au cours des dernières années. La forte demande est à l'origine de la rareté des bâtiments disponibles et elle a conduit à des rendements prime à des niveaux historiquement bas. Le faible niveau des rendements de l'immobilier amène certains investisseurs à penser que les rendements finiront par augmenter, en particulier dans l'attente d'une augmentation des taux d'intérêt et des taux obligataires européens. Certains investisseurs croient qu'une augmentation des taux des obligations d'État entraînera une augmentation des rendements immobiliers. Cette croyance amène à un **biais représentatif** car il n'y a pas suffisamment de preuves qu'ils évoluent toujours en parallèle. Cependant, leur préoccupation est l'augmentation possible des rendements des obligations d'État. Si ils augmentent au-delà des rendements immobiliers, les flux d'investissements risquent de se déplacer des biens vers les obligations; dans ce cas, les investisseurs auront la possibilité d'obtenir un rendement plus élevé en investissant dans des obligations. Cela explique une des raisons pour lesquelles les investisseurs examinent constamment les primes de risque.

Cette recherche illustre également, à la page 220, que les investisseurs utilisent différentes approches pour calculer la prime de risque immobilière au niveau de l'actif. Chacune des approches fournit un niveau différent de perception ou de jugement du risque. Une approche peut, par exemple, résulter en une prime de risque plus élevée, ce qui augmentera le retour des investisseurs requis pour investir dans l'immobilier. Dans le cas où le rendement immobilier attendu ne suffirait pas pour compenser le rendement requis par les investisseurs ¹⁹, les investisseurs ne procéderont pas à l'achat de l'immeuble. Entre temps, d'autres investisseurs recourent à une approche qui résulte en une prime de risque moins élevée. La somme du rendement de l'actif sans risque et de la prime de risque se traduirait alors par un rendement requis qui atteint le rendement immobilier attendu, ils décideront donc d'acheter l'immeuble. Par conséquent, les investisseurs sont **encadrés** par l'approche qu'ils utilisent et leurs décisions d'investissement seront affectées par la manière dont les informations sont présentées. De même, lorsque les investisseurs effectuent une analyse du Taux de Rendement Interne (TRI) d'un immeuble. En fonction des données utilisées (c.-à.-d. hypothèses, scénarios et prévisions), les investisseurs obtiendront des niveaux de performance différents. Par exemple, le prix d'achat de l'immeuble est confirmé (c.-à.-d. **biais de confirmation**) avec des comparables pris en compte dans

¹⁹Voir plus à la page 136

l'évaluation. Cela peut être le mauvais approche pour commencer à évaluer une propriété car ils peuvent être surévalués ou sous-évalués. En outre, l'une des hypothèses déterministes utilisées par certains investisseurs dans le TRI est qu'ils s'attendent à obtenir un prix de revente similaire au prix d'acquisition. Cela conduit certains investisseurs à prendre leurs décisions d'investissement en fonction du scénario de base ou central et à négliger d'autres scénarios qui en diffèrent. Cela est l'illustration du biais de l'**oubli de la fréquence de base**.

Le manque de transparence sur la plupart des marchés immobiliers entraîne des problèmes d'**asymétrie de l'information** notamment lorsque les investisseurs entrent dans un processus d'enchères. Les enchérisseurs ne savent pas toujours qui sont leurs concurrents. Les courtiers peuvent donc profiter de cette situation pour augmenter la concurrence et obtenir le prix le plus élevé pour le vendeur. De la même manière, le vendeur a besoin de savoir quels enchérisseurs vont procéder jusqu'à la fin du processus de vente. Le temps et les coûts consacrés aux transactions de construction peuvent amener les enchérisseurs à prendre plus de risques et à offrir un prix élevé pour éviter de perdre la transaction. Cette décision est connue sous le nom de l'**escalade de l'engagement**. Au cas où cela se produit, et que le vendeur a choisi un enchérisseur, ce dernier pourrait avoir un stress mental, connu sous le nom de **dissonance cognitive**, entre la satisfaction d'être élu et le doute d'avoir surpayé l'actif.

Le problème de l'*information asymétrique* est également présent lors de la diligence détaillée. L'acheteur dispose d'un mois pour analyser la documentation contenue dans la data room. Ainsi, si quelque chose apparaît qui implique un risque pour l'acheteur, cela sera discuté avec le fournisseur lors des négociations pour réduire le prix. Le vendeur peut ne pas être désireux de vendre un actif lorsque son prix diminue en deçà du prix auquel il est prêt à le vendre. Par exemple, le prix offert par un acheteur est inférieur à l'évaluation de l'expert. Cela se produit parfois parce que certains vendeurs ont tendance à surévaluer leurs actifs par rapport aux actifs des autres (c.-à.-d. **effet de dotation**). Ils préfèrent le conserver et faire de l'asset management car ils pensent qu'ils sont capables de récupérer la valeur de l'immeuble. Le problème apparaît lorsqu'un bâtiment est peu performant et que la situation économique est flatteuse. Si les investisseurs persistent dans leur décision de conserver ces bâtiments jusqu'à ce qu'ils obtiennent le prix souhaité, la détention pourrait durer trop longtemps. Ils risqueraient alors d'avoir plus de pertes et de ne pas pouvoir les vendre au prix souhaité.

Pourquoi les investisseurs immobiliers font-ils le biais de l'oubli de la fréquence de base ?

Lorsque les investisseurs institutionnels veulent acheter un immeuble de bureaux, ils prévoient généralement de le conserver pendant un certain temps et de le revendre à la fin de leur plan d'affaires. Dans la plupart des cas, ils utilisent le Taux de Rendement Interne (TRI) pour évaluer la performance du bien. Ce modèle requiert la prise en compte (1) d'un prix d'acquisition, (2) d'un flux de trésorerie que l'immeuble devrait générer et (3) d'un prix de vente théorique. En raison de l'incertitude quant à l'avenir, certains investisseurs émettent des jugements et placent leurs hypothèses dans une simulation de Monte Carlo pour évaluer les éventuelles conséquences pour l'immeuble de bureaux. La multitude des hypothèses conduit à des scénarios différents, tels que les scénarios de centraux, optimistes, ou pessimistes. Chaque scénario entraîne différents niveaux de flux de trésorerie, de prix de revente et de rendement de sortie. Le problème avec les hypothèses des investisseurs est qu'ils établissent déjà le point de départ de leur investissement, le prix d'acquisition. En d'autres termes, ils s'attendent à vendre une propriété à un prix au moins équivalent à celui de l'acquisition. En fait, ils supposent que la valeur locative du marché augmentera chaque année à un taux déterminé, par exemple 1 %; et ils s'attendent à vendre l'immeuble à un prix légèrement supérieur à celui du prix d'acquisition. Par conséquent, ils supposent qu'à la fin de la période d'investissement, ils obtiendront un rendement de sortie égal au rendement initial. Le problème apparaît lorsque les décisions d'investissement sont basées sur le scénario central, car il s'agit du résultat « le plus probable ». L'implication est que d'autres scénarios, comme le scénario optimiste ou pessimiste, sont ignorés, bien qu'ils puissent également se produire. Cela conduit à un biais appelé **l'oubli de la fréquence de base**. Lorsque la décision d'investissement est basée sur le scénario central, les investisseurs supposent que les conditions du marché ne changeront pas pendant la période de détention de l'immeuble. Et ainsi, ils ne permettent pas qu'un résultat inattendu ou une chose étrange se produise pendant la détention de l'actif.

La page [229](#) montre un exemple de comment certains investisseurs basent leur décision d'investissement sur le scénario central. Le niveau actuel des rendements de l'immobilier prime à Paris est à des niveaux historiquement bas. Les investisseurs se demandent si les rendements resteront bas pendant longtemps. Ils pensent que les niveaux de rendement finiront par se rapprocher de leur moyenne de long terme. Une augmentation des rendements immobiliers entraînera une baisse des loyers et des valeurs immobilières.

Ensuite, certains investisseurs voient un risque potentiel de dépréciation des loyers et de la valeur du capital. Lorsque les investisseurs introduisent ces hypothèses dans le TRI, ils pensent que le rendement à la sortie sera probablement supérieur au rendement initial. Cela compromet les incitations à investir dans l'immobilier. Pour ne pas décourager d'autres investisseurs d'investir dans l'immobilier, certains investisseurs négligent la possibilité d'une augmentation des rendements immobiliers à l'avenir. Quoi qu'il en soit, il n'y a pas suffisamment de preuves indiquant que les conditions du marché peuvent être complètement différentes dans 10 ou 20 ans. Et s'elles changent, les investisseurs s'adapteront à des circonstances imprévues dans le but d'obtenir leur rendement requis. A titre d'exemple, en 2016 certains investisseurs élaborent un TRI en supposant que le rendement de sortie dans 10 ans restera au même niveau qu'en 2016. Autrement, il ne sert à rien d'investir dans l'immobilier.

Quels aspects conduisent les investisseurs au biais de l'oubli de la fréquence de base ?

Le niveau d'accord entre les participants, mesuré par l'alpha de Cronbach, valide la façon dont les praticiens de l'immobilier pensent (c.-à.-d. le schéma psychologique) quand ils évaluent le prix de revente d'un investissement immobilier. Les *neuf facteurs* (F) obtenus dans ce schéma (voir le tableau 5.5 décrivent le processus de jugement. Il commence lorsque les praticiens entament la réflexion sur le prix de revente. Ce stade précoce est appelé précédent, et il est décrit par les facteurs (F5) - la « **croissance** » dans la possibilité ou non d'anticiper le prix de revente dans le long-terme (10 ans) ; et (F3) - la « **pénibilité** » de la réflexion sur la revente.

Ensuite, le processus de jugement continue avec des hypothèses pour estimer le prix de revente. Les hypothèses sont basées sur les facteurs (F9) - la « **méfiance** » dans l'information de marché disponible ; (F6) - la croyance dans la constance « **économique** » des marchés immobiliers ; (F4) - l'anticipation d'« **affects** » négatifs en pensant à la revente ; et (F1) - l'« **incertitude** » sur le prix de revente. C'est à ce stade que les professionnels de l'immobilier décident s'ils restent avec un scénario central, optimiste ou pessimiste pour prendre leur décision d'investissement. Donc, l'oubli de la fréquence de base risque d'apparaître à ce stade. C'est pourquoi cette étape est appelée Etat.

Enfin, les facteurs (F2) - l'« **hypothèse** » de constance de la rentabilité locative et / ou du prix entre l'acquisition et la revente d'un actif ; (F8) - l'incapacité à accepter la «

perte » de la valeur immobilière quand elle est là ; et (F7) - l'absence de « **crédibilité** » des calculs financiers ; Ces facteurs comprennent les conséquences de l'ignorance des scénarios optimistes ou pessimistes qu'ils peuvent potentiellement avoir.

Plusieurs variables (ou éléments) ont chargé (c.-à.-d. « load ») fortement sur plusieurs facteurs dans la *structure matrix* (voir tableau 5.6) car les facteurs (F) sont liés les uns aux autres. La relation entre les facteurs (c'est-à-dire F5-F1-F7, F3-F9-F2, and F3-F4-F8-F2) est confirmée dans le tableau 5.7. Les facteurs « **Croyance** » (F5), « **Incertitude** » (F1) et « **Crédibilité** » (F7) expliquent que la croyance d'anticiper le prix de revente est affectée par les imprévus qui peuvent survenir dans le futur et par la crédibilité des calculs financiers.

D'une part, la « **difficulté** » de penser au prix de revente (F3) est due à la « méfiance » vis-à-vis de certaines informations disponibles (F9). Cela conduit certains professionnels de l'immobilier à fixer, en général, une hypothèse de rendement de sortie égale à l'initiale (F2). D'autre part, cette « difficulté » (F3) de penser au prix de revente est aussi liée aux facteurs « **Affect** » (F4), « **Perte** » (F2) et « **hypothèse** » (F2). Les corrélations entre ces facteurs confirment que les investisseurs hésitent à accepter une éventuelle perte réelle de la valeur de leur immeuble, surtout quand ils ont un certain niveau d'attachement pour l'actif. Par conséquent, certains investisseurs négligent la possibilité d'une augmentation des rendements immobiliers dans leur business plan parce que cela signifiera une diminution de leurs valeurs de capital. Par conséquent, certains investisseurs prennent leur décision d'investissement basée sur le scénario central où le rendement de sortie est égal au rendement initial. Encore une fois, cela conduit à ce que certains investisseurs s'attendent à ce que les conditions de marché restent les mêmes que celles d'aujourd'hui²⁰.

La relation entre les items et les facteurs contribue à comprendre la façon dont les professionnels de l'immobilier évaluent le prix de revente futur d'un investissement immobilier. Ces résultats sont également utiles pour expliquer la tendance des professionnels de l'immobilier à avoir un biais de l'oubli de la fréquence de base dans les facteurs (F2), (F8) et (F7). Le niveau acceptable alpha de Cronbach obtenu dans ces trois facteurs (voir tableau 5.6), 0,57, 0,58 et 0,70, respectivement, confirme également que les éléments utilisés pour la conception de cette échelle sont appropriés pour mesurer ce biais.

²⁰Voir plus sur les pages 177 et 180

Poursuite des travaux

Cette thèse a développé une *échelle* fiable pour comprendre la façon dont les professionnels de l'immobilier réfléchissent lorsqu'ils évaluent le prix de revente d'un investissement immobilier, et leur tendance au biais de l'**oubli de la fréquence de base**. L'idée de la fiabilité de l'échelle ne devrait pas dépendre seulement du degré d'accord des participants entre les différentes questions de ce questionnaire. Il doit également être confirmé par d'autres participants dans un autre questionnaire. L'échelle sera plus fiable si les nouveaux participants déclarent des scores similaires dans un autre questionnaire. Bien évidemment des recherches supplémentaires sont nécessaires pour réaliser un autre questionnaire visant à tester à nouveau la fiabilité (voir Field (2017, p.821) pour confirmer la fiabilité de l'échelle.

La *fiabilité* de l'échelle peut également être évaluée d'autres manières. Par exemple, la conduite d'une analyse factorielle pour chaque étape du schéma psychologique (c'est-à-dire précédent, état et conséquences) permettrait de vérifier si les éléments correspondent (ou chargent) aux mêmes facteurs que ceux de l'échelle qui prend en compte le schéma psychologique complet. Il est également possible de diviser l'échantillon en fonction de la préférence d'investissement. Par exemple, distinguer les investisseurs qui cherchent à recevoir des loyers élevés et réguliers de ceux qui souhaitent obtenir une valeur ajoutée importante lors de la revente. Une fois que l'échantillon est divisé en deux parties, la conduite d'une analyse factorielle pour l'ensemble du schéma psychologique permettrait de vérifier si les éléments se chargent des mêmes facteurs entre les échantillons. Dans le cas où les éléments des deux échantillons sont soumis aux mêmes facteurs, cela signifie qu'ils suivent le même raisonnement pour évaluer le prix de revente futur d'un investissement immobilier. Cependant, au vu des résultats de notre étude actuelle, nous pensons fortement que le raisonnement peut être différent entre les investisseurs qui cherchent à recevoir des loyers élevés et réguliers, et les investisseurs souhaitant obtenir une valeur ajoutée importante lors de la revente.

En effet, comme il est fait référence à la page 229, d'une part, les investisseurs qui cherchent à recevoir des loyers élevés et réguliers recherchent généralement des immeubles Core ou Value-Added pour des détentions à long terme (10 ans ou plus). Ces types d'actifs nécessitent un réaménagement et une gestion active. D'autre part, les investisseurs qui souhaitent obtenir une valeur ajoutée importante lors de la revente recherchent généralement des immeubles à value-added ou opportunistes pour les vendre à court terme (entre 3 et 5 ans, par exemple). Ce type d'actif nécessite un développement ou une conver-

sion, et une gestion active pour augmenter les revenus locatifs et la valeur de l'immeuble. Étant donné la difficulté de prévision au-delà de deux ans, cette recherche suppose que les investisseurs qui font des détentions à long terme auront plus tendance au *biais de l'oubli de la fréquence de base* que les investisseurs qui font des détentions à court terme. Ainsi, la façon dont ils pensent quand ils évaluent le prix de revente sera légèrement différente.

Des recherches plus poussées peuvent être menées une fois l'échelle psychologique revalidée. Il est possible de faire une **modélisation d'équations structurelles** et de construire un modèle théorique. Le modèle théorique définira la variable latente de l'oubli de la fréquence de base dans l'immobilier avec une ou plusieurs variables observées. Un modèle structurel suivra pour expliquer les relations entre les variables. Les relations peuvent être estimées avec des équations de régression indépendantes.

Shiller (1999) et R. H. Thaler (2010) soulignent la nécessité de considérer des modèles de comportement humain pour améliorer les modèles économiques et financiers actuels. Un autre axe de recherche est proposé par Roig Hernando (2015). Il réalise un **modèle économétrique à partir d'une perspective comportementale**, EMBP, pour estimer le prix des nouvelles propriétés résidentielles en Espagne. Le modèle comprend trois variables : (1) la tendance du marché, (2) le cycle du marché et (3) une variable psychologique considérée uniquement lorsque le marché présente des périodes ou une exubérance irrationnelles. Par exemple, lorsque les prix résidentiels sont surévalués ou sous-évalués. La dernière variable est une fonction comportementale conditionnelle des variables susceptibles d'affecter le comportement des praticiens de l'immobilier. Par exemple, l'évolution de la situation économique mondiale, les attentes positives ou négatives du marché immobilier, le taux d'occupation, les taux d'intérêt et la volatilité des prix du pétrole. Ce modèle, estimé en utilisant à la fois une régression linéaire et une régression non linéaire, permet aux investisseurs de repérer des prix résidentiels trop chers ou trop bas en raison d'une exubérance irrationnelle telle que l'euphorie ou la tristesse. Ce type de modèles économétriques peut être développé pour évaluer la manière dont les biais affectent les fondamentaux de l'immobilier, tels que les rendements, les loyers ou la prime de risque immobilière.

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Résumé

L'objectif principal de cette thèse est d'analyser comment les biais cognitifs et émotionnels affectent les décisions des investisseurs lorsqu'ils achètent ou vendent des immeubles de bureaux. Pour atteindre cet objectif, cette recherche adopte, dans un premier temps, une démarche qualitative. Les entretiens semi-structurés permettent de détecter et d'analyser les biais les plus importants qui apparaissent au cours de la transaction. Parmi les différents biais décelés « l'oubli de la fréquence de base » a été sélectionné. Ce biais peut apparaître avant l'acquisition lorsque les investisseurs évaluent la performance attendue d'un immeuble. Une analyse quantitative suit pour développer une échelle qui mesure l'effet du biais. Les résultats ont montré que l'incertitude conduit certains investisseurs à supposer que le rendement qu'ils obtiendront à la fin de leur investissement sera égal à celui du rendement initial. En d'autres termes, certains investisseurs estiment que les conditions du marché resteront les mêmes qu'aujourd'hui.

Mots Clés

Biais Cognitifs, Biais Emotionnels, Investissement Immobilier, Recherche Qualitative, Recherche Quantitative, Biais d'Oubli de la Fréquence de Base, Echelle de Mesure

Abstract

The main objective of this thesis is to analyse how cognitive and emotional biases affect investor decisions when buying or selling office buildings. To meet this aim, this research embarks on a qualitative research. Semi-structured interviews permit to detect and analyse the most important biases that appear in the transactions. Among the different biases discovered, the "base-rate fallacy" was selected. This bias may appear before the acquisition when investors evaluate the expected performance of a building. A quantitative analysis follows to develop a scale that tries to measure the effect of the bias. The results showed that uncertainty leads some investors to assume that the yield they will obtain at the end of their investment will be equal to that of the initial yield. In other words, some investors believe that market conditions will remain the same as today.

Keywords

Cognitive Bias, Emotional Bias, Real Estate Investment, Qualitative Research, Quantitative Research, Base-Rate Fallacy, Scale of Measurement