
# Factors Influencing the Propensity of Real Estate Investors in the U.K. to Employ Property Derivatives: A Survey

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By

Alexander Thomas Hanisch


Newcastle University
Business School

Grenoble Ecole
de Management

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**Abstract**

Real estate is the last major asset class without liquid derivatives markets. The reasons for that are not fully known or understood. Therefore, the aim of the current research is to better understand the main factors that influence the propensity of commercial real estate investors in the U.K. to employ property derivatives.

The research methodology that was chosen for the current research is grounded theory which, in its original form, goes back to Glaser and Strauss (1967). A total of 43 interviews were conducted with 46 real estate professionals in the U.K. from property investment management firms (investing directly or indirectly in real estate), multi-asset management firms, real estate investment trusts (REITs), banks, and brokerage and advisory firms, among others.

The research results show 29 factors that influence the propensity of direct and indirect real estate investors in the U.K to employ property derivatives. Out of the 29 factors, the current research identified 12 factors with high explanatory power, 6 with a contributing role, and 11 with low explanatory power. Moreover, factors previously discussed in the literature are tested and assessed as to their explanatory power.

From the research data, three main reasons have been identified as the sources of investor reluctance to trade in property derivatives. The first and main reason is related to a mismatch between motivations of property investment managers and what can be achieved with the instruments. The second reason, which ties in with the first one, is a general misunderstanding as to the right pricing technique of property derivatives. Finally, the third reason is a general lack of hedging demand from the investor base owing to the long investment horizons through market cycles.

The research contributes to the literature on property derivatives in various ways. First, it extends the literature on market hurdles in property derivatives markets by testing and extending the hurdles that were proposed previously. Second, the research shows that the existing price models need to be extended in order to

account for the risk perception of practitioners and their concerns with regard to liquidity levels.

For both theory and practice, the research has shown some limitations in using property derivatives for purposes such as creating index exposure or hedging. Another contribution, in this case to practice, is that this study provides a clearer picture as to the reasons that keep property investment managers away from using property derivatives.

Furthermore, it has been shown that liquidity per se is not a universal remedy for the problems in the market. In addition to the need for improving the understanding of the pricing mechanism, practitioners should give more thought to the notion of real estate market risk and the commensurate returns that can reasonably be expected when they take or reduce it. This implies that property index futures currently do not price like those on any other investable asset class.

Keywords
Property derivatives, real estate derivatives, illiquid markets, index-based derivatives, property index futures, synthetic real estate investments

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## Abbreviations

| | |
|---|---|
| CCP | Central Counterparty |
| CME | Chicago Mercantile Exchange |
| GFC | Global Financial Crisis |
| Eurex | European Exchange |
| EMIR | European Market Infrastructure Regulation |
| FOX | London Futures and Options Exchange |
| IPD | Investment Property Databank |
| ISDA | International Swaps and Derivatives Agreement |
| LIBOR | London Interbank Offered Rate |
| MBS | Mortgage-backed security |
| MSA | Metropolitan Statistical Area |
| NCREIF | National Council of Real Estate Investment Fiduciaries |
| NPI | NCREIF Property Index |
| OTC | Over-the-counter market |
| REIT | Real Estate Investment Trust |
| SFA | Securities and Futures Authority |
| TRS | Total Return Swap |

# Chapter 1. Introduction

## 1.1 Background

The recent global financial crisis (2007-2009) has shown what cataclysmic consequences the convergence of financial markets and real estate markets can have for national macroeconomies. The interweavement of the two markets provides opportunities for product innovations on the one hand and involves new risks on the other. Investors, who are familiar with financial markets, do not necessarily know the peculiarities of real estate markets and vice versa. The financial crisis has also shown how important it is to adapt flexible holding strategies and to have the ability to unwind property investments quickly.

Real estate[1] is the last major asset class without liquid derivatives markets. The reasons for that are not fully known or understood. However, five aggravating factors that come immediately to mind are the inherent illiquidity in real estate markets, their heterogeneous structure, the difficulties associated with the measurement of financial performance of the underlying assets, the auto-correlation of asset prices, and the fact that the real estate index itself is not investable.

The creation of derivatives, whose values depend on a real estate price index and that are cash-settled, goes back to 1991 when those instruments were traded for a short period of time[2] on the London Futures and Options Exchange (FOX). Since then, various attempts have been undertaken to establish liquid property derivatives markets with, however, limited success. In 2006, the Chicago Mercantile Exchange (CME) introduced futures and options that cash-settle based on a residential real estate index; the S&P/Case-Shiller Home Price Index[3]. Since 2009, property index futures can be traded on the European Exchange (Eurex) using commercial real estate indices provided by MSCI-IPD[4] as the underlying instrument. Both residential property derivatives traded on the CME and commercial property derivatives traded on the Eurex show very low

[1] The terms real estate and property are used interchangeably. They denote the physical asset that investors invest in which comprises the land and the building on it.
[2] Trading was stopped after only five months because of trading irregularities.
[3] The underlying real estate indices will be discussed in greater depth in section 2.3.1.
[4] Formerly known as the Investment Property Databank (IPD).

trading volumes. The graph illustrated in Figure 1.1 shows the quarterly trend in trade volumes of OTC swaps and futures[5] and the total outstanding notional in the U.K. between 2004 and 2016.

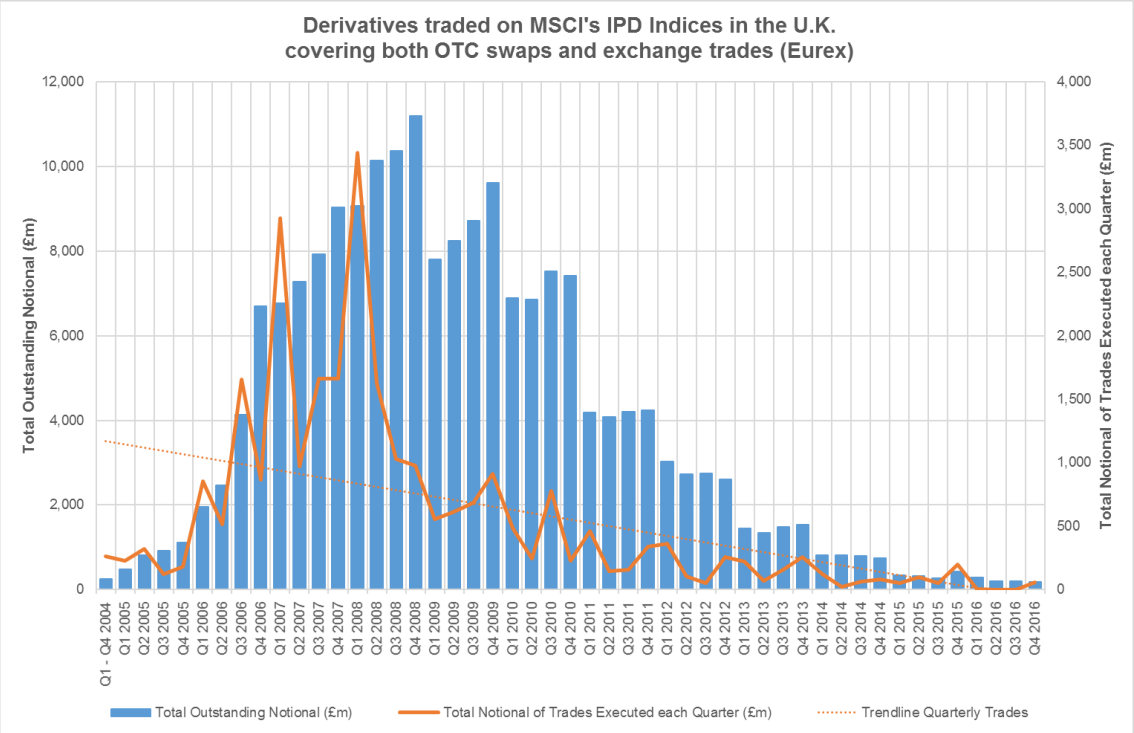


Figure 1.1: OTC swaps and exchange trades (Eurex) in the U.K. (Data Source: MSCI-IPD)

The property derivative market in the U.K. is considered the most developed market internationally, followed by that in the U.S. (Fabozzi, Shiller and Tunaru, 2010). Possible reasons are the existence of a recognised real estate index in the U.K. (MSCI-IPD) and joint efforts by the industry (including banks) to promote the instruments and to support the development of a property derivatives market.

The low trading volume and lack of market liquidity create a barrier to the market for those investors who are interested in employing the instruments. The conceivable migration of investors from the physical spot market to the derivatives market has so far failed to materialise, considering the low transaction volume which has been in decline since the beginning of 2009.

Typically, the trading volume of futures is correlated with the size of the underlying market and its volatility (Corkish, Holland and Vila, 1997). Real estate is the

[5] Traded on Eurex.

largest asset class in the world (Geltner, Miller, Clayton and Eichholtz, 2007) with an estimated asset value of $217 trillion compared to $55 trillion in equities and $94 trillion in outstanding securitised debt according to a research report published by Savills in 2016 (Barnes, 2016). Of the $217 trillion, $54 trillion account for investable residential real estate and $19 trillion account for investable commercial real estate. Given the size of the real estate market, one would expect a corresponding derivatives market of noteworthy size. This, however, is not the case for reasons not known thus far. Figure 1.2 provides a comparative overview of the global asset market sizes and the total volume of futures and options traded on 78 exchanges worldwide. The most trading volume can be found in derivatives written on equities, interest rates, and currencies. The comparatively small category "*Other"* consists of contracts based on commodity indices, credit, fertilizer, housing, inflation, lumber, plastics, and weather. Given the asset size of both residential and commercial real estate, the trading volume of property derivatives seems surprisingly low.

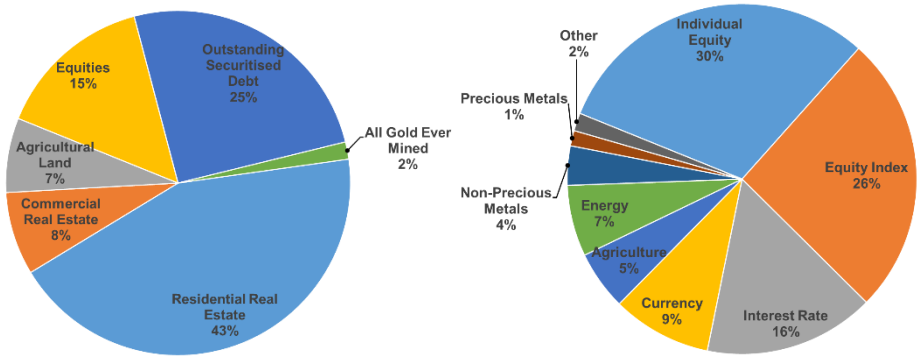


Figure 1.2: Left chart: Global real estate market compared to equities and bonds (Source: Barnes, 2016); Right chart: Total volume of futures and options traded and/or cleared at 78 exchanges worldwide (Source: FIA, 2014)

The lack of liquid derivatives markets has some repercussions on real estate as an asset class. It is not possible to completely reproduce the financial characteristics of real estate by combining other financial assets. This makes the market incomplete which, in turn, renders hedging difficult and perfect risk transfer impossible. A liquid derivatives market would improve the efficiency of real estate markets which are considered inefficient due to autocorrelation of prices, inertia in prices, and the presence of excess returns (Case and Shiller, 1989; 1990).

Real estate markets are known to be cyclical. Therefore, it would be appropriate to have a hedging tool at hand which preserves asset values in declining markets. The boom and bust nature of real estate cycles has led to major economic issues in various countries in the world, especially in such periods of time when busts spill over into other economic sectors and cause major economic downturns.

## 1.2 Aims and Objectives

The reasons for real estate investors' reluctant use of property derivatives are not yet fully known and can only be conjectured, as the literature in this field is scarce.

Considering the variety of advantages that are attributed to the use of property derivatives such as low transaction costs, fast execution time, possibility to short property assets or to rebalance portfolios (to name but a few), it remains unclear why investors do not make more use of the instruments. Potential users would be property fund managers, multi-asset managers/asset allocators, real estate investment trusts (REITs), banks, property development and investment companies, hedge funds, and high-net-worth individuals.

Existing research has unanimously confirmed that market liquidity is the most important prerequisite for the development of property derivatives markets. The present body of literature falls short, however, in exploring the reasons for the reluctant use of property derivatives, especially in the U.K. which is considered the most developed market in this regard.

The aim of the current research is to better understand the main factors that influence the propensity of commercial real estate investors in the U.K. to employ property derivatives. Given the low liquidity levels in the property derivatives market, investors must have their own specific set of reasons why they do not make use of the instruments to a greater extent. The understanding of their views and the relationships between the influencing factors help explain the reasons for the illiquidity in the market. Moreover, the research allows drawing conclusions as to necessary product improvements, regulatory changes, and the future viability of commercial property derivatives.

So far, real estate has been the only, and by far largest, asset class without liquid derivatives markets which impedes direct risk transfer to the financial market. This research sheds light on the reasons for this idiosyncratic and unique feature.

## 1.3 Research Questions

The central question that the present research seeks to answer is: Why are real estate investors reluctant to use property derivatives and what are the factors that influence the propensity to employ property derivatives?

In order to elicit the main themes that help answer the central research question, the following set of sub-questions is addressed:

1. What reasons do potential users (e.g. fund managers) put forward for not using property derivatives?
2. Is there a pattern that emerges in these reasons as to why real estate derivatives are not used?
3. What are the motivations that potential investors have for using property derivatives?
4. Do the characteristics of property futures, which are currently available on Eurex, meet investors' expectations and their investment requirements?
5. What is the perception of liquidity that real estate investors have with regard to the property derivatives market?
6. Which conditions need be fulfilled in order for real estate investors to consider trading property derivatives?

A special feature of the applied research methodology[6], which will be outlined in the next section, is that questions start out broadly and become increasingly focused during the research process. While the research process starts with the questions above, their further direction is determined by the themes that emerge from the data in the process of their analysis[7].

[6] Grounded theory.
[7] This is referred to as the theoretical sampling technique.

## 1.4 Research Methodology

The nature of the research questions requires a research methodology that meets two important conditions. First, it needs to engage with the research subjects on a one-to-one basis in order to conduct in-depth data collection. And second, the research methodology should avoid preconceptions as to the reasons for the reluctant use of property derivatives that force the data collection and analysis process in a certain preconceived direction.

Therefore, the research methodology that was chosen for the present research is grounded theory. Grounded theory, which in its original form, goes back to Glaser and Strauss (1967), allows the development of a theory that emerges directly from the data or, in other words, that is grounded in the data. The techniques and procedures underlying this methodology require data collection and analysis to be conducted in parallel, thus informing and shaping each other.

The data was collected by conducting 43 in-depth interviews with 46 practitioners from different real estate-related backgrounds and in different positions in their organisations. The research was conducted in a commercial real estate environment in the U.K. It is important to note that the unit of analysis is not the individual. In grounded theory the unit of analysis is the concept (Corbin and Strauss, 2015) or the process (Glaser, 1992).

## 1.5 Outline of Chapters

This thesis is divided into five chapters. Chapter 1 provides an introduction to the thesis by briefly describing the background of the research, its aims and objectives, and the applied research methodology.

In Chapter 2, the academic literature on property derivatives is discussed. In the first section of the chapter, the development of property derivative markets and instruments is reviewed, beginning with the analysis of the characteristics and

peculiarities of real estate markets which is an indispensable presupposition for contextualising the liquidity issues in the market. In the section thereafter, the typology of existing property derivatives markets is discussed by showing the different types of real estate indices and the influence of their characteristics on the usefulness as underlying instrument for property derivatives. Moreover, the most common types of property derivatives, namely futures, structured notes, and swaps, are discussed. In the third section, the pricing of property derivatives is discussed by examining no-arbitrage and market equilibrium models. Having set the scene in the first three sections for a deeper analysis, in the last section the possible reasons for the reluctant use of property derivatives are analysed and the studies addressing this topic are discussed.

Chapter 3 discusses the methodology that is used for this research. After reiterating the focus of the study and the research questions, the philosophical assumptions (i.e. the ontology) that underlie the current research are explained and the theoretical research paradigm (i.e. the epistemology) of the current research are discussed and justified. Thereafter, the contrasting views apparent in Social Science and the overall methodological approach are discussed and justified. After explaining the method of data collection and data analysis, the chapter continues with a discussion of research design quality in the context of grounded theory.

In Chapter 4, the findings of the research are presented in the form of identified factors that influence the propensity of real estate investors to employ property derivatives. Factors identified that contribute most significantly to the reluctance of investors to use the instruments are also discussed.

Chapter 5 provides a summary of the research and draws conclusions which help frame relevant implications for policy and practice. The chapter ends with recommendations for future research.

# Chapter 2. Literature Review

## 2.1 Introduction

This chapter presents a review of the academic literature on property derivatives and the possible reasons for the reluctant use of these instruments by real estate investors, leading to lack of liquidity in the property derivatives market.

Since studies focusing solely on the reasons for the reluctant use of property derivatives are few in number, this review of the literature has been enlarged to cover other related issues. A property derivative is defined as a financial instrument whose value depends on that of an underlying asset, with real estate indices serving as proxies.

While there is an abundance of literature on financial derivatives and real estate, the literature on the link between the two fields is scarce and dispersed. This review is, consequently, intended to underline the relevance of this link. To this end, the extant literature on property derivatives is divided into four issues; namely:

- the prerequisites for the development of successful property derivatives markets and the characteristics and peculiarities of real estate as an asset class;
- the analysis of the characteristics of real estate indices and the definition of the necessary prerequisites for a proxy to serve as an underlying asset;
- the mechanism for the pricing of property derivatives; and
- the possible reasons for the reluctant use of property derivatives and the barriers to a more widespread use of those instruments.

This chapter is organised in five sections. The first section reviews the development of property derivative markets and their products. It also reviews the analyses on the characteristics and peculiarities of real estate markets. Section two discusses the typology of the existing property derivatives markets with the view to highlighting the different types of real estate indices and their influence on the usefulness as underlying instruments. Section three presents the most common types of property derivatives, namely futures, structured notes, and swaps. Section four reviews the literature on pricing property derivatives with

special emphasis on no-arbitrage and equilibrium models. Finally, section five examines the literature on the possible reasons for the reluctant use of property derivatives.

## 2.2 Review of the Development of Property Derivative Markets and Instruments

### *2.2.1 Characteristics and Peculiarities of Real Estate Markets*

The real estate market is a decentralised market where land, buildings, multiple types of property-related rights, and services are traded. Real estate is the largest asset class in the developed world and an important contributor to national wealth (Case, Shiller and Weiss, 1993; Syz, 2008; Baum, 2015). According to Fabozzi et al. (2010), the property market presents the largest market in developed countries accounting for about 30% to 40% of all underlying physical assets.

Depending on its use, real estate can be grouped into two categories: commercial and residential real estate. Commercial real estate refers to properties that are sold or leased for business purposes (e.g. office, industrial, retail, and hotel properties). Whereas commercial real estate assets are acquired for net rental income and value appreciation, residential real estate is used as habitats (Geltner *et al.*, 2007)[8]. The latter, often, constitute a combination of a consumption asset and a leveraged investment (Fabozzi, Shiller and Tunaru, 2009b) because of the use of debt. In terms of global market size, commercial and residential properties have the largest share of all assets, with 51% (see Figure 1.2, p. 3).

The commercial real estate market can be further subdivided into the space market and the asset market. The space market is often referred to as the usage market or the rental market. In that market, the rights to use buildings or land are traded between the property owners and tenants. The space market determines the future net cash flows that properties can generate through owners and occupiers agreeing on rents to be paid.

[8] An exception to this statement is income-producing residential real estate.

Rental prices in the space market are driven by the supply and demand for space. Generally, demand and supply correlate with the business cycle, so that changes in the business climate have, in the long run, an impact on the level of rents. Space markets are highly segmented due to the specific needs and requirements of tenants.

In the asset market, on the other hand, the ownership of buildings and their income stream is of interest to investors. Similar to the space market, the prices of properties in the asset market are determined by supply and demand which, in turn, depend on macroeconomic conditions that change over time with a certain cyclicality. The asset market can be viewed as a part of the larger capital market where ownership rights of real estate assets are traded. Figure 2.1 below provides a general overview of the structure of the real estate market.

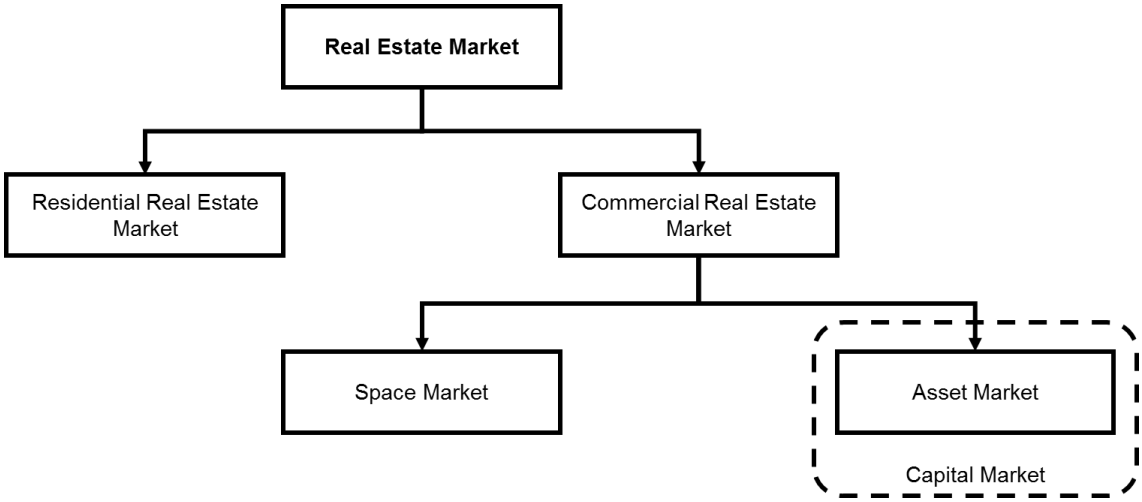


Figure 2.1: Structure of the real estate market[9] (own depiction)

The space and the asset markets can be categorized by property usage into segments which include office, industrial, retail, and hotel properties. This segmentation and the fact that properties are idiosyncratic make the real estate market heterogeneous.

[9] Arguably, the residential real estate market can be divided as well into a space market and an asset market, provided there is no owner-occupied housing included. Historically, investors have focused more on commercial real estate in the U.K. However, an increased interest in residential real estate has been observed in recent years.

The available information in the real estate market and its transparency differ considerably from those in capital markets for two main reasons. The first one concerns the much lower transaction frequency of properties (Fisher, Geltner and Pollakowski, 2007) and the second concerns the absence of an organised trading place such as a stock exchange. A reason for the low transaction frequency is that investors view real estate as long-term investments with holding periods of ten years and longer (Collett, Lizieri and Ward, 2003). The low transaction frequency causes the market to have a low liquidity; since the latter depends on the ease and speed with which properties are traded (Köhler, 2003).

The illiquidity inherent in real estate markets poses a major problem to the investor who may want to apply modern portfolio management models to manage his/her portfolio. This is because the lack of market liquidity impedes the investor's ability to adjust security or sector allocations when necessary. Moreover, rebalancing investment portfolios in such a market comes with high transaction costs. Furthermore, there is no organised market for such assets and the disclosure of financial information on properties is uncommon and opaque.

This lack of transparency implies that real assets markets are very likely semi-strong inefficient. As such, the resultant lag in response to information could create market inertia. A side effect of this inertia is that markets react to shortages and oversupplies of buildings with some delay. This phenomenon is enforced by long lead times in the real estate development and construction process which can result in project completions at economically inconvenient times (i.e. when property prices are beginning to decline). It also contributes to the strong swings in the real estate market.

Despite the inefficiencies in the real estate markets, no arbitrage opportunities are possible because of the inability to short properties.

Regarding the characteristics of properties, it is worth noting that in general, each building is unique due to its location and specific property characteristics (e.g. design and facilities). Unlike commodities, such as oil and wheat, buildings are not interchangeable and cannot be replaced easily; in other words, they are not

fungible. Usually, properties are not divisible and require capital-intensive investments.

Real estate properties are especially characterised by high transaction costs, lengthy contract[10] negotiations and long lead times owing to the necessary duration required for developing and erecting new buildings. The costs of buying or selling a property[11] comprise, among others, agent fees, stamp duty, legal fees, transfer duty, taxes, and land registrations fees. These costs "are generally estimated to be between 5 and 8 per cent of the value of the property investment" (Syz, 2008, p. 23). The time for legal and tax, commercial and technical due diligence, negotiations, and closing procedures can easily take between three to six months or more for commercial properties. These estimates do not include the time it takes to find the right counterparty.

Due to high transaction costs and long transaction time, the property market is considered to have frictions. A third main friction in the market is constraints on short selling (Syz and Vanini, 2011), that is, the impossibility to borrow properties in order to sell them and return them at a later point in time to the original seller after having bought them back at a lower price.

Based on the discussions above, it can be concluded that the peculiarities and specific characteristics of real estate assets do not promote market liquidity or, for that matter, market efficiency. The table below summarises the characteristics at the property level and the real estate market level, respectively.

| **Property Characteristics** | **Real Estate Market** |
|---|---|
| Unique due to location | Heterogeneous |
| Not fungible (no interchangeability) | Decentralised market |
| Not divisible | Not frictionless (costs or restraints on transactions) |
| High transaction costs | Short sale constraint |
| Long lead time for development and construction | Lack of transparency (less than in capital markets) |
| Long transaction time (search, due diligence, etc.) | Inefficient market due to lack of transparency |
| High unit costs | Price inertia |
| | Arbitrage not possible |

[10] Sale and purchase agreement (SPA).
[11] So-called "round-trip" transaction costs.

| Property Characteristics | Real Estate Market |
|---|---|
| | Illiquidity |
| | Incomplete (financial characteristics cannot be reproduced by combining other financial assets) |

Table 2.1: Characteristics of real properties and the real estate market (own depiction)

### *2.2.2 Important Milestones in the Development of Real Estate Derivatives Markets*

This section reviews what can be considered as the most important milestones in the development of property derivatives markets and the resultant financial products. The U.K. is considered to have the most developed market internationally in this regard (Fabozzi et al., 2010). Thus, the discussion is set within the framework of the U.K. market. The possible reasons for the advanced development status in the U.K. are:

- it was the first market to be launched in the early 1990s;
- the availability of commercial real estate indices (provided by MSCI-IPD[12]) that are recognised and accepted by the industry; and
- the efforts undertaken by interest groups to educate practitioners and to develop the market.

Figure 2.2 below illustrates the key milestones in the development of property derivatives markets in the U.K. and the U.S.:

[12] MSCI is an independent provider of research-driven insights and tools for institutional investors.

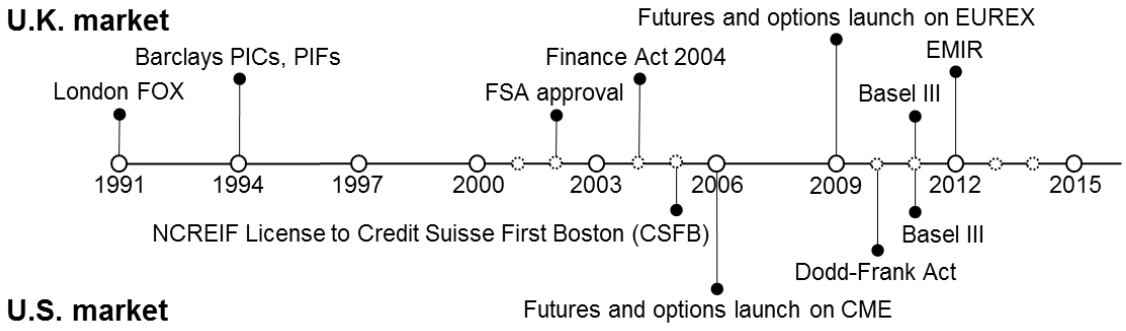


Figure 2.2: Milestones in the development of property derivatives markets in the U.K. and the U.S.[13] (own depiction)

These milestones can be categorised as follows:

**1) 1991 to 2002**

As shown in Figure 2.2, the first important milestone in the evolution of property derivatives markets was the introduction of property futures by the London Futures and Options Exchange (FOX) on May 9, 1991. There were four futures contracts available: commercial property futures, commercial rent futures, residential property futures, and mortgage interest rate futures (Roche, 1995) as detailed in the table below.

| Property Derivative Offered by the London FOX in 1991 | Underlying Index |
|---|---|
| Commercial property futures | IPD[14] Capital Growth Index |
| Commercial rent futures | IPD Rental Growth Index |
| Residential property futures | Nationwide Anglia House Price (NAHP) Index[15] |
| Mortgage rate futures | Mortgage Interest Rate (MIR) Index |

Table 2.2: Overview of the initially offered property derivatives by the London FOX in 1991 covering the U.K. market (own depiction)

The main focus of the London FOX in 1991 was on institutional investors (Adams and Venmore-Rowland, 1991). Among the most active users of the early market were pension funds (Phillips, 2004). The timing of the launch was somewhat unfortunately chosen as investors at that time were not particularly interested in

[13] The market development in the U.S. is briefly described in Appendix A.
[14] IPD stands for the Investment Property Databank and is today part of the MSCI, an independent provider of research-driven insights and tools for institutional investors.
[15] Nationwide Anglia house price index is based on hedonic regression and provided by Nationwide, the U.K. largest building society.

real estate and were actually turning away from this asset class (Baum, 1991). The reasons for the limited interest in property futures were falling property prices at the time of the launch and the associated unidirectional market sentiment. Consequently, the trading volume did not reach the expected levels which adversely affected the liquidity of the contracts. The low liquidity levels proved difficult for those investors wishing to take active positions in the market (McAllister and Mansfield, 1998). Trading was suspended after only five months in October 1991 following news that some traders were trading among themselves supported by the London FOX in an attempt to create artificial liquidity[16] (Case, Shiller and Weiss, 1991; Patel, 1994; Roche, 1995). Indeed, investigations by the Securities and Futures Authority (SFA) revealed that in the five-month trading period, only 7% of the property futures trades were genuine, the remainder was generated artificially by the exchange and privy brokers (Roche, 1995).

Patel (1994) analyses the reasons for the failure of this first launch by focusing on the residential property futures that were based on the Nationwide Anglia House Price (NAHP) index and on the futures on mortgage rates that were based on the Mortgage Interest Rate (MIR) index[17]. She concludes that, due to the lag dependence of the NAHP index, the futures contracts did not provide the same hedging effectiveness as stock index contracts. For Patel, NAHP index lag and the illiquid nature of the "cash" market created substantial time basis risk[18]. Furthermore, the MIR index, as constructed by FOX, lagged behind the LIBOR which also reduced the hedging effectiveness. Patel (1994), therefore, infers from this first market experience that the underlying index should adequately reflect market risk and track the hedged portfolio closely enough while keeping the time basis risk at a minimum. She did, however, not mention how this could be achieved.

Another problem that was identified by Patel concerned the pricing of NAHP index contracts. Due to short sales constraints, market participants could not use the

[16] The exchange provided rebates on trading levies on other contracts to some of the brokers limiting their potential losses up to a certain amount (Roche, 1995) and thus encouraged trading.
[17] The mortgage interest rate index was constructed by FOX using the average daily weighted rates from ten lenders (Patel, 1994).
[18] In this context, time basis risk refers to a mismatch between the futures contract expiry date and the transaction date of properties.

cash market to conduct arbitrage trading and thus had no mechanism to calculate the fair value of these contracts (Patel, 1994). The lack of understanding of "fair value" made it difficult for contracts to be properly priced (Roche, 1995).

Shiller (2008), for his part, argues that the failure of the London FOX property derivatives launch created a bad precedent and slowed the market development, but it did not prove the impossibility to launch property derivatives markets.

After the failure of the property derivatives launched by the London FOX, activity moved to the over-the-counter (OTC) market (Fabozzi et al., 2010)[19]. This is an important step in the development of the market because it changed the principal market player from an exchange to banks in the market[20].

**2) 2002 to 2004**

The second major milestone after the failed FOX property futures launch and the increased OTC activity in the U.K. market covers the period between 2002 and 2004. In 2002, the Financial Services Authority (FSA)[21] allowed life insurance companies in the U.K. to include real estate swaps and forward contracts as admissible assets in the computation of their solvency ratios (Ducoulombier, 2007). They were allowed to treat the value of property derivatives as an asset to

[19] An intermediary step worth mentioning is the unsuccessful attempt to create a screen-based real estate index market (REIM) that would have allowed investors to trade directly in a brokered market without a market maker. The structure of the REIM was reviewed in 1997 by the competent authority and was rejected due to regulatory constraints (life funds were restricted to holding property derivatives) and uncertainties as to the taxation and accounting of property derivatives positions (McAllister and Mansfield, 1998, IPD, 2006).

[20] One of the early adopters was Barclays de Zoete Wedd Plc (BZW) which issued in 1994 so-called Property Index Certificates (PICs) as a response to the bank's requirements to reduce its exposure to the commercial property lending sector (McAllister and Mansfield, 1998). PICs were tradable bonds which paid a quarterly income and a capital redemption amount contingent on the corresponding real estate index performance (PDIG, 2007). The coupon payments were linked to the IPD All Property Income Return Index and the capital redemption value was linked to IPD All Property Capital Growth Index (IPF, 2006). The par value was set at Pounds 100 with contract periods ranging from two to five years. The instrument allowed betting on the market but not against it (Syz, 2008). There were in total six issues reported; in 1994 (Pounds 150 million), 1995 (Pounds 101.5 million), 1996 (Pounds 25 million), 1999, 2005, and 2009. Other instruments that Barclays de Zoete Wedd issued were Property Index Forwards (PIFs) and Property Index Notes (PINs) in 1996 and 1999, respectively. PIFs were based on the IPD UK All Property Capital Growth Index and thus depending only on the capital growth and not on the income return. There was no margin payment required (McAllister and Mansfield, 1998). As an unfunded OTC instrument, they allowed investors to take long or short positions in the capital component of the index. On maturity, a payment was due depending on the movement of the index value relative to the forward price (McAllister and Mansfield, 1998). PINs, on the other hand, were debt instruments with bond-like characteristics (McAllister and Mansfield, 1998). In this way they provided a regular fixed income return (e.g. quarterly) and a redemption based on the IPD index.

[21] Today it is the Financial Conduct Authority (FCA).

set against liabilities (Phillips, 2004). In 2004, the Inland Revenue[22] clarified the fiscal treatment of property derivatives in the U.K. It stipulated that no stamp duty, land tax, or other duties shall be levied when issuing or transferring property derivatives (Syz, 2008). The fiscal treatment of income and loss arising from property derivatives contracts is explained in Appendix B.

In a nutshell, it can be argued that by 2005 all of the regulatory and fiscal constraints had largely been removed (IPF, 2006), and total return swaps and structured notes dominated the commercial property derivatives trades, mainly among banks (Baum, 2015).

A common feature of the early days of the market evolution was that strategic partnerships emerged between real estate brokerage firms and interdealer brokers (e.g. between CBRE and the GFI Group in 2005, and between Cushman & Wakefield and BGC Partners in 2006). More importantly, there were market makers (active in the market) who had the capacity to warehouse risk[23]. Since the market activity attenuated with the beginning of 2009 (as can be seen in Figure 1.1, p. 2), the majority of these brokers and dealers have withdrawn from the market[24].

**3) 2004 to 2009**

In 2004, IPD granted licenses to various banks allowing them to use the IPD indices as underlying instrument for property derivatives. The period between 2004 and 2009 was characterised by property derivative trades in an OTC market, mainly among banks. In 2009, the next important step in market development was made when the European Exchange (Eurex) began offering commercial property derivatives. The annual futures contracts are based on various quarterly U.K. indices provided by MSCI-IPD. The trading volumes and open interests, however, remained comparatively low as depicted in Figure C.1 and Figure C.2 in Appendix C.

[22] Today, it is the HM Revenue and Customs.
[23] Entering a trade with one counterparty while searching the market for the second counterparty to offset the trade.
[24] The extent to which this constitutes a market entry hurdle is discussed in Chapter 4.

### 4) 2009 to present

The period after 2009 was characterised by more regulatory activity as a response to the global financial crisis which is said to have had an impact on the property derivatives market as well. The two most important reforms affecting the European market are Basel III and the European Market Infrastructure Regulation (EMIR). The Basel Committee on Banking Supervision developed with Basel III a set of reforms which require banks to increase their capital strengths and liquidity coverage ratios in order to ensure capital resilience in times of financial stress. The reforms concern, as well, the capital requirements for counterparty credit exposures arising from banks' derivatives activities (BIS, 2011). Moreover, the reforms provide "incentives to move OTC derivative contracts to central counterparties [CCP], thus helping reduce systematic risk across the financial system" (BIS, 2011, p. 3). In addition, the European Market Infrastructure Regulation (EMIR) from 2012 requires "that eligible OTC derivatives between covered counterparties are cleared through an CCP [central counterparty] registered in Europe" (Gregory, 2014, pp. 48-49).

Currently[25], there are nine index futures contracts listed on the Eurex on various quarterly MSCI-IPD indices covering the different sectors and sub-sectors of commercial real estate in the U.K. which are illustrated in Figure 2.3. The individual contracts are based on calendar years with quarterly index intervals. The settlement is in cash on the first exchange day following the final settlement day[26].

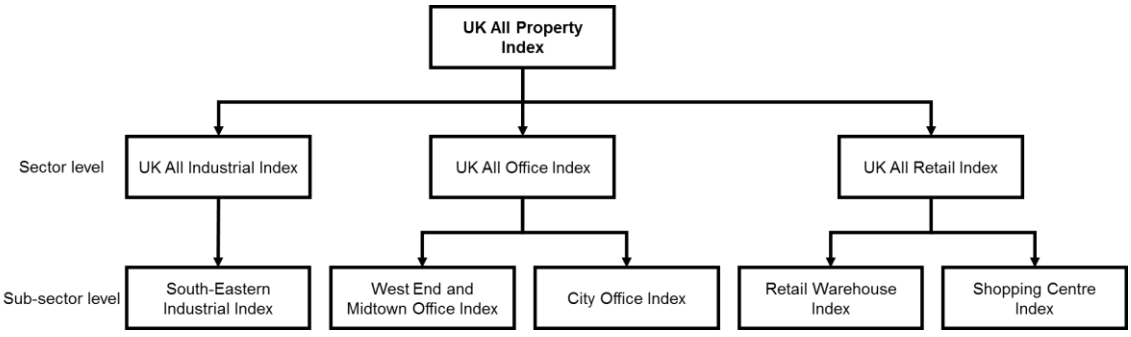


Figure 2.3: Topology of MSCI-IPD total return indices used as underlying for property derivatives in the U.K.

[25] As of March 2017.
[26] The final settlement day is the seventh calendar day after the last exchange day in January.

Eurex has a 10-year agreement with MSCI-IPD to use its proprietary data on commercial property values for listing property futures and options[27] starting with 2009 (Baum, 2015). Notwithstanding any contractual details, the year 2019 would therefore mark a possible exit year for Eurex in the event that the contracts do not generate sufficient trading volume and liquidity.

The global financial crisis (GFC) from 2007 to 2009 and the consequent strengthening of global capital and liquidity rules had a severe impact on the interbank trading that dominated the OTC property derivatives market. Trading volume decreased after 2008 which can be attributed to the reduced involvement of banks in the market[28], among others. Baum (2015) is of the view that the regulatory changes forced banks out of the market. As a consequence of the changed regulations, such as Basel III as well as the European Market Infrastructure Regulation (EMIR) of 2012 and the Dodd-Frank Act[29] in the U.S. of 2010, banks are required to hold more capital on their balance sheets for non-centrally cleared contracts and for open positions, with the aim of imposing clearing of standardised OTC derivatives through a central counterparty (CCP)[30].

Today, property derivatives trading takes place on the Eurex exchange and in its futures referenced to the MSCI-IPD U.K. indices. It is worth mentioning that, in contrast to the market development in the U.S., most institutional property investors in the U.K. do not invest in residential property (FOW, 2008)[31].

To sum up, the evolution of the property derivatives market started with their launch on the London FOX but turned out to be unsuccessful. Subsequently, market activity moved to the OTC market which flourished after 2004 with an active interbank market. Finally, with the GFC and the withdrawal of banks from the market, trading activity returned to the exchange (Eurex).

[27] Options are currently not available on Eurex.
[28] The structural change in the market that took place in the aftermath of the GFC is discussed in depth in section 4.7.2.
[29] In the U.S., the Volcker Rule of the Dodd-Frank Act prevents bank from proprietary trading and from trading that does not benefit customers.
[30] The reasons that led the banks to leave the market are discussed in detail in section 4.7.3.
[31] The development of the property derivatives market from a U.S. perspective is outlined in Appendix A.

### *2.2.3 Prerequisites for Successful Real Estate Derivatives Markets*

Having discussed the characteristics and peculiarities of real estate markets, and the various unsuccessful attempts to develop property derivatives markets, it is expedient to analyse and assess the prerequisites for successful real estate derivatives markets. As already set out at the beginning of the chapter, due to the scarcity of literature on the topic, the discussion of the relevant literature includes both residential and commercial property derivatives.

Gemmill (1990) is one of the first authors to examine the necessary conditions for a successful housing futures market. According to him, the feasibility of such a market depends on the existence of a sufficient number of participants willing to use the market to hedge their exposures to price risks. He suggests that there are five main conditions that affect the demand for hedging exposures from which the first two ones are considered the most important:

1) the size of the underlying market;
2) the unpredictability of prices;
3) a sufficient number of independent buyers and sellers of the commodity;
4) a sufficiently homogeneous commodity; and
5) no other satisfactory means of hedging.

By comparing the number of transactions in the housing market with that in government bonds, Gemmill concludes that with 1.8 million transactions on houses in the U.K. in 1989 – which was more than three times the number of government bond transactions – it would appear likely that the number of house transactions is sufficient to support a futures market. With regard to the unpredictability of prices, he argues that house prices depend mainly on personal incomes, inflation rates, and interest rates. But these factors are difficult to predict notwithstanding ‘self-feeding’ effects in house prices for short periods. Based on the number of house transactions, he deduces what would be a sufficient number of independent buyers and sellers, although the comparatively small transaction amount for each buyer and seller causes some concern. Admitting the homogeneous nature of residential real estate, Gemmill argues that “house prices throughout the land do tend to rise and fall together” which is the reason why he

considers the “commodity” sufficiently homogeneous. His last proposed condition is considered fulfilled due to the absence of other satisfactory means of hedging. In conclusion, Gemmill considers all five conditions that affect the demand for hedging fulfilled.

Syz (2008) and Baum (2015) provide evidence in favour of the argument that the size of the U.K. estate market is sufficient. According to them, the commercial and residential real estate markets account together for the largest asset class in the investment world.

For Gordon and Havsy (1999), there are three additional, necessary but not sufficient, conditions for a liquid real estate derivative market. First, there should be “a large actively traded underlying market of assets” (p. 40). This condition is in line with Gemmill’s first condition. Secondly, there must be “the presence of sophisticated institutional investors who have both the skills and the need to manage risk” (p. 40). The third condition is the availability of “reliable [indices] or real-time pricing of underlying assets” (p. 40), respectively.

The demand from the actual trading community for the market was also highlighted by Roche (1995) as a factor for a successful futures market. The need to manage risk depends directly on the volatilities in asset prices. Whether this condition is fulfilled or not remains debatable since volatility levels are lower than those of equities, for instance.

Given the illiquidity in the commercial property derivatives market and the absence of a residential property derivatives market, the condition of the presence of sophisticated investors is not fulfilled. With regard to the index, it can be argued that at least in the commercial real estate market in the U.K. there is an index present that is recognised by the industry. Syz (2008) and Deng and Quigley (2008) argue that the key to a successful property derivatives markets lies in the development of transparent, reliable, and replicable indices for various geographic regions and property types. The importance of the real estate index as a reliable instrument for the measurement of the performance of the underlying assets is discussed in section 2.3.1.

Gordon and Havsy (1999) believe that once the three conditions are fulfilled, a "precipitating event or stochastic shock" (p. 40) would create a 'volatility spike' followed by a rapid development of new risk management tools. However, with the benefit of hindsight, it can be argued that the recent global financial crisis (2007-2009) and the associated volatility spikes in real estate prices around the globe have not led to the development of new risk management tools such as property derivatives. To the contrary, the trading volume actually decreased in the aftermath of the global financial crisis and the market liquidity has dried up ever since (see Figure 1.1, p. 2).

As in other derivatives markets, there are usually three broad categories of traders present, namely: hedgers, arbitrageurs, and speculators (Hull, 2009). Hedgers want to protect their open positions by entering into contracts that reduce or eliminate the adverse impact of changes in the price of the underlying asset. Arbitrageurs on the other hand, seek to take advantage of relative value mispricing between the derivative and the underlying asset. Speculators make bets on asset prices with the sole intention of generating profits and they "enable the market to clear and operate efficiently" (Baum, 1991, p. 237).

The importance of hedgers, arbitrageurs, and speculators for the property derivatives market is that they provide the required diversity in the investor base because too much homogeneity in the market makes trading difficult or even impossible (AFMA, 2007).

The table below provides a summary of the prerequisites and an assessment as to whether the conditions are fulfilled.

| **Summary of Prerequisites** | **Assessment if Condition Fulfilled** |
|---|---|
| Size of the underlying market and sufficient number of transactions occurring in the market (Gemmill, 1990, Gordon and Havsy, 1999, Syz, 2008) | **Residential real estate market:** Fulfilled in terms of size of the underlying housing market and in terms of a sufficient number of transactions.<br><br>**Commercial real estate market:** Fulfilled in terms of size of the underlying market but not fulfilled in terms of sufficient number of transactions. The underlying market is not liquid enough to construct a transaction-based price index as in other asset classes. |
| Unpredictability of prices (Gemmill, 1990) | There is auto-correlation ("self-feeding effect") in the short-term in both the residential and commercial real estate markets. Historic events such as the Brexit in 2016 have shown that there is not always certainty as to the direction of the market. In addition, while the overall direction might typically be predictable in the short-term, a precise forecast with regard to the capital return |

| Summary of Prerequisites | Assessment if Condition Fulfilled |
|---|---|
| | component in commercial real estate markets is almost impossible because of its dependence on various macro-economic factors. |
| Sufficient number of independent buyers and sellers (Gemmill, 1990) | In theory, there should be sufficient independent sellers and buyers in both the residential and commercial real estate market; but in practice the number of traders is not sufficient as demonstrated by the illiquidity in the commercial property derivatives market and the absence of a residential property derivatives market. The reasons for the illiquidity are not known and can only be conjectured. |
| Sufficiently homogeneous asset (Gemmill, 1990) | Not fulfilled due to the heterogeneous structure of the real estate market. |
| No other satisfactory means of hedging (Gemmill, 1990; Syz, 2008) | Neither in the residential nor in the commercial real estate market are tools available that enable hedging against declining asset prices. Therefore, this prerequisite can be considered fulfilled. |
| Availability of reliable price indices (Gemmill, 1990, Gordon and Havsy, 1999, Syz, 2008) | **Residential real estate market:** There is currently no index available in the U.K. that meets the requirements for an underlying instrument of an exchange-traded derivative.<br><br>**Commercial real estate market:** At least for the U.K., the index quality is accepted by the investment community which is not necessarily the case for indices covering other countries. |
| Presence of sophisticated institutional investors who have both the skills and the need to manage risk (Gordon and Havsy, 1999). Demand from the actual trading community (Roche, 1995) | Not fulfilled. Institutional investors do not participate actively in the market. They watch the market from the side lines. |
| Volatility of property prices that justifies hedging | Partly fulfilled, at least for the capital return component in commercial real estate markets. Overall, the volatilities of commercial real estate returns are lower than the ones in other asset classes (e.g. equities). |
| Diversity in the investor base | Not fulfilled. |

Table 2.3: Summary of the prerequisites for successful property derivatives markets in the U.K. and their assessment (own depiction)

### *2.2.4 Advantages and Disadvantages of Property Derivatives*

In this section, the main advantages and disadvantages associated with the use of property derivatives, identified in the academic and professional literature, are successively summarised. It is, therefore, divided into two parts. The first part deals with the advantages, while the second part deals with the disadvantages. The main purpose is to highlight their importance to potential users.

**(a) The key advantages of property derivatives:**

*(1) Portfolio management*

One of the most important fields of application of property derivatives is portfolio management. Given a liquid market, property derivatives would enable the construction of synthetic portfolios in an easier, faster, and more cost-effective

fashion than with physical real estate (Baum, 1991). Due to the swift and inexpensive acquisition process, property derivatives allow a portfolio manager to employ short-term strategies that would not be possible with physical real estate (IPF, 2010). In addition, allocation strategies can be realized that allow risk transfer across asset classes, real estate sectors, borders, and geographical regions. The ease and speed of doing this allows tactical asset allocations[32] which might be of interest to asset allocators; by doing so, they can diversify across asset classes and also rebalance asset allocations when necessary. Moreover, access to the real estate asset class would be granted to investors for whom physical real estate is usually inaccessible (Fabozzi et al., 2010).

Another advantage, in this regard, is the possibility to out-perform the average market return by combining physical and synthetic real estate investments; that is, to generate significant alpha without affecting the beta of the portfolio (Baum, 1991; Fisher, 2005; Lim and Zhang, 2006). Furthermore, leverage can be increased, when choosing a derivative, without the requirement of making an upfront payment (Buttimer, Kau and Slawson, 1997) because the investment requires only a margin.

Traditionally, the commercial real estate market is a long-term investment market which allows only passive buy-and-hold strategies. This limitation becomes a problem when a property fund, for example, gets redemption requests in times of weakening real estate prices. In this case, the fund manager would be forced to sell the properties at prevailing market prices. With property derivatives, however, it is possible to take short positions therein and so avoid selling the properties at unfavourable prices (IPF, 2010). With the use of property derivatives, fund managers would be able to increase or reduce their effective property exposures more efficiently, and to apply hedging strategies (Baum, 1991; Baum, 2015). Nevertheless, applying a cash-and-carry strategy will still be difficult since a portfolio that comprises a short position in derivatives would have to include a large number of properties in order to replicate the returns of the underlying market (Euromoney, 2007).

[32] Increasing/decreasing the weight of real estate in the short-term relative to equities, bonds, or other instruments.

Another reason to increase or reduce the exposure to the real estate markets is its inherent cyclicality which could be managed more efficiently via property derivatives (Baum, 2015) by taking long or short positions in the index. In addition, there might be a temporary over- or underexposure to certain real estate sectors which can be adjusted using property derivatives (IPF, 2010) by shorting one sector index and going long in another.

*(2) Transaction time*

The second most important advantage relates to the speed of trade (Baum, 2015). Property derivatives can be used to bridge the long periods of time necessary to sell or buy properties (IPD, 2012), and they create or reduce almost instantly property exposure. This is a major advantage in comparison with buying and selling physical real estate which can take up to six months or longer.

*(3) Acquisition and management costs*

A strong argument that speaks for property derivatives is that they enable significant reductions in transaction costs and the elimination of management costs associated with the ownership of real estate. The round-trip transaction costs associated with ownership amount to 6-8% of the purchase price in the U.K. and 4-6% in the U.S. (Lim and Zhang, 2006). These costs stand in sharp contrast to transaction costs of 0.5% for property derivatives (IPD, 2012). The annual costs of the ownership of direct real estate and non-listed funds in the U.K. are estimated to be 2.48% and 2.95%, respectively (Ducoulombier, 2007 citing Goldman Sachs).

(4) Property pricing

Transparency of the real estate markets has been a frequently mentioned point that is in need of improvement. Since there is no central trading place for properties, the current market prices are not known. The most recent transaction prices are very often used as proxies for current transactions. It is important to note that prices are in general determined through the interactions between buyers and sellers. Nevertheless, property derivatives pricing may give some indication of the investment community's sentiment as to their price expectations with regard to the underlying property market. For instance, prices on futures

markets could serve as an indicator of the expectations of market participants of current spot prices.

In well-functioning property derivatives markets, this type of information could be a useful element in the investment decision process. Thus, property derivatives should improve the efficiency of the real estate market by enabling efficient risk sharing and enhancing its transparency (PDSG, 2007). The price discovery mechanism, via the derivative markets, may also reduce the volatility of property prices since the information about the underlying real estate market is conveyed faster and more efficiently (Drouhin and Simon, 2014).

*(5) Taxes, duties and fees*

The fiscal advantages associated with derivatives particularly concerns international real estate investors. Indeed, under the current U.K. legislation, returns on foreign derivatives are not subject to withholding tax (Baum, 2015). This is not the case with rents received from abroad (Johnson and Miller, 2005). Thus, it may also be advantageous to invest in derivatives abroad instead of directly investing in real estate. This is even more true when one factors in the fact that trading in derivatives is not subject to stamp duties and agent fees[33], unlike trading in physical real estate (Syz, 2008).

**(b) The key disadvantages of property derivatives:**

In the literature, seven factors can be identified as impeding the development of an efficient real estate derivative market; these factors are briefly presented below.

*(1) Real estate market indices*

The characteristics of real estate indices[34] constitute a major and serious impediment to the development and proliferation of property derivatives markets. The quality of real estate indices causes some concern among researchers and practitioners. A particular case in point is the basis risk due to the difference

[33] Except brokerage fees which are much lower for the derivative than for physical real estate.
[34] Commonly known index issues are the low publication frequency, presence of temporal lag in the published index levels, smoothing of the volatility in the underlying market, limited data sources, and serial correlation which are discussed in detail in section 2.3.1.

between the return performance of a portfolio and that of the underlying index. The basis risk is important for investors who want to hedge their portfolio using property derivatives. For them the “[h]igh basis risk translates into ineffective hedging” (Lecomte and McIntosh, 2006, p. 121).

*(2) Margin calls*

Counterparty risk is fairly limited with property derivatives since they are now cleared through Eurex Clearing. However, the futures price may change in such a way that the exchange will request a margin call which needs to be managed by the investor accordingly. In order to do so, the right risk management and accounting systems need to be in place.

*(3) Liquidity*

Liquidity is understood as trading volume that allows investors to enter and close out a derivative position swiftly and at market prices. One possible reason for the reluctant use of property derivatives by real estate investors is the lack of liquidity in the market (Lim and Zhang, 2006) which acts like a barrier in itself[35]. For instance, the trading volumes of the futures contracts traded on the Eurex and CME are still low compared to the volume in other derivatives (e.g. interest rate, currency). In 2016, there was a total number of 1,200 property futures contracts traded on Eurex and 146 housing futures contracts traded on CME. With such low levels of liquidity comes the risk of not being able to close out a position before maturity.

*(4) Leverage in the derivative position*

Leverage refers to investing a certain amount of capital in a derivative position, a so-called margin, and having exposure to a multiple of the invested amount; the notional amount. For instance, when entering into a property futures contract, the investor is required to deposit a margin, usually between five and twenty per cent of the notional amount (Baum, 2015). This leverage leads to an attractive return on capital when gains are realised, the opposite is true for losses which may be higher than the invested capital.

[35] A detailed discussion of this topic follows in the analysis and discussion of the conducted interviews in Chapter 4.

*(5) Administrative hurdles*

Administrative hurdles refer to the appropriate systems, policies, and procedures within an organisation that need to be set up in order to manage property derivatives positions and the associated risks on a day-to-day basis. An organisation which is used to trading solely physical real estate will have to make more effort to allocate resources and to gain the necessary knowledge than a multi-asset manager who is already familiar with trading currency swaps or the like. There is an additional in-house management risk which must be actively managed (Baum, 2015). This requires the allocation of resources and a capital commitment.

*(6) Mark-to-market the derivative position*

Mark-to-market refers to the procedure of determining the fair value of a derivative position, if it were sold in the market. Additional risks that are introduced are the marking to market of contracts and their volatilities (IPF, 2010). The value of derivatives contracts can move more quickly than the relatively smooth prices of physical property and their performance will be different from that of the underlying index prior to maturity (Baum, 2015). Price changes are immediately apparent and effective with property derivatives, whereas with physical real estate it requires a transaction to realise the gain or loss. The main disadvantage is that the derivative position introduces more volatility than the physical real estate would do. In addition, the physical real estate usually provides an income until the property is sold.

*(7) Portfolio Management*

Another disadvantage concerns the management of synthetic portfolios and the fact that no rewards for good stock selection can be gained (Baum, 1991). With a property derivative position that is referenced to a real estate market index, it is not possible to generate alpha, i.e. to outperform the index. With physical property on the other hand, the fund manager would be able to outperform the index by selecting the best performing properties.

### *2.2.5 Users of Property Derivatives*

In general, there are three broad categories of traders in derivatives markets: hedgers, speculators, and arbitrageurs (Hull, 2009). The academic literature focuses on the first two groups. The division of potential users of property derivatives into these categories is not straightforward because, for portfolio management, a trader may be simultaneously speculating on one market and hedging on another.

In the past, most of the market activities in the U.K. were performed by banks and pension funds (IPF, 2010), as shown in Figure 2.4 below[36].

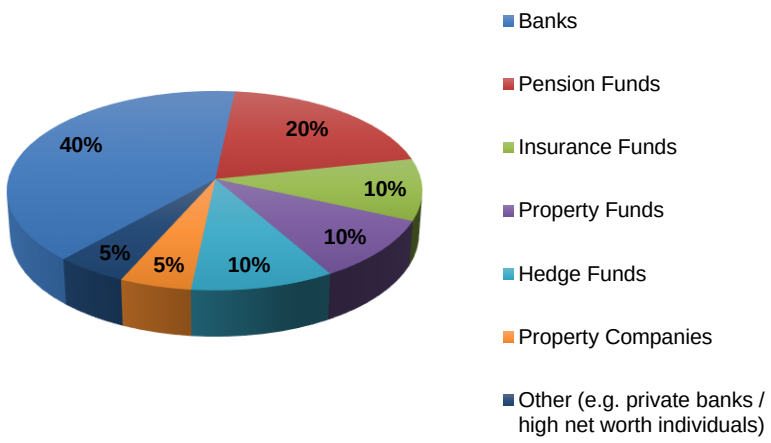


Figure 2.4: Estimated share of volume by type of user (Source: IPF (2010), p. 6)

Banks have played a dominant role in the past as originators of property derivatives, accounting for 40% of the trading volumes. Although the involvement of banks in the property derivatives market has dramatically changed, they still represent an interesting group of users, especially those involved in mortgage lending activities or commercial loans. In fact, these markets provide possible avenues for these banks to hedge against default.

Besides their hedging potential, an often-highlighted benefit of property derivatives is their diversification effect. Insurance companies and pension funds could benefit from expanding their diversified portfolios to include real estate

[36] The structural change that took place in the property derivative market is discussed in section 4.7.2.

(Fabozzi et al., 2010) without incurring high transaction costs. Property derivatives would allow them to rebalance their multi-asset portfolios efficiently (IPF, 2010). In the same vein, asset managers, portfolio managers, property funds and dealers could hedge their price risk exposure in domestic and foreign real estate markets or adjust their sector allocations easily (Fabozzi et al., 2010).

Furthermore, listed property companies and hedge funds are potential users who apply more complex investment strategies, involving different sectors, sub-sectors, or asset classes (IPF, 2010). Hedge funds could play an important role in the development of the market as they would likely act as speculators and thus provide liquidity to the market.

Other potential users are building societies and investments banks (Ducoulombier, 2007) who wish to protect themselves against falling real estate prices or participate in bull markets, respectively. Investors in close-ended real estate funds could reduce their effective allocation to real estate by selling the derivative but not their investments in the funds (Fisher, 2005).

Table 2.4 summarises the potential end users of property derivatives and their corresponding strategies.

| **End user** | **Strategy** |
|---|---|
| Mortgage lenders/investors/insurers | Hedging of default risk |
| Insurance companies and pension funds | 1. Tactical asset allocation<br>2. Synthetic rebalancing<br>3. Strategic asset allocation<br>4. Hedging of price risk |
| Asset allocators & multi-asset managers | Manage real estate exposure in an efficient and low-cost way |
| Property fund managers | 1. Reduce tracking error<br>2. Reduce cash drag<br>3. Portfolio rebalancing between sectors/sub-sectors<br>4. Lock-in future property returns to give certainty of return and the potential for risk reduction at the portfolio level |
| Property companies and property funds | 1. Hedging of price risk<br>2. Tactical asset allocation<br>3. Synthetic rebalancing<br>4. Alpha extraction |
| Hedge funds | 1. Relative value strategies<br>2. Long/short strategies |
| Investment banks | 1. Market making (liquidity provision)<br>2. Hedging of price risk |
| REIT managers | 1. Relative value opportunities<br>2. Smart beta strategies |
| Defined contribution (DC) funds | Providing exposure to real estate in an efficient and low-cost way |

Table 2.4: End users and their strategies (Source: Ducoulombier, 2007, p. 11; IPF, 2015, p. 1)

Another classification of potential users is possible by dividing them into buyers and sellers of real estate risk. Buyers are seeking exposure to the real estate market and the sellers wish to reduce it. Table 2.5 below lists some examples from each of the two groups.

| Buyers of Real Estate Risk | Sellers of Real Estate Risk |
|---|---|
| Retail investors | Corporates with non-strategic properties |
| Institutional investors | Mortgage lenders |
| Building savers | Homeowners |
| Real estate portfolio managers | Real estate portfolio managers |
| Hedge funds | Hedge funds |
| | Developers |
| | Home suppliers |

Table 2.5: Potential buyers and sellers of property derivatives (Source: Syz, 2008, p. 25)

In summary, the separation between the three broad categories of property derivative users presented at the beginning of this section is in practice less straight forward and a mix of strategies is more conceivable. Hedgers will be interested in preserving the values of the properties they are physically invested in, especially in times of higher uncertainty (e.g. Brexit in 2016). Speculators take bets on the future real estate market development with the intention to make profit. Arbitrageurs, for their part, seek to earn riskless profit by seizing opportunities provided by disequilibria in the market pricing mechanism.

## 2.3 Typology of Existing Property Derivative Markets

### *2.3.1 Types of Underlying Real Estate Indices and their Valuations*

For the sake of contextualising the current research, this section will present the characteristics of the most common forms of real estate indices that are discussed in the academic literature and that are important to property derivatives. Some of their characteristics, such as methodologies, designs, robustness, validity, and representativeness, may pose a problem to the use of property derivatives and may constitute reasons for their reluctant use by real estate investors.

The section starts with a discussion of the importance of real estate indices in the context of property derivatives. Thereafter, the methodologies, advantages and disadvantages of the most common index types will be explained and their suitability for property derivatives assessed. Finally, the general index requirements, for suitable underlying indices, are discussed.

#### 2.3.1.1 The Importance of Real Estate Indices for Property Derivatives

Gemmill (1990) and Baum (1991) are amongst the early researchers to underline the importance of the degree of correlation between real estate indices and the exposed properties. For them, the success of property derivatives can be underscored by the following three points:

- First, a reliable index that shows high integrity[37] is important for the acceptance of property derivatives. The index must be credible and accurately reflect the price movements in the underlying market (Clapham, Englund, Quigley and Redfearn, 2006). It is noteworthy that accuracy influences the hedging effectiveness which ultimately has a bearing on the acceptance of property derivatives. For Clapham et al. (2006), the integrity of the index may be the most important factor in developing a successful property derivatives market.
- Second, a robust modelling of the index is a prerequisite for the correct theoretical pricing of property derivatives. The underlying model and the associated key assumptions have an immediate impact on the pricing, and thus on the general acceptance of property derivatives.
- Third, one of the possible barriers to a widespread use of property derivatives may be associated with the characteristics of the real estate indices which merit closer analysis.

Generally, the statistical quality of a real estate index is defined by the frequency with which index returns are reported, the frequency of revaluation observations (transaction price observations or reappraisals) per property, the number of properties that are tracked by the index and the index methodology (Geltner and

[37] Refers to the quality of the index in terms of its construction method and data input.

Ling, 2006). Unlike stocks, properties are not traded frequently, hence measuring their performance is difficult. This thin trading problem creates basis risk and it must be taken into account in the choice of a methodology for constructing indices.

The composition of transacted properties can vary considerably in quality and in quantity from one period to another due to the heterogeneous structure of the real estate market. For example, in the U.S., the NCREIF[38] flagship index NPI is a composite index that includes apartments and hotels, as well as industrial, office, and retail properties. Changes in the composition of the portfolios of the data-contributing members will also affect the representation of the individual property types (e.g. apartment, hotel, industrial, office, and retail) in the index. It is therefore important to get the index construction method right before starting to trade property derivatives (Shiller, 2008).

#### 2.3.1.2 Types of Real Estate Indices

There are three main types of indices, with distinctive methodologies, that have been proposed as proxies for the performance measurement of real estate (Eichholtz, 1997). These are the appraisal-based indices, transaction-based indices, and indices based on share prices of listed real estate companies or Real Estate Investment Trusts (REITs)[39]. The transaction-based indices can be further broken down into repeat-sales indices and hedonic indices. Appraisal-based indices are constructed from valuation data of properties or portfolios. Transaction-based indices on the other hand are based on the actual property transaction data. Figure 2.5 provides a general overview of these indices.

[38] NCREIF stands for the National Council of Real Estate Investment Fiduciaries which is a not-for-profit trade association that collects and processes commercial real estate data and that produces performance measurement indices for the U.S. market. Their flagship index is the NCREIF Property Index (NPI). For further information, see https://www.ncreif.org/index.aspx.

[39] It must be noted that derivatives written on REITs will not be discussed in this thesis for two reasons. First, the performance of REITs is influenced by management skills and levels of debt on the asset and liability side of the balance sheets as well as the associated interest rate risk (Syz and Vanini, 2009). Secondly, it is commonly known that shares of listed companies or REITs correlate strongly with financial markets (see Case et al., 1993, Eichholtz, 1996).

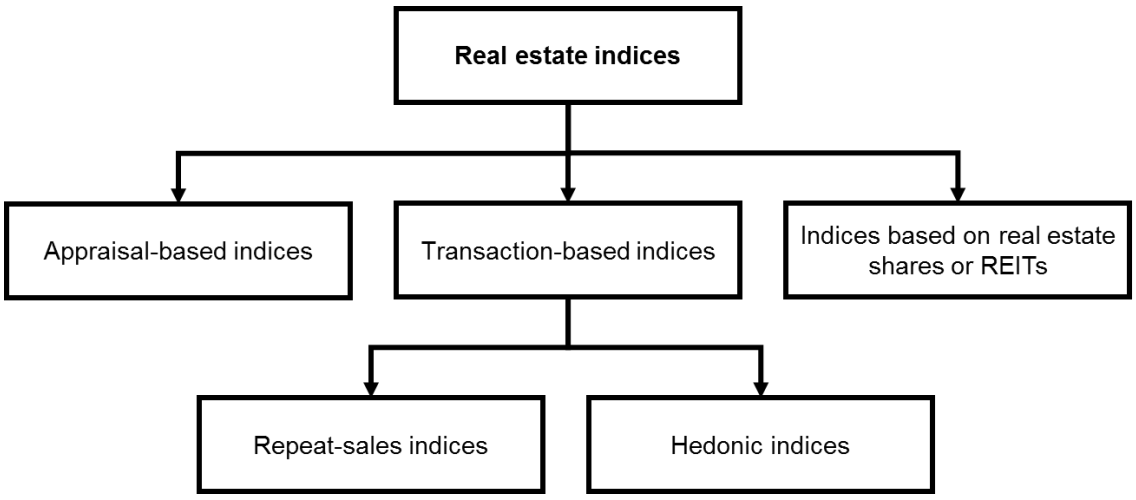


Figure 2.5: Overview of real estate indices (own depiction)

Another differentiation of indices is based on the type of real estate that they track. The two main categories in this context are the residential (e.g. housing) and the commercial (e.g. office, retail, hotel, and industrial) real estate indices.

In order to reduce the influence of heterogeneity of properties on the index quality, indices are usually grouped by sectors (e.g. office, retail, and industrial). The index value may represent either the total return or, depending on the index methodology, its constituent parts; namely capital growth and income return.

The amount of capital invested per property is lower in residential real estate markets than in their commercial counterparts. The number of market players and transactions, in turn, is higher in residential real estate markets. Consequently, more transaction data is available which explains why transaction-based indices are more commonly used to track the performance of residential real estate (Syz, 2008).

The transaction frequency of commercial properties is lower than that of residential properties; that is why transaction data are scarce for the former. Since there are no sufficient transaction data available to construct an index, the value of commercial properties is appraised at regular intervals (e.g. monthly, quarterly, or annually). Appraisal-based indices lend themselves better to performance measurement of commercial real estate (Donald, 2005; Syz, 2008)[40].

[40] Both index types are discussed in more detail in the next sections.

#### 2.3.1.3 Appraisal-based Indices

Appraisal-based indices are based on periodic valuations of properties. These valuations determine the best estimate of their current market value. They are performed by certified real estate appraisers who estimate the market value of the properties at a given point in time. The valuations are linked from one period to the next and "each successive index value is calculated by multiplying the preceding index value by (1+montly return)" (MSCI, 2014, p. 14) in the following way:

$$Index_{t=0} = 100$$

$$Index_{t+1} = Index\ t * (1+TR_{t+1}/100)$$

Where $TR_{t+1}$ is the total return in month t+1 expressed as decimal.

In reality, however, the appraised values are dispersed around the true market values (Geltner and Ling, 2006). The valuations assume that markets are in equilibrium. This assumption does not, however, always hold (Chegut, Eichholtz and Rodrigues, 2013). The key challenges in constructing an appraisal-based index include obtaining sufficiently large sample sizes, regular data collection and appraisals, and devising a common valuation approach (Parker, MacFarlane, Newell and Rossini, 2007).

The most important real estate index provider, for measuring the investment performance of commercial real estate in the U.K., is the MSCI-IPD. The methodology of this index is explained in more detail in Appendix D.

An advantage of the appraisal-based index methodology is that it does not require transaction data and it thus allows a quarterly or monthly index frequency depending on the frequency of valuations. In addition, a wide range of sector indices and sub-indices can be designed using this methodology.

There is, however, a range of disadvantages associated with appraisal-based indices which limit their reliability and usefulness as an underlying instrument for property derivatives.

First and foremost, appraisal-based indices are not based on real transaction data and are therefore an artificial construct. Since the appraisals are not conducted simultaneously and since there is a tendency for appraisers to be influenced by historical property prices, a temporal lag is introduced into the index compared to market price changes and this lag smooths out market volatility (Geltner and Ling, 2006)[41].

The consequence of the lag for the index validity is twofold. First, the index lag introduces time basis risk. Secondly, the understated volatility creates a cross-hedge basis risk and renders the hedge less efficient.

Geltner and Fisher (2007) add three other implications of the temporal lag:

- First, it gives the index inertia and predictability (positive serial correlation) which causes the expected future returns to differ from the market returns;
- Second, the index can have different risk characteristics compared to the market it is supposed to track;
- Third, the correlation with other financial assets can be dampened.

Any form of distortion in the performance tracking by real estate indices constitutes a threat to their acceptance and usefulness and may have an adverse effect on potential users.

As already pointed out by Geltner and Fisher (2007), the asynchronous valuation of properties introduces autocorrelation into the index. This autocorrelation makes the index values behave like moving averages (Brown and Matysiak, 1995) and therefore, creates a certain degree of predictability which may cause homogenous market sentiments among investors and exacerbates the endeavour to match opposing market views (i.e. when bringing the short and long side together).

According to Lizieri, Marcato, Ogden and Baum (2012, pp. 782-783), over the period of 1981-2007, the “IPD UK All Property Index” returns exhibited a first

[41] Further details on unsmoothing procedures can be found in Fisher et al. (1994).

order autocorrelation of 0.357 indicating that 13% of the current year's returns can be explained by the returns from the previous year. In the period from 1978 to 2010, the coefficient of determination ($R^2$) is even higher at 48% (Rehring and Steininger, 2011). The autocorrelation is not always positive, but alternating (Fabozzi, Shiller and Tunaru, 2012), which reduces the predictability in the long run.

The time series analysis of real estate prices requires special attention because empirical research results show that the IPD indices (for all property, office, retail, and industrial) are clearly characterised by non-stationarity and drifts and trends (Myer, Chaudhry and Webb, 1997). This non-stationarity implies that standard statistical tests cannot be applied because the conditional means, variances, and temporal autocorrelations are time-variant. These statistical index properties are important considerations when modelling the real estate index. Furthermore, these indices are also characterised by long-run mean reversion (Fabozzi, 2009). Consequently, if these characteristics are not taken into account, statistical valuation techniques would tend to underestimate the risk levels of the indices (Myer et al., 1997; Syz, 2008). This tendency should be of particular concern if the index distribution is flat tailed (i.e. in case of kurtosis) (Syz, 2008).

A last point that distinguishes real estate indices from those of other asset classes is the so-called "index revision or backward adjustment". Since the two principal index providers -- the MSCI-IPD in the U.K. and NCREIF in the U.S. -- depend on the data of their contributing clients and members, it may be necessary to revise the indices after their first publication and adjust them backwards to account for new information from new data contributing members, late data submissions, and for the treatment of sold properties (Lecomte and McIntosh, 2006) all of which could change the composition of the index.

In summary, it can be argued that the suitability of appraisal-based indices for use as underlying assets is constrained by such factors as time lag, autocorrelation, volatility smoothing, and revision.

#### 2.3.1.4 Transaction-based Indices

Transaction-based indices are constructed from empirical observations of ex post transaction prices of properties. The basic approach consists of comparing the price change of a property at two points in time; at the time of purchase and at the time of sale. One of the main problems of this approach is that quality may change in the meantime, a possibility that should be taken into account. For instance, one property may be refurbished between purchase and re-sale while another dilapidates. This is commonly referred to as the constant quality problem. Another problem is that the sample mix (i.e. the nature of sold properties) may differ from one period to another; this problem would make it difficult to conduct comparisons on a like-for-like basis.

In the academic literature, three methods are discussed that address the sample mix changes and constant quality problem: repeat-sales indices, hedonic indices, and hybrid methods (Eichholtz, 1997). In the following paragraphs, only the repeat-sales indices and hedonic indices will be discussed, because they are more important for the origination of property derivatives based on econometric regression methods[42].

*Repeat-sales method*

The repeat-sales method goes back to the work of Bailey, Muth and Nourse (1963) which was revisited and extended by Case and Shiller (1987) and Case and Shiller (1989). This method is straight forward and matches the price change between two arms-length sales of one and the same property[43].

Consequently, the properties included in the index must have been sold at least twice; a requirement that excludes new buildings. Since only a location identifier (address), the purchase and sales prices, and the corresponding moments in time

[42] Hybrid methods will not be discussed here because they play a tangential role in the context of property derivatives.

[43] The most widely known repeat-sales indices in the U.S. that serve as the underlying instruments for property derivatives are the S&P/Case-Shiller Home Price Indices produced by CoreLogic. These indices measure the change in market value of residential real estate in 20 defined Metropolitan Statistical Areas (MSAs) and three price tiers (low, middle, and high). The price change is recorded between two arms-length sales of the same single-family home. Not eligible for the index inclusion are new constructions, condominiums, co-ops/apartments, multi-family dwellings, or other properties that cannot be identified as single-family. The indices are calculated monthly, using a three-month moving average algorithm. The moving average is used in order to offset delays from county deed recorders and to keep the sample sizes large enough.

are required, some critics argue (e.g. Chegut et al., 2013) that this method makes inefficient use of the available information because only a subset of the dataset is used.

Another point to consider is that transactions of one and the same property are rare and span over long periods of time (Syz, 2008). A necessary prerequisite for using the repeated measures method, when measures are infrequent, is the availability of a large number of repeated measures and a long enough historical sample period (Shiller, 1993). This makes the index construction method inapplicable for commercial properties.

The advantages of the repeat-sales method are that it needs less data (Eichholtz, 1997), and that the constructed indices do not exhibit noise caused by a change in the composition of property data. However, the price changes are auto-correlated and predictable with an $R^2$ of about 50% over a one-year horizon (Fabozzi, Shiller and Tunaru, 2009a).

One of the most important drawbacks of repeat-sales indices is the necessary revision of the index upon the arrival of new data pairs (e.g. when a property is sold again). This issue needs to be considered in the derivatives contracts since the maturity date and index fixation date most probably differ. A subsequent restatement of the index value would complicate the entire trading procedure and shy potential market participants away from trading in property derivatives. Due to the fact that the revision is an ongoing process, the index could be subject to perpetual revisions (OECD, 2013).

In the academic literature, there are several studies dedicated to the revision problem. Among them is Clapham et al. (2006) who examine it by measuring the price changes of owner-occupied houses. The analysis was made in the context of an equity insurance and the settlement of futures contracts. Their aim was to find out whether the revision effect is large enough to limit its usefulness for house price index derivatives. They used a chained Fisher ideal index[44], which is not subject to revisions, as the benchmark index. The benchmark index was then

[44] The Fisher ideal index is the geometric average of the Laspeyres and Paasche indices, and it is based on a series of cross-sectional hedonic regressions (Clapham et al., 2006).

compared with the computed repeat-sale and also hedonic indices. They used data from dwellings sold in Sweden during a 19-year period (1980-1999). The findings indicate that downward revision is more prevalent than upward revision. The findings show that the restated index values are generally lower (around 1.7% and 2.4%) than the benchmark values[45]. Most of the revisions in the repeat-sales indices occur in the first ten quarterly estimates and become more stable thereafter. Clapham et al. (2006) point out that the revision problem may be an impediment to the development of equity insurance products or futures markets based on aggregate housing prices. The only solution to reduce revision effects would be to delay the final settlement of contracts which would not be conducive to the development of housing market futures or equity insurances. They conclude that hedonic indices[46] would better serve the market development and that care must be taken when using repeat-sales indices as the only basis for the settlement of financial contracts.

Baroni, Barthélémy and Mokrane (2008) extend the work of Clapham et al. (2006) by using an extensive repeat sales database for the residential real estate market in Paris (France). They address the issues of the robustness of the price level, the mean, and the volatility estimates for two repeat-sales indices. The aim of their study is to help gauge the efficiency of such indices in designing property derivatives. Baroni et al. (2008) conclude that the revision impact is, in most cases, negligible compared to the expected benefits of property derivatives contracts and is not sufficient to deter market participants. Their findings indicate that the rate of revision never exceeds 2% of the index levels based on annual periodicity. They argue that the basis risk could be substantially larger than the revision impact. However, the revision has an impact on the level of volatility which is problematic for options written on repeat-sales indices. Despite a decreasing effect of revision over time, Baroni et al. (2008) consider the revision problematic for the pricing of standard options and sufficient to hinder the development of a market. They see the real problem in the index price level and volatility revision. They note that the latter requires delta-hedging[47] and vega-

[45] Further, the rate of revisions for the repeat-sales index is two to six times higher than for the compiled longitudinal hedonic index.
[46] The hedonic method is discussed on page 44.
[47] Delta refers to the change in the option price as a function of the price of the underlying asset.

hedging[48] positions on options. Both of these additional hedging needs may invalidate the use of standard options. In conclusion, the authors conclude that the revision effects are in most cases negligible and should not constitute an impediment to futures or swaps contracts[49].

Another study of the revision effects, based on residential real estate markets in the U.S., was conducted by Deng and Quigley (2008). They investigate the magnitude and bias of price revisions during a six-year period (2001 and 2007) in 238 metropolitan statistical areas (MSAs) and their systematic effects on the settlement prices in housing options markets. The analysed series of state and metropolitan indices consists of paired sales data from a government agency (Federal Housing Finance Agency, FHFA[50]). They compare the historical data on house prices, released at two different points in time, and find that the geographical definitions of metropolitan areas were subject to substantial revision which seems to preclude the use of FHFA indices as underlying instrument for property derivatives. In terms of magnitude, they find that the average quarterly revision across the 238 MSAs was small, with about -0.125%. About 25% of the MSAs exhibited an average revision of about 1.5% in absolute size and in about 15% of the housing markets, while the average absolute revision exceeded 2%. According to them, there is little evidence to support the argument that the revision of these indices was strongly predictable. They conclude that the revision effect of repeat-sales indices makes the settlement of property futures contracts less precise, but not subject to systematic biases. Moreover, they note that the efficiency gains from trading in housing price futures was limited due to the magnitude of the arbitrary revisions to price estimates. Unfortunately, they do not analyse the impact of the revision on volatility.

In addition to the revision problem, repeat-sales indices also suffer from some other shortcomings. For instance, they do not capture market changes in a timely manner since they are constructed with transaction data. Since there may be a long time span between the sales of the same property, temporal lag is introduced, as well as an artificial smoothing of the returns (AFMA, 2007) which

[48] Vega refers to the change in the option price as a function of the volatility of the underlying asset price.
[49] These instruments will be discussed in more detail in section 2.3.2.
[50] Formerly known as the U.S. Office of Housing Enterprise (OFHEO).

adversely affects the index reliability. Another important point is that changes in quality are ignored; yet they may occur between the sale and resale of a house, thus further reducing the measurement reliability of the index.

*Hedonic method*

An index construction method that circumvents the problems related to changes in quality is the hedonic method. The method was originally employed by Rosen (1974) to create a constant-quality price index for goods. The basic idea is that heterogeneous goods can be explained by a package of characteristics whose marginal price contributions are estimated using standard regression methods.

By analogy with the Rosen hedonic method, the price of a property can be expressed by certain physical characteristics that contribute to its value. In the field of residential real estate, the hedonic model consists of regressing the transaction price onto various building characteristics, including location, floor area, age, facilities, and quality. After decomposing the property into these single attributes or explanatory variables, a regression analysis is used to find the corresponding prices of the explanatory variables. In this way, a standard house can be assembled with a range of standard characteristics which are held constant and whose values change over time.

One of the advantages of hedonic indices is that they are substantially more stable than repeat-sales indices and they are not subject to index revisions due to the arrival of new information (Clapham et al., 2006). Moreover, hedonic indices can be adjusted for both sample mix changes and quality changes of the individual properties (OECD, 2013).

However, there are also some drawbacks associated with this method. One of them is that the method is data intensive because it requires data on the chosen explanatory variables (e.g. number of rooms, floor area, facilities, location, etc.) in order to feed the regression equation. Moreover, a different choice of the explanatory variables may lead to different estimates of index values. This eventuality can, to some degree, affect the reproducibility of the index.

A key problem in using the hedonic method is that of correlations amongst the included variables. A high correlation would increase the standard errors of the regression coefficients and thus render them unstable (OECD, 2013). Fabozzi et al. (2009a) add the other known problems of regression analysis such as spurious regression, multicollinearity[51], and model risk originating from the used multivariate regressions.

Finally, it is noteworthy that other problems related to transaction-based indices have been raised in the literature; they include:

- The transacted properties may not be representative for the entire property population because they are not randomly chosen and there may be times when more expensive properties transact more often than cheaper ones (Donald, 2005; Syz, 2008).
- Since only the capital appreciation or depreciation can be measured with the transaction data, it is not possible to construct a total return index because there is no data available on the income return component.
- Real estate indices can suffer from noise; that is, the "random deviation between the index value level and the actual market price" which tends to be a problem affecting transaction-based indices more (Geltner and Fisher, 2007, p. 100) than appraisal-based indices. The signature of noise is excess short-run volatility and negative serial correlation (Geltner and Fisher, 2007). In case an index contains both noise and lag, they can mask each other, making their detection more difficult (Geltner and Fisher, 2007). Both may reduce the credibility of an index.

In summary, the limiting factors of transaction-based indices, in terms of their suitability for use as underlying instruments of property derivatives, are index revision (in case of repeat-sales indices) as well as noise and temporal lag. The most promising index model in terms of robustness and index quality is the hedonic index method.

[51] When the independent variables in a multiple regression model are closely correlated to one another.

#### 2.3.1.5 Requirements for Real Estate Indices as Underlying Instruments

From both the academic and the professional literature, it can be deduced that for a real estate index to qualify as a suitable proxy for the underlying assets, it must meet certain requirements. These requirements are the subject of this subsection.

Ong and Ng (2009) examine the challenges to be overcome in developing a property derivatives market for Singapore, as well as the limitations of the existing real estate index. They argue that a real estate index as underlying instrument for property derivatives must meet the following requirements:

- the index must pass the stringent scrutiny of academics and practitioners;
- the index must be well understood and accepted by the industry;
- the index must be published in a timely fashion and without biases; and
- there must be a trustworthy index provider.

Syz (2008, p. 53) complements the above requirements by arguing that a reliable index must also meet the following criteria:

- **Representativeness:** the index should truly represent the underlying market in terms of volatilities and timing;
- **Transparency:** the estimation method used, and the input data must be clear;
- **Track record:** the dataset should cover time periods long enough to enable meaningful statistical calculations and the assessment of the long-term financial behaviour of the index so that investors can be comfortable with the quality of the index.

The above requirements and criteria are crucial for the confidence of investors in the index (AFMA, 2007). In this regard, it can be argued that the MSCI-IPD indices in the U.K. and the NCREIF Property Index in the U.S. are well established and recognised by the industry, despite their varying degrees of market coverage[52].

[52] Unlike IPD's dominance and market coverage in Europe, the NCREIF Property Index represents only about 5 to 7% of the commercial property market in the U.S. according to Syz (2008).

The frequency of the index publication should be in accordance with the trading patterns of the tracked assets and the number of observations. It should at least be monthly when originating derivatives (PDSG, 2007).

Another requirement for a reliable index is its “robustness and stability”. This requirement implies that the index should not change just because the sample group is different from one period to another (Syz, 2008). As stock indices do not change just because of higher volumes of sales in higher-priced stocks, real estate indices should be similarly designed so that the volume of sales does not significantly affect the index.

#### 2.3.1.6 Summary

There is a vigorous debate in the academic literature as to the preference that should be given to one index model over another. Indeed no single index model can optimally meet the industry’s needs for performance measurement (Geltner and Ling, 2006).

As highlighted in this section, it is clear that there are certain shortcomings of real state indices that complicate using them as proxy underlying instruments for property derivatives. They include temporal lag, autocorrelation, volatility smoothing, index revision, and noise.

The appraisal-based indices suffer mainly from temporal lag, which is induced by staggered appraisals, and the volatility smoothing effect. Due to the temporal dispersion of appraisals and the tendency of appraisers to be influenced by former appraisal values, reported return measures are smoothed.

Repeat-sales indices, on the other hand, suffer from the need to revise the index when new data pairs are added. As noted by Clapham et al. (2006), the index revision of repeat-sales indices may be an important impediment to the development of both equity insurance products and futures markets.

The hedonic method does not suffer from any of these defects. But it requires more extensive data than the others and therefore poses the problem of multicollinearity.

The limited number of publications in the field of real estate indices as underlying assets for property derivatives has focused on the issue of revision associated with repeat-sales indices. The key question that these studies have sought to answer is whether the impact of revisions is a serious obstacle to the development of property derivatives. The results are not conclusive. Nevertheless, some authors (e.g. Baroni et al., 2008) argue that the impact of revisions is negligible compared to other index issues such as basic risk. Other authors (e.g. Clapham et al., 2006) have suggested the use of hedonic-based indices instead of repeat-sales indices in order to avoid the latter's disadvantages. For some indices (OFHEO/FHFA indices), the results suggest that efficiency gains would be limited due to the revision constraint.

### *2.3.2 Types of Property Derivative Instruments*

As discussed in section 2.2.2, in the development process of property derivatives markets, trading activity moved from exchange-traded products (such as futures) to OTC products (such as structured notes, swaps, and forwards) and, lately, back to an exchange-traded product (futures), potentially due to the consequences of regulatory changes.

This section successively discusses the major exchange-traded and OTC-traded derivative markets in order to provide a general overview on commonly used products.

*Exchange-traded products*

The only exchange-traded property derivative type that is currently available in the U.K. is index futures. Exchanges seem prepared to introduce options if demand builds up. There are currently two stock exchanges worldwide which

offer trading in property futures. One is the CME Group[53] which offers futures trading in the S&P/Case-Shiller Home Price Indices for ten different U.S. cities[54] and a 10-city composite index. The other exchange is the Eurex[55] which offers futures trading in nine different MSCI-IPD U.K. indices. The corresponding contract specifications are shown and compared in Appendix E.

A futures contract is an agreement between two parties to buy or sell an underlying asset (financial or otherwise) at a certain time in the future for a predetermined price (Hull, 2009). In contrast to forward contracts, the contract sizes are standardised (known as the "notional"). The clearing house is the counterparty thus eliminating the counterparty risk. Moreover, until the final settlement day, futures contracts are marked to market[56], at the end of each trading day. The consequence of this procedure is that the party which goes long (short), on the index, profits (loses) when the underlying index appreciates (depreciates). In case the balance of the margin account falls below the maintenance margin, there is a margin call.

Physical delivery, in the case of property futures, is impossible because the indices are synthetic constructs that only serve as proxy for the underlying assets. Therefore, these contracts can only be cash-settled.

Figure 2.6 illustrates how property futures work.

[53] The Chicago Mercantile Exchange (CME) is the largest derivatives exchange worldwide, by number of contracts traded.
[54] BOS=Boston, CHI=Chicago, DEN=Denver, LAV-Las Vegas, LAX=Los Angeles, MIA=Miami, NYM=New York, SDG=San Diego, SFR=San Francisco, WDC=Washington, DC.
[55] The European Exchange (Eurex) is the largest European derivatives exchange, by number of contracts traded.
[56] The variation margin covers the net change in market value of the member's position (Gregory (2014), p. 9).

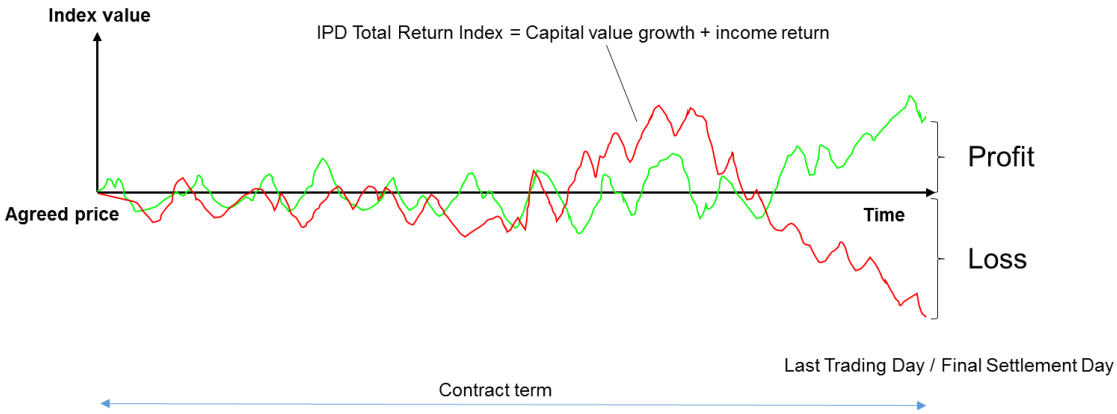


Figure 2.6: Principle of a long position in a property futures contract (own depiction)

There are two main advantages of property futures trading. First, the existence of a clearing house eliminates counterparty or default risk. Secondly, the standardised size of the futures contracts renders the ISDA[57] documentation unnecessary.

*OTC-traded products*

In the following, structured notes and total return swaps will be briefly described.

**(a) Structured note:** A structured note is a bond-like investment whose coupons are linked to the performance of a real estate index. The investor pays a capital sum upfront to the note issuer (i.e. the par value). At maturity the amount to be paid is calculated as follows: (Final Index / Initial Index) times the Nominal Amount (i.e. the par value). There is no need for ISDA documentation due to their simple structure (Baum, 2015). They are funded and involve a certain degree of counterparty risk.

One of the main reasons for their use is that they avoid the high regulatory hurdles and the operational complications associated with swaps and futures (IPF, 2010). Since structured notes are currently not considered as

[57] Usually, the parties involved in over-the-counter derivatives transactions use the standardised documentation from the International Swaps and Derivatives Association (ISDA). There is an ISDA master agreement which contains the general terms and conditions, and there is a trade confirmation, setting out the details of the trade.

derivatives in the narrower sense, investment in these instruments is allowed without FSA[58] approved person status (IPF, 2010). A typical structured note based on an IPD-index in the U.K. would pay the investor the total index return plus or minus a premium during the life time of the contract, and at contract termination the principal is returned at the current value of the index. Structured products were widely sold to retail investors in the past (FTSE, 2008).

**(b) Total Return Swap:** Total Return Swap (TRS) is the second OTC instrument which first gained in importance but later declined as a result of the regulatory changes that affected banks. A TRS is an agreement to periodically exchange fixed payments (i.e. to swap the income return and capital growth component of a real estate index) for a floating leg (e.g. LIBOR) plus spread (or premium).

The basic structure of the U.K. return swap is a contract for difference[59] (Lizieri et al., 2012; Drouhin and Simon, 2014). Initially, the MSCI-IPD index return was swapped for the 3-month LIBOR plus or minus spread. The convention LIBOR plus/minus spread was changed at the beginning of 2008 to a swap of the index return for a fixed rate (IPF, 2010).

According to Goodman and Fabozzi (2005), a TRS can be thought of as a portfolio composed of a long leg which proxies for the long position in the reference asset, and a financing leg which stands for the cost of acquiring this position. So, the total return receiver achieves the equivalent economic effect of borrowing funds and investing them to buy the reference asset. Figure 2.7 below shows how the total return swap works.

[58] The Financial Services Authority (FSA) was until 2013 the regulator of all providers of financial services in the U.K. Today, there are two agencies: the Financial Conduct Authority and the Prudential Regulation Authority of the Bank of England.

[59] A contract for differences does not require the exchange of up-front payments and is settled based on the difference between the current/agreed value of the underlying asset and its value at contract end. The settlement is in cash.


Figure 2.7: Structure of a total return swap (Source: Clayton, 2007, p. 35)

In a TRS transaction, no upfront payment is required since only the cash flows based on the notional amount are exchanged. The swap is executed within the framework of an International Swaps and Derivatives Agreement (ISDA) which regulates the terms of trade. The long investor receives the total return from the short investor in return for paying a fixed rate. If the value of the capital falls, (i.e. if the capital index value depreciates), the long investor pays the respective capital value to the short investor. The fixed spread balances the demand on both the long and the short side of the deal and can, depending on the market conditions, also be zero or negative (Fisher, 2005). Alternatively, the parties to the contract can swap the difference in total return of two real estate sectors (e.g. office and retail) for a fixed leg, and hence invest in the relative performance of the respective sector.

TRS investors are required to deposit a margin, generally 5-20% of the notional, in order to reduce the counterparty risk (Baum, 2015). The duration of a swap is usually between one and five years (IPF, 2010). The vast majority of transactions are based on the MSCI-IPD UK All Property index. The index is published at the end of February for the preceding year. This means that the earliest cash flow payment is in March, usually at the end of the month (IPF, 2010).

The timing of the cash flows, from TRS, is asynchronous as can be seen in Figure 2.8. Since the indices are typically published two weeks after the end of each month, the index level from the preceding month needs to be used as reference point, hence the swap has a retro start (Lizieri et al., 2012).

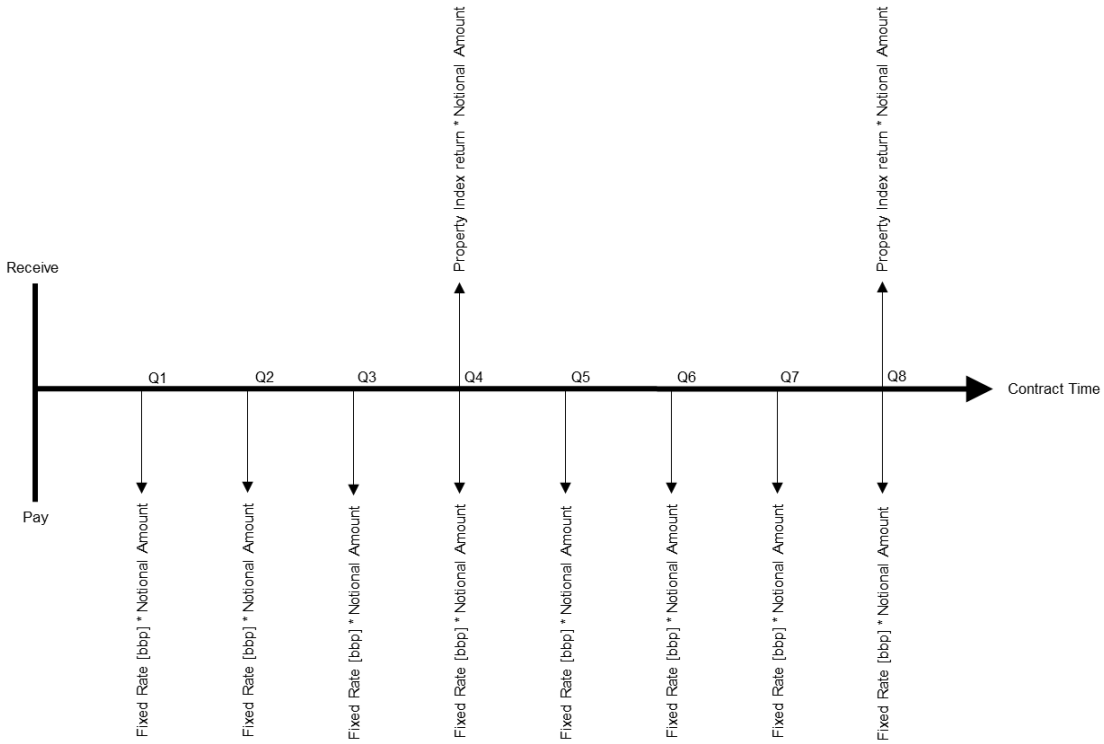


Figure 2.8: Total return swap cash flow from the view of the property index return receiver or swap buyer (Source: Ducoulombier, 2007, p.6)

The mismatch of cash flows is an impediment to the use of TRS. However, using quarterly indices (if available) may improve this situation (Ducoulombier, 2007)[60].

## 2.4 Pricing of Property Derivatives

### *2.4.1 Introduction*

A survey (conducted at the MIT Centre for Real Estate in 2006) of 37 U.S. real estate investment managers and other likely participants in a property derivatives market identified the lack of confidence with regard to pricing property derivatives as one of the two[61] most important perceived barriers to the use of these instruments (Geltner and Fisher, 2007). Seventy-five per cent of the respondents indicated the pricing of property derivatives as either an “important” or a “very important” concern.

[60] A summary of the key characteristics of structured notes, swaps, forwards, and futures can be found in Table F.1 in Appendix F.
[61] The other identified barrier was liquidity or a secondary market for the derivatives.

The pricing of property derivatives has been discussed intensively in the academic literature. The discussion is mainly centred on no-arbitrage models and equilibrium models (Fabozzi et al., 2010; Rehring and Steininger, 2011). The reason for the debate is found mainly in the characteristics of the underlying index and in the real estate market which can be considered incomplete.

The index itself is non-tradable which complicates the application of standard no-arbitrage pricing models. Moreover, the index shows auto-correlation in the short-run and temporal lag. The temporal lag may lead to a state where the index and the underlying market are out of equilibrium.

The underlying real estate market on the other hand is incomplete which means that the risk associated with a derivative cannot be hedged by creating a replicating portfolio (Pu, Fan and Ong, 2012) due to the impossibility of buying the underlying assets contained in the index.

In the next two subsections, the debate around the no-arbitrage models and equilibrium models is presented and the associated underlying assumptions are explained.

### *2.4.2 No-arbitrage Models/Risk-neutral framework*

Under the risk-neutral framework, investors are risk-neutral, and hence their expected return on all investment assets is the risk-free interest rate (Hull, 2009). From this it follows that a risk-less portfolio must earn, in the absence of arbitrage, the risk-free rate of interest. This assumption simplifies the valuation of derivatives and allows the calculation of the present value of any future cash with the risk-free rate as discount rate. Hence risk-neutral valuation models use “risk-neutral stochastic processes to describe the dynamics of the underlying state variables, and discount all cash flows at a risk-free rate” (Schwartz and Smith, 2000, p. 896).

One of the model's assumptions is that the market is frictionless. But this assumption does not hold for real estate markets due to the existing market frictions such as transaction costs, transaction time, and the short sale constraint, among others.

An early contribution to the development of no-arbitrage models in the context of real estate was provided by Titman and Torous (1989) who examine the valuation effects of default risk in commercial mortgages by applying the models for pricing corporate bonds developed by Brennan and Schwartz (1977) and Ingersoll (1987). They investigate the contingent-claims approach to pricing commercial mortgages by "examining empirically the differences between mortgage rates generated by" the Titman and Torous (1989) model and the "corresponding quoted rates on these mortgages" (p. 346). They avoid the issue of prepayment of the mortgage because the empirical analysis was limited to bullet mortgages[62]. They built a risk-free portfolio "by hedging the interest rate risk of the mortgage with a short position in the default-free bond and by hedging its risk due to changes in the value of the building with a short position in the building" (p. 348) and thus derived the value of the mortgage. The results show that the two-state-variable contingent-claims pricing model provides, within certain parameters, accurate estimates of commercial mortgage rates quoted by large insurance companies.

Kau, Keenan, Muller and Epperson (1990) use an option pricing model to value commercial mortgages and their mortgage-backed securities (MBS) considering both default and prepayment risk. Option pricing theory was used to ascertain the value of prepayment and default.

Buttimer et al. (1997) were the first to propose a risk-neutral pricing model to price swaps linked to a commercial real estate index. The model is a real estate index-based stochastic process combined with a stochastic interest rate to create a two-dimensional binomial tree. They approximated the real estate index by using and extending the stochastic process proposed by Kau et al. (1990) which consisted

[62] The entire principal of the loan amount is paid at maturity.

of a Wiener process[63] with drift. In order to demonstrate the usefulness of their model, they priced a total return swap from the perspective of a party that goes long, with the Russell-NCREIF[64] index as underlying instrument. Their results show a swap value higher than zero.

The non-zero result of the swap value has raised some debate in the academic literature. Since a swap can be characterised as a portfolio of a series of forward rate agreements, the present value of its cash flows should be zero at initiation of the contract (Stulz, 2004; Hull, 2009). Indeed, Björk and Clapham (2002) have shown that the theoretical no-arbitrage value of commercial real estate index-linked swaps should actually be equal to zero because of the pure arbitrage argument, irrespective of the assumptions about the dynamics of the index, the income process, and the interest rate model. Moreover, Björk and Clapham (2002) find that two approximation errors introduced by Buttimer et al. (1997) caused the swap to have a value other than zero. First, they inconsistently discounted the dividend yield using the continuous compounding method. Second, they assimilated the LIBOR rate (a discrete interest rate) as equal to a continuous rate. This error has led to an underestimation of the LIBOR rate and an overestimation of the swap value. Björk and Clapham (2002) calculate the combined effect of confusing continuous and simple rates and find a value of the same order of magnitude as shown by Buttimer et al. (1997).

Patel and Pereira (2008) extend the study by Björk and Clapham (2002) by taking the typical counterparty swaps default risk into account. They priced total return swaps with different levels of default risk and find that the total return swap price is no longer zero. They argue that the payer of the total return swap, (i.e. the counterparty that pays the total return and receives LIBOR plus spread), must charge a spread over the reference interest rate taking into account the lower liquidity in the underlying assets and the transparency in the market. Their result shows that the fair spread over the market interest rate is highly dependent on the volatility of the underlying index returns and on the counterparty default risk. The higher the index volatility and the counterparty default risk, the higher the

[63] Also called Brownian motion. A continuous-time stochastic process, i.e. a random walk with random step sizes.
[64] In 1995, the name Russell-NCREIF Property Index was changed to the NCREIF Property Index.

spread over the market interest rate. On comparing the quotes from a trader in the U.K. market with the spreads computed by their model, they observe that the computed spreads underestimate the spreads quoted by traders in the market[65]. They suggest that the underestimation is due to components other than the counterparty default risk that the market spread incorporates, and that were not considered in their analysis including low transparency, low liquidity, and high transaction costs in the underlying property market. Therefore, traders might charge a high liquidity premium in addition to the total return swap fair spread. Unfortunately, Patel and Pereira (2008) do not investigate the pricing of these other components that could influence the spread values. Other possible explanations for the difference between the market spreads and the calculated spreads are the high inventory holding and adverse selection costs for brokers who are required to cover their exposure to the property market through a hedging strategy.

In the literature on pricing property derivatives, little attention has been given to the pricing of options based on real estate indices. An exception was the study by Ciurlia and Gheno (2008) who adapt the Black-Scholes-Merton model, an option pricing model to price American and European Options on real estate indices. In their two-factor model, the real estate asset value is represented by a geometric Brownian motion and the spot interest rate is modelled as a stochastic variable. The model allows a calibration to the interest rate and volatility term structures.

Another risk-neutral valuation approach was proposed by van Bragt, Francke, Kramer and Pelsser (2010) who use an autoregressive model with multiple lags to replicate an underlying transaction-based house price index. They model the short interest rate using the Hull-White one-factor model. Based on these and other modelling parameters such as market returns following a random walk with drift, they derive pricing formulas for forwards, swaps, and European options. Using market prices for forwards and swaps, the derived formulas help estimate

[65] Tullet Prebon Corporation made available indicative swap prices for a range of property derivative contracts with different maturities. For example, over the period from November 2005 to March 2006, the average spread of a LIBOR-IPD UK All Property swap with one year of maturity was around 400 basis points compared to a computed (with a different sample period) average spread of around 65 basis points.

the difference between the current index level and the efficient market price which may reveal market over- or undervaluation and improve market efficiency.

In contrast to the models discussed above, Syz and Vanini (2011) argue that standard no-arbitrage pricing models are not sufficient to price property derivatives since a perfect replication of the derivative is not possible due to frictions in the market. In addition, they note that quotes obtained from market participants who trade swaps are not in line with spreads computed by no-arbitrage models. Syz and Vanini (2011) are the first to recognise that the lack of perfect replication of the underlying index and the frictions in the market require an adjustment of the arbitrage-free pricing models. Given frictions in the market such as transaction costs, long transaction time, and the short-sale constraint, they suggest that the pricing of property derivatives should be based on arbitrage-free price bounds rather than on a single arbitrage-free price. The argument put forward is that these price bounds are a function of the price of the underlying instrument and of market frictions. Arbitrage opportunities would only exist outside these bounds. The upper arbitrage-free price boundary is the maximum spread an investor is willing to pay for a derivative instead of buying actual property and is affected by the buyer's and seller's transaction costs and by the transaction time. The lower boundary, in turn, reflects the value of the short sale constraint.

In their empirical study, Syz and Vanini (2011) use daily price quotes[66] (provided by a U.K.-based brokerage firm) of the Halifax HPI forward contracts with maturities up to ten years to calibrate the price boundaries. This allowed them to assess the market-implied cost of the frictions that impact derivative prices, and to empirically assign values to them. They found boundary values of 5.15% for the buyer's transaction costs, 4.11% for the seller's transaction costs, 4.48% for transaction time, and 13.25% for the short sale constraint. A shortcoming of this study, nevertheless, is the potential selection bias inherent in choosing the market frictions that were then subsequently priced.

[66] The pricing data covered the period from February 2007 to August 2008.

### *2.4.3 Equilibrium Models*

The fact that the underlying index cannot be traded in the spot market, and hence no futures-spot parity theorem can be used to price the derivative, gave rise to the development of pricing models that take special features of underlying real estate indices such as temporal lag, high transaction costs, and inherent illiquidity into account.

The index lag, as encountered in appraisal-based indices, provokes inertia and predictability which, in turn, creates disequilibrium between the index and the underlying market. Therefore, equilibrium refers to a state where the property market return expectations are reflected in the true current market values. Consequently, as Geltner and Fisher (2007) argue, there is no guarantee that the underlying real estate index is in equilibrium. For that reason, the difference in values between the underlying index and the tracked property market must be considered in order to obtain the equilibrium price which is the price that "allocates to each party in the trade an expected return exactly commensurate with the risk that party bears" (Geltner and Fisher, 2007, p. 103). The fair price of a property derivative, (i.e. the equilibrium price), is the "expected future index value discounted at the risk premium" (Geltner and Fisher, 2007, p. 105).

Arbitrage is viewed by Geltner and Fisher (2007) as a means of enforcing equilibrium so that the futures-spot parity theorem still applies but only under the condition that the underlying index provides expected equilibrium returns. They note that this can be achieved by well-constructed transaction-based indices but not by appraisal-based indices due to their lag and stale appraisals. However, equilibrium analysis can still be used for an appraisal-based index, which does not represent the current equilibrium in the property market, to indicate what the derivative price should be (Geltner and Fisher, 2007).

Provided the index is in equilibrium, a long party should receive the total return of the index and the short party should receive LIBOR which is basically the same as the futures-spot parity theorem. Since the condition of index equilibrium rarely holds in reality, the index lag needs to be taken into account according to Geltner and Fisher (2007). They define the lag effects as the difference between the

property markets' required equilibrium risk premium[67] ($RP_P$) over LIBOR and the property market equilibrium risk premium[68] for the index ($RP_S$) plus a transient momentum effect which is positive in a rising market and negative in a declining market. They then derive a window of feasible trading prices by combining the bullish and bearish feasibility conditions regarding the price of a swap as:

$$i + L - \alpha - b_s - E[\gamma_s] \leq F \leq i + L + B^L - E[\gamma_s]$$

with

$i$ ... Riskless rate (e.g. LIBOR rate)

$L$ … Lag effect

$\alpha$ … Generated alpha from own property portfolio

$b_s$ … Bearish expectations about the market

$E[\gamma_s]$… Expected income return of the index assets

$F$…Price of the swap expressed as fixed-leg rate that the long party must pay to the short

$B^L$… Bullish expectation about the market

If both parties have neutral expectations about the market ($B^L=b_S=\alpha=0$) then the future trading price is reduced to LIBOR plus lag effects minus the expected income return of the index.

The expected income return of the index $E[\gamma_s]$ can be eliminated when the derivative is based on an appraisal-based index because the index already includes the income component. The expectation of the index income return component is more problematic with transaction-based indices since they show only the capital return.

Geltner and Fisher (2007) argue that the equilibrium and expectational considerations are the basis of a successful derivatives market in the long run. For them, what is vital to the practical feasibility of derivatives trading is that "the long position is willing to pay a fixed-leg rate F greater than what the short position

[67] A compensation that investors demand for taking property risk.
[68] Reflects the amount of risk in the index including a possible lower deviation of the index risk from the risk in the market.

is willing to accept" which would result in a profit for intermediaries (e.g. exchanges, banks). They explain that the understanding of reasonable values of the lag effect (L) and the income return component of the index E[$\gamma_s$] is crucial to the development of the market and that a lack thereof could make potential users hesitate to trade.

Lizieri et al. (2012) extend the Geltner and Fisher (2007) model by taking the market frictions and their impact on the trading window into account. They explore the reasons for the large spreads found in real estate total return swaps based on the IPD returns in the U.K. Among the analysed market constraints were high transaction costs, long execution time, tracking error and basis risk, management costs, and the impossibility to short-sale properties.

Given the imperfections in the market, Lizieri et al. (2012) argue that there may be market conditions and certain circumstances when investors are willing to pay a margin above or below LIBOR. From this they infer the existence of a rational trading window around the zero-spread equilibrium position. Trades should occur within this trading window with a spread close to zero if there is a critical mass, liquidity, and a balance between buyers and sellers (Lizieri et al., 2012). Therefore, the lagging effects, transaction costs, and heterogeneity of the real estate market create a rational trading window around the expected zero spread over LIBOR which is expected to shrink as the market evolves.

In contrast to Geltner and Fisher (2007), Lizieri et al. (2012) consider a total return swap instead of a swap based on a capital appreciation index. Therefore, the income return component E[$\gamma_s$] does not need to be deducted on either side. They add transaction costs, execution time, and cash flow timing, and restate the formula from Geltner and Fisher (2007) as follows:

$$i + L - \alpha + B_S - TC_S + ExC_S + CF_L \leq F \leq i + L + B_L + TC_L + ExC_L + CF_S$$

with

$i$ ... Riskless rate (e.g. LIBOR rate)

$L$ … Lag effect

$\alpha$ … Generated alpha from own property portfolio

$B_s$ … Bearish expectations about the market

$TC_s$… Present value of round-trip transaction costs of reducing exposure to real estate over the swap period

$ExC_s$… Costs for seller associated with the time to execute

$CF_L$… Cash flow timing (time effect of receiving income return and capital appreciation return)

$F$…Price of the swap expressed as fixed-leg rate that the long party must pay to the short

$B_L$… Bullish expectation about the market

$TC_L$… Present value of the round-trip transaction costs from gaining exposure to real estate over the swap period

$ExC_L$… Costs for the buyer associated with the time to execute

$CF_L$… Cash flow timing (time effect of receiving income return and capital appreciation return)

They argue that the shift of the trading window is due to changes in the number of market participants prepared to pay LIBOR plus premium or discount and not primarily a result of changes in the market sentiment.

In a next step, Lizieri et al. (2012) provide a basic model to price total return swaps, and subsequently include the transaction costs, execution time, and cash flow timing in the formula for the net present value of a swap. Setting the value of the swap equal to zero, consistent with market efficiency, they then isolate the impact of the individual institutional characteristics and calculate the required spreads. They show that transaction costs, execution times, and to a lesser extent, cash flow patterns in the underlying market help explain margins above or below LIBOR. The results show for the combined effects of the various market inefficiencies a considerable variation in the required spreads for short-traded contracts which, in turn, converge quickly as maturity increases. The results for the combined effect, under consideration of the index smoothing effect, show an asymmetric spread window with buyers being prepared to pay a larger premium to avoid transaction costs and the tracking error of the index.

According to Lizieri et al. (2012), observed spreads are explained by the short-run momentum effects suggested by Geltner and Fisher (2007) with the

differences in the number of investors seeking long and short positions, respectively. They conclude that it is the balance or imbalance "between buyers and sellers within the rational trading window that drives the margin set in the market" (Lizieri et al., 2012, p. 802).

Rehring and Steininger (2011) empirically investigate fair commercial real estate swap pricing in the U.S. and U.K. by using the equilibrium pricing framework developed by Geltner and Fisher (2007). Future index returns were estimated using a vector auto-regression (VAR). The IPD index in the U.K. and the NCREIF index in the U.S. served as basis for their analysis. These indices are appraisal-based indices. The fair price of the swap was calculated by subtracting the equilibrium risk premium of the index returns from the expected return on the index. First, the expected index returns were forecasted using a vector auto-regression. Three state variables were used as predictors of appraisal-based real estate returns: return on property shares, the cap rate, and the yield spread.

In a second step, the equilibrium risk premium of the appraisal-based returns was calculated. Finally, the fair swap prices were calculated for swaps with maturities ranging from one to five years and compared with actual market prices.

The results show that although the estimated swap prices are in the region of the actual market prices, there still remain some notable differences of -3 to -6% on average in relative terms for the U.K. swap prices and between -1 and -1.7% for the U.S. swap prices. For Lizieri et al. (2012), the impact of transaction costs, execution time, and cash flow timing explain the differences between the estimated fair price and actual swap price.

### *2.4.4 Summary*

In summary, the focus of the discussion in the realm of arbitrage-free models has been on total return swap spreads and their pricing. The debate has centred on the fact that when market frictions and counterparty risks are considered, the theoretical spread value is no longer zero. Despite some mixed results in the academic literature, it seems that the market prices of spreads are higher than

theoretically suggested. The possible reasons include the nascent stage of the market and imbalances between hedgers and speculators. The large spreads observed in the market are considered to come from market disturbances.

The equilibrium models on the other hand consider those factors that cause the disequilibrium between the real estate index and the tracked market. These are in particular the index lag, transaction costs, transaction timing, and time differences in receiving exchanged cash flows of a total return swap.

There is general agreement among some authors (Geltner and Fisher, 2007; Syz and Vanini, 2011; Lizieri *et al.*, 2012) that there is a trading window around the zero spread value.

## 2.5 Possible Reasons for the Reluctant Use of Property Derivatives

This section gets to the core of the literature related to the research questions presented in section 1.3 and examines the possible reasons for the reluctant use of property derivatives.

The scant literature that may be viewed as potentially contributing to the understanding of the reasons for the reluctant use of property derivatives can be divided into two groups. The first group consists of studies which use surveys or interviews in order to understand investor attitudes towards property derivatives. The second group examines the necessary conditions, barriers, or practical problems facing investors.

The purpose of the first group of studies is to analyze and understand the opinions of investors. The second group bases their analyses on secondary data. The problem with this second group is that the identified reasons are not confirmed by practitioners and as such are only propositions.

This section is organized in two parts. The first part discusses the literature on investor attitudes towards property derivatives and part two is dedicated to the literature on the reasons for the reluctant use of real estate derivatives.

### *2.5.1 Studies on Real Estate Investor Attitudes Towards Property Derivatives*

Lim and Zhang (2006) conducted a survey on interest levels and concerns among U.S. investors in real estate derivatives. The survey was conducted in conjunction with Credit Suisse which was then active in the commercial property derivatives market. The bank helped to identify potential investors with interest in property derivatives. In total, 37 participants completed a web-based survey. The surveyed group consisted of real estate investment managers, fund managers, commercial lenders, and brokers.

For purpose of the analysis, Lim and Zhang (2006) divide the respondents into three groups: investment managers, other investors (e.g. commercial lenders, banks, and fund managers), and non-investors (e.g. brokers, real estate research firms, and consulting firms). The results show that the biggest concern among U.S. investors, which prevented them from investing in property derivatives, was related to the liquidity of the property derivatives market and the associated lack of secondary market. Eighty per cent of the respondents considered these two issues important or very important.

The other major concerns that the survey revealed refer to investor uncertainty on how to price property derivatives, which was identified by 75% of the respondents as “important” or “very important”, and the lack of dealers in the market place.

Less pronounced, but still causing some concern among investors, were issues related to the appraisal-based real estate index which lags behind the performance of the underlying real estate market, and lack of expertise and knowledge in the field of property derivatives.

For comparative purposes, Lim and Zhang (2006) also analyse the results of a similar survey conducted by Hermes Real Estate at the property derivatives trading forum in the U.K. in 2006. Participants included institutional investors,

investment managers, investment banks, and property companies. The respondents were asked, among other questions, what were the three hurdles that dissuaded their organisations from trading in property derivatives. The two most highly rated answers were the requirement to obtain trustee or investment committee approval and insufficient market liquidity. Interestingly, 20% of the respondents answered that for them, there are no hurdles preventing them from trading in property derivatives. The second-rated answer most often cited concerned insufficient systems and controls, as well as tax and accounting issues.

In summary, Lim and Zhang (2006) conclude that the major issues that need to be addressed in order to establish a property derivatives market are related to market liquidity, the real estate index, and the pricing of property derivatives.

Another study that engaged directly with real estate investors and potential users of property derivatives was conducted by Venter (2007) on the barriers to growth in the U.S. property derivatives market. Based on a comparative analysis, ten structured interviews were conducted in the U.S. and U.K., respectively. The group of interviewees consisted of tax lawyers, an index provider, investment advisors, brokers/traders, investment banks, and a property company. The following were identified as the main barriers: real estate indices, pricing of property derivatives, education of end users on specific property derivatives products, fund mandates not allowing property derivative trading, and applicable tax and accounting rules. A major concern in the U.S. market is the quality and the plethora of real estate indices. The variety of indices from which investors in the U.S. can choose is considered detrimental to market development by some authors, as it may confuse potential traders and the market could be spread too thin (Clayton, 2007; Ducoulombier, 2007). The nature of the most popular NPI index (appraisal-based) and its market coverage caused some concern among the interviewed investors.

The results of the study conducted by Venter (2007) confirm the survey results from Lim and Zhang (2006) and highlight the importance of a reliable real estate index, clarity as to pricing property derivatives, as well as mandates and approvals that allow trading property derivatives.

A more recent study[69] was conducted by Püntener (2011) who defines general drivers, market entry barriers, and critical success factors of the property derivatives market in the U.S. and the U.K, respectively. She develops an evolutionary model of property derivatives markets based on the study from Gordon and Havsy (1999). The exploratory case study research was based on 25 expert interviews with 17 financial and property experts[70], two advisors, and 6 academic experts.

In addition, a self-completed paper-based survey among 68 Swiss property investment managers was conducted to gauge demand and potential motivations to use property derivatives. The survey results show that the main motivations for using property derivatives linked to a Swiss property index were diversification, hedging, and index participation. Moreover, the main reasons discouraging Swiss investors from investing in property derivatives are the low level of market transparency and the low level of market liquidity, little information about pricing and derivatives products, and mandates not allowing the use of derivatives. Püntener (2011) also finds that Swiss investors generally show little interest in property derivatives and prefer physical over synthetic real estate.

In a study of the property derivatives market in the U.K., Püntener (2011) identifies general hurdles and entry barriers. She distinguishes impeding factors at an institutional level from those at the company level or organisational level. At the institutional level she identifies the lack of understanding between the property industry and the financial derivatives industry, education (i.e. knowledge about the product), taxation (i.e. with regard to the applicable tax regime), accounting volatility due to mark-to-market valuations, low transparency of the IPD-index, pricing of total return swaps, and legal and mandate restrictions concerning the use of property derivatives. At the organisational level, Püntener (2011) identifies the following impeding factors: lack of understanding between the property and financial divisions within a company, the necessity to have an internal risk management in place, issues arising from mandates, certain council

[69] More recent studies have not been found on this topic in the academic literature.
[70] From banks, brokers, index providers, property companies, as well as investment managers of insurance and pension funds.

laws, contract size for small property funds, and a poor fit with the corporate strategy.

### *2.5.2 Proposed Reasons for the Reluctant Use of Property Derivatives*

This subsection reviews the proposed reasons for the reluctant use of property derivatives.

Syz (2008) summarises the hurdles to trading property derivatives and divides them into four different categories as follows:

1. Establishment of a reliable real estate index;
2. Education of investors and potential market participants;
3. Heterogeneity of the real estate market and the lack of replicability of the indices; and
4. Regulation and taxation.

Another but similar summary of practical problems that limit the use of property derivatives was provided by Ducoulombier (2007) who identifies the following factors as impediments:

1. Scarcity of data for the index construction and related index quality issues;
2. Very low levels of market liquidity;
3. High levels of (accounting) volatility;
4. Evaluation difficulties;
5. Short maturities;
6. Counterparty risk;
7. Investment policies;
8. Need for training in the use of derivatives; and
9. Legal, fiscal, and accounting rules reducing the attractiveness of derivatives.

In addition to the aforementioned possible reasons for investor reluctance to use property derivatives, Fabozzi et al. (2010) add the unidirectional market sentiment as a possible main obstacle, especially when returns show autocorrelation and have a certain degree of predictability. This obstacle makes it difficult to find

counterparties and aggravates liquidity conditions. Another main obstacle mentioned by Fabozzi et al. (2010) is the lack of homogeneity of the underlying in real estate markets.

The importance of reliable and transparent performance measurement with real estate indices, the presence of indices that cover different geographical areas and real estate sectors have been frequently mentioned in the academic literature (see Roche, 1995; Clapham et al., 2006; Lecomte and McIntosh, 2006; AFMA, 2007; Geltner and Fisher, 2007; Deng and Quigley, 2008; Hoesli and Lekander, 2008; Syz, 2008). The types of underlying real estate indices, their valuation techniques, and their requirements as underlying instruments for property derivatives are discussed in depth in section 2.3.1.

Other factors identified in the literature that may have an influence on the willingness of investors to employ property derivatives concern the importance of intermediaries in the market as well as usefulness and hedging effectiveness which are discussed in the next sections consecutively.

#### 2.5.2.1 The Importance of Intermediaries in the Market

Gemmill (1990) and Case et al. (1991; 1993) can be considered as the ones who first developed a framework that enabled the extension of financial derivatives to the real estate sector. They, respectively, propose the introduction of futures markets in the U.K. and the U.S. Their initial concepts were designed with an actuarial rationale. The core idea of both studies was that intermediaries would provide some kind of price insurance for homeowners against general house price changes and offset their risks on the futures markets. A real estate price index would serve as the underlying instrument and capture the price trends.

Gemmill (1990) argues that without intermediation it would be doubtful that a futures market could succeed. According to him, the intermediaries should be entrusted with two tasks. The first task should be to match long and short positions in derivative contracts and the second should be to warehouse risk when a perfect match cannot be achieved.

In the past and prior to the global financial crisis (GFC) of 2007-2009, banks acted as the market makers in a market that was facilitated by brokers. Banks were able to provide prices for property derivatives and warehoused risk. In the post-GFC era, the exchange has taken the role of the counterparty and brokers have largely left the market due to low trading volumes. In such an illiquid market, financial intermediaries have inadequate risk management possibilities for supplying derivatives (Lecomte and McIntosh, 2006). Fabozzi et al. (2010) argue that liquidity in the market can be established only if banks have decided to participate actively in the property derivatives market. Banks are considered as being most important for the market development process and they are the primary source of liquidity (IPF, 2006).

#### 2.5.2.2 Usefulness and Hedging Effectiveness of Property Derivatives

The usefulness and hedging effectiveness[71] of property derivatives is another decisive factor for their use. A low hedging effectiveness would provide a strong argument against the use of property derivatives and help explain their reluctant use by investors. This section is devoted to the very few empirical studies in the U.S. and the U.K.

Lecomte and McIntosh (2006) argue that the usefulness of a futures contract depends on the combination of the following specifications: the underlying index (most important due to cross-hedge basis risk), the contract size, the contract months and horizon, and the settlement procedures. They claim that real estate index-based futures should be modelled according to the characteristics of the underlying real estate market.

An early analysis of the expected usefulness[72] and effectiveness of risk management with a swap in a multi-period framework was provided by Park and Switzer (1995). Their analysis was based on a swap agreement in which the

[71] The degree to which an offsetting position in property derivatives reduces the impact of decreasing real estate asset values.
[72] Mean-variance expected utility function expressed as the utility from a swap transaction in form of the weighted sum of the expected cash flows and their variances.

parties exchange the cash flows from the NCREIF Property Index (NPI) for a fixed or floating amount of interest on the notional principal. They determine the optimal swap quantity, expressed as the ratio of the notional swap amount to the underlying initial property value, by maximising the mean-variance expected utility function of a real estate owner. The results show, for a hypothetical property value of $1 million and a contract length of five years (20 quarters), that swaps would be an effective risk management tool in all the analysed regions and for all of the analysed property types in the U.S. between 1983 and 1992. However, the return and risk characteristics of the property value, as reflected in its correlation with the interest rate and the index returns, delimit their risk management potential and thus their usefulness as hedging tools.

Iacoviello and Ortalo-Magné (2003) provide further evidence on the potential benefits of property derivatives. In particular, they conducted a case study on the benefits for London/U.K. homeowners who hedge their portfolios with property derivatives. Iacoviello and Ortalo-Magné (2003) claim that households are overinvested in housing due to their housing consumption motive and that, while gaining from the high returns on their home, they hold a very risky portfolio owing to the high volatility in London housing returns. They conducted different analyses of mean-variance efficient portfolios for various asset combinations and various categories of households (tenant, poor homeowner, average homeowner, and rich homeowner). They proceed as follows. First, they calculated the portfolio weights and the efficient mean-variance frontier for seven assets (general stocks, real estate stocks, T-bills, bonds, U.K. housing, London housing, and an individual London home). Secondly, they analysed the optimal allocations for households with varying levels of wealth invested in their home. Thirdly, they expanded the analysis by allowing households to take short and long positions in the relevant index and in stocks. The results show that housing derivatives provide substantial financial benefits to all four household categories. Poor homeowners and wealthier investors would benefit the most.

Another study of residential property derivatives was conducted by Hinkelmann and Swidler (2008) but with a focus on the U.S. market. They analyse the effectiveness of existing futures contracts to offset volatility in national house prices in two steps. First, they analysed the effectiveness of hedging real estate

with 31 existing futures contracts (currency, energy, interest rate, food, grain, metal, meat, and equity index futures). Two real estate indices were also used for the analysis, the House Price Index (HPI) provided by the Federal Housing Enterprise Oversight (OFHEO)[73], and the new home price index provided by the Census Bureau. Daily prices of futures contracts were analysed between the second quarter of 1983 and the last quarter of 2005. The hedging efficiency for each region was tested by using the regression method proposed by Kolb and Overdahl (2003). The changes in the HPI were regressed on the returns of all the 31 futures contracts. Unsurprisingly, the results show that hedging the national HPI with existing futures contracts may not be very effective ($R^2$=40%). The same applies for the home price index calculated by the Census Bureau ($R^2$=48%).

In the second step, they examine the hedging effectiveness of CME housing futures. Instead of using the underlying S&P/Case-Shiller home price index, they decide to use the HPI since its data set is richer and covers all of the 50 U.S. states. The results show that the optimal hedge ratio is noisy (i.e. varies widely) and might indicate that the betas[74] are unstable when using a national futures contract[75]. They conclude that hedgers might not be able to effectively manage risk, unless their portfolio highly correlates with the adopted futures index. Consequently, they suggest that hedgers will not use the CME[76] futures contracts to manage house price risk which may lead to a failure of these contracts. They base their conclusion on the assumption that ineffective hedging would subsequently result in the failure of the derivative product.

Bertus, Hollans and Swidler (2008) also analysed the effectiveness of CME futures. They examine whether house price risk in Las Vegas can be effectively hedged by using those instruments. In this study, and contrary to Hinkelmann and Swidler (2008), the underlying S&P/Case-Shiller Home Price Index was used. House price data were taken from the tax records of six different tax districts in Clark County, Nevada in the period from 1994 to mid-2006. Similar to Hinkelmann and Swidler (2008), Bertus et al. (2008) adopt the approach suggested by Kolb and Overdahl (2003) to test for the hedging effectiveness.

[73] Today, the Federal Housing Finance Agency (FHFA).
[74] Slope coefficient for the risk minimizing hedge using futures contracts.
[75] The same applies to the more granular city contracts listed on the CME.
[76] Chicago Mercantile Exchange.

They used the coefficient of determination ($R^2$) to gauge the effectiveness of futures contracts in hedging house price volatility. The analysis considered hedging from the viewpoint of "groups holding equity stakes in property for returns generated by income and appreciation" (p. 266), mortgage portfolio investors, local real estate developers, and individual homeowners. The results reveal that hedging with CME futures could reduce the house price risk by more than 88% for the investment groups and mortgage holders provided their holdings were spread across the Las Vegas metropolitan area. The results are not the same in all tax districts. For builders and developers of new homes, however, the results showed poor hedging results due to the low correlation between new house price appreciation and the index. They also find that hedging ratios and hedging effectiveness are not stable over time. Over certain periods, the portfolio volatility actually increased with using a naïve hedge[77] which would cast some doubts on the usefulness of the instruments as a hedging tool.

Schorno, Swidler and Wittry (2014) revisit Bertus et al. (2008) by extending the analysed period from mid-2006 to the first quarter of 2011, and thus covering the bursting of the real estate bubble in the U.S. They argue that the success of home price futures hinges upon whether there is significant hedging activity and whether derivatives contracts can be used to effectively hedge house price risk.

Schorno et al. (2014) also studied the effectiveness of using CME futures contracts to hedge against risk in housing prices in Las Vegas (Nevada). They find that proportion of variance reduced by hedging was less than 30% for the period between the second quarter of 2006 and the first quarter of 2011. Further, they find that, with increasing granularity from county level to property level, "the ability to hedge either the idiosyncratic risk or the basis risk decreases" (p. 334). The analysis of the proportion of idiosyncratic risk relative to total risk in various Las Vegas tax districts revealed a decreasing trend and an increase in basis risk throughout the recession. Schorno et al. (2014) argue that neither the idiosyncratic risk nor the basis risk is a trivial matter and suggest that successful hedges should account for both.

[77] A naive hedge means that an investor takes an equal but opposite hedge position to the stake in the cash market. In this case, the slope coefficient for the risk minimizing hedge equals one.

Given the poor performance of the static minimum variance hedging strategies, Schorno et al. (2014) also test the effectiveness of dynamic out-of-sample hedging and compare the following strategies: (1) a naïve hedging strategy (hedge ratio equal to one throughout the life of the hedge), (2) a static minimum variance hedging strategy, (3) a rollover minimum variance hedging strategy, and (4) a rollover conditional ordinary least squares (OLS) strategy.

In order to estimate the hedging effectiveness of these strategies, they used changes in the median transaction prices to measure the return on the typical home, and they then regressed the returns on the percentage change of the S&P/Case-Shiller Las Vegas Real Estate Index. They compared the static minimum variance hedge ratios for two sample periods. The quarterly percentage change in the value of the S&P/Case-Shiller LVRX was used as a proxy for the return on the futures in a five-year hedging period (Q2/2006-Q1/2011). For a seven-year hedging period (Q2/2006-Q1/2013), they used both proxy returns and actual CME futures contract price data.

The results of the analysis show that the dynamic and naïve strategies generally dominate the static minimum variance strategy over the seven-year hedge horizon. Except for the static minimum variance strategy, the performances of the various strategies are similar for the majority of the hedging windows. All of the three strategies (i.e. rollover conditional OLS, rollover minimum variance, and naïve strategy) converge to a hedging effectiveness of 65% during the recession.

They further compared the different hedging strategies for the five- (Q2/2006-Q1/2011) and seven-year (Q2/2006-Q1/2013) hedging horizons using CME futures prices. For the first hedging horizon, in which housing returns dropped by 60.4%, the results show that each strategy would have mitigated a portion of the loss despite overall poor hedging results. The naïve strategy provided the best net return of the hedged portfolios. The second and longer hedge horizon, which recorded a drop in housing returns of 45.3%, provided a superior hedge which may have been influenced by the market recovery in early 2012. Similar to the five-year hedging horizon, the naïve strategy provided the best hedge return. In both cases the most successful hedge in terms of volatility reduction is the rollover minimum variance strategy.

Schorno et al. (2014) conclude that when using the S&P/Case-Shiller index, as proxy for futures returns, both static and dynamic strategies would have failed to maintain an effective hedge through the financial crises. They find "that the simple naïve strategy may have been the best approach to manage systematic risk" (p. 340). Further, they find that the residential real estate risk could not have been hedged with CME futures over the period 2006-2013. None of the tested strategies would have recouped all of the losses, regardless of the hedge horizon. Two of the strategies (naïve and rollover conditional OLS) would have led to higher quarter-to-quarter price variances than the home price itself in the seven-year hedge horizon.

These findings and other findings (such as De Jong, Driessen and Van Hemert, 2008; Voicu and Seiler, 2013) led Schorno et al. (2014) to the conclusion that hedgers would not use city-level futures to mitigate either systematic or idiosyncratic house price risk. They argue that due to the low activity of hedgers, there would be no long-term success of the CME real estate futures contracts.

Turning to the U.K. and the commercial property derivatives market there, Lecomte (2014) conducts an empirical study of three models of property derivatives consisting of index-based derivatives, factor hedges[78], and combinative hedges based on the U.K. IPD indices, as well as on various macro-factors and micro-factors. The aim of the study was to find out whether the latter two models dominate the index-based models in terms of hedging effectiveness.

Similar to Hinkelmann and Swidler (2008) and Bertus et al. (2008), Lecomte (2014) follows Ederington (1979) for the definition of the hedging effectiveness ($R^2$-measure between spot price and hedge). From a historical database with 224 individual office properties covering the period from 1981 to 2007, 37 buildings located in East London with holding periods equal to or longer than 15 years were chosen for the sake of statistical significance.

[78] These are hedges that are based on a selection of macro-factors (e.g. city stock, stock market volume, consumer spending, CPI, etc.) and micro-factors (e.g. age and location of the building).

The results show for the sample properties low hedging effectiveness with existing Eurex futures and IPD index-based OTC derivatives. Lecomte (2014) concludes that both do not address the needs of individual property owners because of the high basis risk accounting for more than 50% on a ten-year average. Moreover, there are some buildings in the sample that cannot be hedged at all with the index-based instruments because their returns are not correlated with the IPD indices. In addition, hedging effectiveness seemed to be time-variant.

The results further show that factor hedges and combinative hedges are significantly more effective than index-based hedges, but their effectiveness is not systematic and varies from case to case. However, Lecomte (2014) notes that a large number of adjustments are necessary when using factor and combinative hedges, thus limiting their use. Therefore, he argues that factor hedges would complement the IPD indices, but not replace them.

In conclusion, Lecomte (2014) recommends the introduction of new Eurex contracts with postal code granularity (e.g. EC2 office and EC3 office indices) and contracts based on macro-factors such as household consumption, FTSE 100[79] transaction volume, and supply of new office buildings.

In summary, it can be concluded that the majority of the studies conducted to analyse the usefulness and hedging effectiveness of property derivatives have come to the conclusion that property derivatives are an efficient hedging tool. The focus of these studies has been on both residential and commercial property derivatives. However, there are some concerns (e.g. Hinkelmann and Swidler, 2008; Schorno et al., 2014) regarding the hedging effectiveness of CME housing futures and their economic survival capability.

A common shortcoming of the studies is that they do not use real portfolio return data and futures market data but use the return on the underlying index as proxy for the derivative's return. Admittedly, these data are difficult to obtain due to access restrictions to portfolio data and the lack of liquidity in the futures markets.

[79] Financial Times Stock Exchange 100 Index is a composite share index of the 100 companies listed on the London Stock Exchange with the highest market capitalization.

## 2.6 Summary and Conclusions

This chapter started with a review of the development of property derivatives markets and instruments. The characteristics and peculiarities of real estate as an asset class were discussed and the most important milestones in the market development process summarised. Moreover, the prerequisites for a successful development of property derivatives markets were identified and the advantages and disadvantages of property derivatives analysed. Potential users of property derivatives were also identified, and the possible trading strategies summarised.

Further, the importance of real estate indices, as underlying instruments, was analysed in detail and their valuation methods discussed. Problems associated with the different index methodologies were identified and their impact on the usefulness of property derivatives assessed. The different types of property derivative instruments were also explained.

The discussion of pricing the instruments was centred on the two main approaches; namely no-arbitrage models and equilibrium models.

Finally, the academic literature addressing the illiquidity of property derivatives markets and possible reasons for the reluctant use of these instruments was reviewed and potential explanatory factors elicited. Figure 2.9 provides an overview of these identified potential reasons.

To conclude, it should be noted that the number of studies (quantitative or otherwise) that examine the market hurdles to a more widespread use of the instruments is very limited in the literature. Also, it remains unclear why real estate investors are reluctant to use property derivatives. What could enhance the understanding of this phenomenon is a theory, grounded in the views of investors, that explains the reasons for the reluctant use and the underlying investment behaviour.

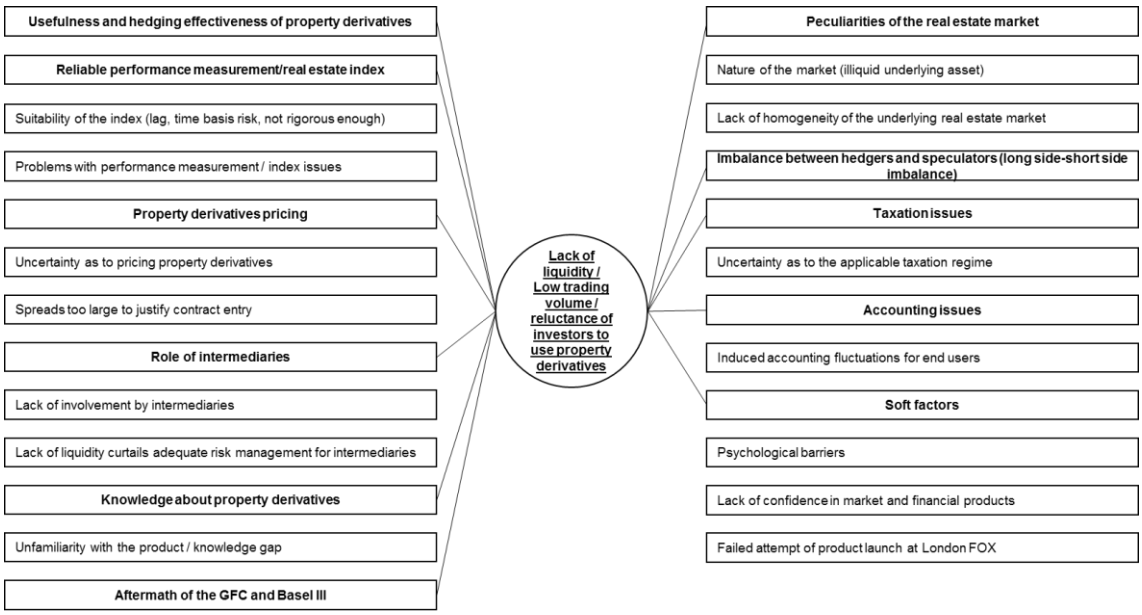


Figure 2.9: Potential reasons for the reluctant use of property derivatives (own depiction)

# Chapter 3. Research Methodology and Data Collection

## 3.1 Introduction

The purpose of this chapter is to outline the choice of the research paradigm and its philosophical underpinnings. Furthermore, the applied methodology and the data collection method used for the current research are explained. Another objective of this chapter is to defend the philosophical choices in relation to alternatives and to demonstrate a coherent methodological structure of the research project.

The aim of the current research is to forge a transdisciplinary bridge between a real-world problem and the corresponding academic research in the field of real estate derivatives. The knowledge that the current research produces is a result of the interaction between practitioners and researchers. Gibbons, Limoges, Nowotny, Schwartzman, Scott and Trow (1994) refer to a mode 2 research or applied research when knowledge is produced through direct engagement with social practice which leads to the solution of a problem.

As can be deduced from the preceding chapter, previous research on property derivatives has been conducted using mainly quantitative methods or conceptual frameworks (see Lim and Zhang, 2006; Venter, 2007; Püntener, 2011). Consequently, the focus of past studies has been more on testing hypotheses to verify the veracity of propositions and less on developing theories that explain the illiquidity of the market.

The research questions of the current research, however, require a direct contact with the people in the field in order to see the world through their eyes. The best way to achieve this connection – and to generate a theory that could explain the reasons for the reluctant use of property derivatives – is by applying a qualitative research strategy. Since the reasons for this reluctance are poorly understood, as the gap in the literature shows, further exploration is necessary to increase that understanding. Qualitative research is justified if a phenomenon needs to be understood because little research has been conducted in the corresponding field and the important variables needing examination are not known (Creswell, 2009).

The literature review in the preceding chapter has shown that the studies that show the potential of enhancing the understanding of the reasons for the reluctant use of property derivatives are few in number, and so further inquiries are necessary to enhance that understanding. In addition to the nature of the research questions, there is another justification for the choice of a qualitative approach; there are multiple “realities” or perspectives (e.g. property fund managers, multi-asset fund managers, brokers, banks, and REITs) that practitioners in the field have depending on their viewpoint. The qualitative approach allows exploring and understanding the meanings individuals ascribe to a given problem (Creswell, 2009). The underlying inductive logic of the applied qualitative approach allows gaining an understanding of the meanings investors attach to certain (yet to be identified) circumstances surrounding them. This type of approach provides the advantage that the researcher can make “sense of a situation without imposing pre-existing expectations on the phenomena under study” (Mertens, 1998, p. 160).

The term qualitative research covers a wide array of techniques and is usually exploratory in nature (Corbin and Strauss, 2015). Moreover, there is no one correct method for conducting qualitative research (McGrath, 1982; Mertens, 1998) and “[t]he researcher, like the voter, often must choose the lesser among evils” (McGrath, 1982, p. 76). Therefore, the research process needs to be considered in all its facets such as data collection and data analysis.

The multi-layered research process is described by some authors via metaphors. Saunders, Lewis and Thornhill (2008) compare the research process with the composition of an onion. They assign the research philosophies to the outer layer of the onion, followed by research approaches, strategies, research choices, time horizons, with data collection and data analysis being the core of the onion. Easterby-Smith, Thorpe and Jackson (2015), for their part, use the metaphor of a tree whose trunk has four rings with ontology representing the heartwood, followed by concentric layers of epistemology, methodology, and methods and techniques representing the bark of the tree.

The chapter primarily follows the logic of the research process epitomised by the aforementioned two metaphors. First, the epistemology and ontology of the

present research is discussed. The philosophical anchoring of the research is important because it entails important assumptions on how the researcher views the world which underpins the research strategy and the corresponding methods used (Saunders et al., 2008).

The remainder of the chapter is organised as follows. Section 3.2 reiterates the focus of the research and the research questions which serve as the starting point for the data collection process. The philosophical assumptions (i.e. the ontology) that underlie the current research are explained in section 3.3. The theoretical research paradigm (i.e. the epistemology) of the current research is discussed and justified in section 3.4. The contrasting views apparent in Social Science are discussed in section 3.5. Section 3.6 discusses the overall methodological approach known as “grounded theory” and justifies that choice. It also summarises the different versions of grounded theory. The method of data collection which is based on in-depth interviews, and the data analysis which follows the analysis techniques of grounded theory, are explained in section 3.7. The last section, which concludes the chapter, presents some thoughts on the quality of the research, in particular its validity, reliability, credibility, and applicability.

## 3.2 Focus of the Study and Research Questions

Existing research on market barriers (see for example Lim and Zhang, 2006; Venter, 2007; Püntener, 2011) falls short when explaining the reasons for the reluctant use of property derivatives and the consequent illiquidity in the market. Therefore, the focus of the current research is to better understand the factors that influence the propensity of real estate investors in the U.K. to employ property derivatives and those that keep potential users away from using the instruments. With a set of pertinent sub-questions, the views of potential users on property derivatives shall be captured and the reasons for not using the instruments identified. A better understanding of the investment behaviour and attitudes towards property derivatives should help explain why no liquid market in property derivatives has been established yet, despite numerous attempts in the past.

In order to elicit the main themes that help answer the central research question, the following set of sub-questions is addressed:

1. What reasons do potential users (e.g. fund managers) put forward for not using property derivatives?
2. Is there a pattern that emerges in these reasons as to why real estate derivatives are not used?
3. What are the motivations that potential investors have for using property derivatives?
4. Do the characteristics of property futures, which are currently available on Eurex, meet investors' expectations and their investment requirements?
5. What is the perception of liquidity that real estate investors have with regard to the property derivatives market?
6. Which conditions need be fulfilled in order for real estate investors to consider trading property derivatives?

### 3.3 Underlying Philosophical Assumptions of the Research – Ontology

In this and the next section, the ontological beliefs or philosophical assumptions about the nature and structure of reality and the underlying epistemology for inquiring into the nature of the social world are discussed. This is important because "[d]ifferent ways of viewing the world shape different ways of researching the world" (Crotty, 1998, p. 66). What is more, the philosophical assumptions inform the theoretical research paradigm, and both ought to be in logical alignment.

There are various ways of approaching the ontological stance in the research process because ontology is concerned with the nature of reality, the way the world operates and the corresponding philosophical assumptions that the researcher holds about it (Corbin and Strauss, 2015; Easterby-Smith et al., 2015).

Saunders et al. (2008) dichotomise ontology into objectivism and subjectivism. Objectivism assumes that social entities exist in reality external to social actors,

while subjectivism holds that “social phenomena are created from the perceptions and consequent actions of social actors” and are in a constant state of revision (Saunders et al., 2008, p. 111). The current research aims to uncover the perceptions of real estate investors with regard to employing property derivatives which lead to the decision and consequent action not to use the instruments.

In Social Science, the ontological debate has been primarily between internal realism, relativism, and nominalism (Easterby-Smith et al., 2015) which can be considered as different positions along a continuum with differing assumptions about truth. Realism asserts that the world is concrete and external (Easterby-Smith et al., 2015), that is, realities exist outside the mind (Crotty, 1998), and hence there is a single truth. A less stringent form of realism is internal realism which acknowledges that one truth exists. But it also asserts that this truth is obscure and that facts cannot be accessed directly (Easterby-Smith et al., 2015).

The other ontology on this continuum is relativism which asserts that there is no single reality that can be discovered but that there are many perspectives which depend on the viewpoint of the observer (Easterby-Smith et al., 2015). The relativist position assumes that different observers may have different viewpoints (Easterby-Smith, Thorpe and Jackson, 2008, p. 62) and “what counts for the truth can vary from place to place and from time to time” (Collins, 1983, p. 88). At the other end of the ontological continuum (compared to realism) is nominalism. The nominalist view, as opposed to realism, assumes that there is no truth and it is the “labels and names we attach to experiences and events which are crucial” (Easterby-Smith et al., 2015, p. 49). There are many individual reasons possible for not employing property derivatives which, in turn, depend on past experience, the purpose of application, and the expectations as to the outcome of using the instrument. Therefore, this research can be located in the realm of relativism. Moreover, this research is based on the postulate that the reasons for not using the instrument depend on the viewpoint of the observer and its focus is to capture these multiple perspectives.

Ontological issues and epistemological issues tend to emerge together (Crotty, 1998, p. 10). Therefore, they should be discussed in direct relation with each other. In the next section the theoretical research paradigms are discussed.

## 3.4 Theoretical Research Paradigms – Epistemology

Epistemology refers to the theory of knowledge and to what constitutes acceptable knowledge in a field of study (Saunders et al., 2008). It is concerned with explaining how we know what we know (Crotty, 1998). Epistemology in research stands for a "general set of assumptions about ways of inquiring into the nature of the world" (Easterby-Smith et al., 2015, p. 47).

It is worth mentioning that there is no consistency among authors as to the terminology and the scope of classifications when discussing epistemologies. Saunders et al. (2008) use the term research philosophies and label positivism, realism, interpretivism, and pragmatism. Mertens (1998) talks about the three major paradigms when discussing positivism/post-positivism, interpretivism/constructivism, and the emancipatory epistemology. Crotty (1998) argues that epistemology is imbedded in the so-called theoretical perspective. According to his interpretation, it is epistemology that informs the theoretical perspective. He divides epistemology into objectivism, constructionism, and subjectivism, and discusses the following theoretical perspectives: positivism (and post-positivism), interpretivism, critical inquiry, feminism, and postmodernism. Merriam (2009) uses the term epistemological perspectives and discusses positivist/post-positivist, interpretive/constructivist, critical, and post-modern/post-structural perspectives. Creswell (2009) uses the term worldviews and labels post-positivism, constructivism, advocacy/participatory, and pragmatism. Recently, Easterby-Smith et al. (2015) have argued that there are two contrasting views of how Social Science research should be conducted; namely, positivism and social constructionism. Dependent on the underlying ontology, Easterby-Smith et al. (2015) add a strong version of positivism and constructionism, respectively.

Table 3.1 provides an overview of the different types or labels of epistemology which vary in scope but indicate that positivism/post-positivism and interpretivism/constructivism are among the core types in Social Science.

| Source | Epistemological label | Epistemology | | | | |
|---|---|---|---|---|---|---|
| Saunders et al. (2008) | Research philosophies | Positivism | Interpretivism | Realism | Pragmatism | |
| Mertens (1998) | Paradigm | Positivism/ Post-positivism | Interpretivism/ Constructivism | Emancipatory | | |
| Crotty (1998) | Theoretical perspectives | Positivism/ Post-positivism | Interpretivism/ Constructivism | Critical inquiry | Feminism | Post-modernism |
| Merriam (2009) | Epistemological perspectives | Positivism/ Post-positivism | Interpretivism/ Constructivism | Critical | Postmodern/ Post-structural | |
| Easterby-Smith et al. (2015) | Epistemology | Positivism | Social constructivism | | | |
| Creswell (2009) | Worldviews | Post-positivism | Constructivism | Advocacy/ Participatory | Pragmatism | |

Table 3.1: Differently labelled epistemologies

In order to understand the factors that influence the propensity of real estate investors to employ property derivatives and the reasons for their reluctant use, a positivist approach would not be appropriate because the intended outcome is not causality, nor the confirmation or falsification of a theory. What is required, in this case, is an epistemology that is flexible enough to account for the variance in human action and behaviour. In addition, since there are different motivations for using property derivatives including hedging and speculation, there are multiple realities in which individuals make sense of the information available to them.

Social constructionism, as will be discussed in the next section in greater detail, provides the right set of assumptions for the circumstances under which the current research is conducted. Central to the research is the “sense-making” of the actors in the field in order to see the world through their eyes. The multiple realities that the actors create entail relativism as ontological stance which underlies constructionism.

## 3.5 Contrasting Epistemological Views in Social Science

The two contrasting views of how research in Social Science should be conducted are positivism and interpretivism/social constructionism[80] (Saunders et al., 2008; Easterby-Smith et al., 2015). They are both discussed hereafter.

The key idea of positivism is that the social world exists externally and that there is an emphasis on quantifiable observations that lend themselves to statistical analysis (Saunders et al., 2008). Historically, it is the oldest research paradigm and is akin to the philosophical stance of natural scientists. There is only one reality which is knowable within a certain level of probability (Mertens, 1998). In a positivist view, the observer must be independent of what is being observed and the explanations should demonstrate causality (Easterby-Smith et al., 2015). The research problems are reduced to the simplest possible elements. Researchers holding a positivist view are likely to use existing theory to develop hypotheses which will be tested and confirmed or refuted (Saunders et al., 2008).

Positivism asserts that "objects in the world have meaning prior to, and independently of, any consciousness of them" (Crotty, 1998, p. 27). In other words, meanings are not ascribed, but are discovered, and the social world exists externally and can be measured through objective methods rather than inferred subjectively (Easterby-Smith et al., 2015). The generated knowledge is based on observed facts. The observer must be independent of what is being observed. Post-positivism "recognises that knowledge is 'relative rather than absolute'" (Merriam, 2009, p. 7) and this reality can be discovered within a certain level of probability (Mertens, 1998).

Easterby-Smith et al. (2015) dichotomise positivism into 'normal' positivism and strong positivism. Strong positivism is ontologically rooted in realism and assumes that reality exists independently of the observer. The aim of the researcher is directed towards the discovery and the verification or falsification of hypotheses that confirm theory which, in turn, explain reality. The less strong version of positivism is based on internal realism, and so it acknowledges that reality cannot be accessed directly. The nature of reality needs to be inferred

[80] The terms constructivism and interpretivism are often used interchangeably (Merriam, 2009).

through conducting surveys of large samples, thus enabling the identification of patterns and regularities in behaviour (Easterby-Smith et al., 2015).

The view that reality is not objective but socially constructed by people, who give a meaning to it in their interactions with each other, gave rise to the development of social constructivism. The nature of reality is multiple and may change through the process of study (Mertens, 1998). Since there are many realities, the researcher needs to gather multiple perspectives (Easterby-Smith et al., 2015). There is, thus, a focus on subjective meanings and social phenomena, and their interpretations in order to reveal the underlying reality. This focus requires an interactive link between the researcher and the research subject. It is about what people feel and think. To this end, the researcher enters the social world of the research subjects and tries to understand the world from their point of view (Saunders et al., 2008).

In order to understand the actions of social actors, it is necessary to study the subjective meanings motivating their actions (Saunders et al., 2008). According to Easterby-Smith et al. (2015), human actions are a result of making sense of different situations rather than responding directly to an external stimulus. They dichotomise constructionism into a normal and strong forms subject to the underlying ontology. For them, strong constructionism is based on nominalism and assumes that there is no pre-existing reality. The research framed by this epistemology aims to understand how people invent structures that help them understand what is going on around them. They argue that “normal” constructionism is based on relativism and works under the assumption that there are many different realities. Moreover, the focus of the researcher is to capture these multiple perspectives. Therefore, the current research can be located within the realm of “normal constructionism”.

The research philosophy, which some authors call worldview or research paradigm, contains important assumptions on how the researcher views the world which underpin the research strategy and the corresponding methods used (Saunders et al., 2008). In the next section, the chosen research strategy is explained and justified.

## 3.6 Overall Methodological Approach and Justification

Having established the epistemology of the current research and its philosophical underpinnings, the methodological approach and the justification for its choice are discussed in this section.

Generally, the methodological approach refers to a way of thinking about social phenomena (Corbin and Strauss, 2015). It describes the process and logical structure of inquiry into the research problem (de Vaus, 2001), that is, the systematic way in which data on the factors that determine the propensity of investors (in this case real estate investors in the U.K.) to employ property derivatives, are collected and analysed.

The methodological approach chosen for the current research is “grounded theory” because the research problem can be best tackled by grounding the reasons for investor reluctance in their own answers provided through in-depth interviews. This approach provides a first-hand account from practitioners who are active in the field and who are knowledgeable about the product. In addition to this pragmatic reason, there are others inherent in the methodology such as the theoretical sampling technique, and the systematic comparison of phenomena (to be explained in this section in greater detail).

Grounded theory is a methodology that was developed by Glaser and Strauss (1967) “as a reaction against the extreme positivism that had permeated most social research” (Suddaby, 2006, p. 633). Glaser and Strauss (1967) argue in their book “The Discovery of Grounded Theory: Strategies for Qualitative Research” in favour of grounding theory in social research itself, and thus generating theory from data. They argue against “armchair theorising” and assert that theory should be derived and based on actual data.

Grounded theory is an approach that helps to find out why something is going on and what accounts for certain patterns of behaviour and the variations therein. The researcher, as the primary instrument of data collection and analysis, derives meaning from the data assuming an inductive stance (Merriam, 2009). There is

a strong emphasis on theory as a process which is considered an ever-developing entity and not a perfected product, and hence the published word is just a pause and not a finality (Glaser and Strauss, 1967). It is an interpretive process that is grounded in systematically obtaining the views of the research participants and in contrast with logical deduction from a priori assumptions. The advantage Glaser and Strauss (1967) saw in their methodology is that theory based on data cannot be easily refuted by more data or replaced by another theory because "it is too intimately linked to data" (Glaser and Strauss, 1967, p. 4).

According to Glaser (1992), the logic of grounded theory is to ask two formal, not pre-conceived questions[81]: (1) "What is the chief concern or problem of the people in the substantive area, and what accounts for most of the variation in processing the problem?" and (2) "[…] what category or what property of what category does this incident indicate?" (p. 4).

One of the key points of grounded theory is that the processes of data collection, data analysis, and data presentation are tightly interwoven and "constantly adjust each other to the emergent theory through theoretical sampling, memoing[82] and sorting" (Glaser, 1992, p. 14).

A theoretical difficulty the researcher is faced with, when using grounded theory and while ensuring the ontological and epistemological alignment of the chosen methodology, is that no commitment to any specific theoretical foundation or philosophy was originally made (Corbin and Strauss, 2015). Consequently, various attempts were made afterwards to position grounded theory in ontological and epistemological terms.

Charmaz (2011) suggests that Glaser and Strauss have been influenced by different schools of thought which entailed conflicting philosophical and methodological pre-suppositions. Glaser, who graduated from Columbia

[81] Glaser, as protagonist of an extreme form of grounded theory, is against any form of preconception which also excludes the review of relevant literature prior to entering the research field. In this way he believes that the emergence of categories will not be "contaminated" by concepts that were preconceived. Similarities and convergences with extant literature can be established once the core of categories has emerged.
[82] Writing memoranda as records of the data analysis.

University, was influenced by positivism, and Strauss, who graduated from the University of Chicago, was influenced by interactionists and pragmatists. These influences may be a possible reason for the major disagreement and dispute that arose between them which found its expression in the reinforcement of the original version of grounded theory from 1967 espoused by Glaser, and the development of a parallel version developed by Strauss (1987) and Strauss and Corbin (1990).

According to Glaser's interpretation of grounded theory, the researcher discovers what does exist, irrespective of his or her own perspective or experience and thus takes a neutral and objectivist stance (Glaser, 1992). There is an emphasis on emerging concepts from the data. The theory emerges from the data itself and in order to avoid any kind of preconception, the study of extant literature and theories is delayed until after the emergence of the first core categories and their properties from the data. Glaser's belief, that the social world is out there waiting to be discovered, suggests a realist or internal realist ontological stance. According to his interpretation of grounded theory, the research problem emerges from the data and is not predefined.

However, to enter the research field without a clearly defined research problem and without any prior knowledge about the field of study seems to be out of touch with reality in academic research. Moreover, there has been a debate as to when to conduct the literature review. In order to avoid forcing data into preconceived categories or properties, Glaser and Strauss (1967) insist on ignoring the literature on the topic at the outset of the research. Their idea was that similarities and convergences with the literature can be established once the categories have emerged. This original thought was reinforced by Glaser (1992) who insists that there is actually a need not to review the literature in order to avoid any form of preconception when analysing the data. Once the emerging theory is sufficiently grounded and developed in a core variable, the integration of categories and properties starts to emerge, and then the literature in the substantive field may be reviewed and related to the research.

Suddaby (2006) disagrees with this approach and asserts rightly that "the idea that reasonable research can be conducted without a clear research question

and absent theory simply defies logic" (p. 634). In addition, the procedure stands in contrast with the generally accepted and required research process in which the literature on the topic is reviewed in order to identify gaps and deficiencies, which are then filled after making the case for the applicable research methodology.

Contrary to Glaser's ontological and epistemological stance, and in disagreement with some of his methodological details, Strauss believes that social reality is constructed, and theory is generated by the interaction of the researcher with the data. He recommends familiarizing oneself with prior research and favours a more systematic approach to data analysis (Easterby-Smith et al., 2015).

The research problem is established a priori, and the researcher verifies his or her suppositions. Strauss and Corbin acknowledge that the researcher has some degree of prior knowledge about the field of study which is impossible to discount (Corbin and Strauss, 2015). However, they put the statement into perspective when the say that too much knowledge of literature "can bias interpretations and block discovery of new concepts" (Corbin and Strauss, 2015, p. 55). A valid point of their argument is that it is impossible to know all relevant concepts before they emerge from the data.

Glaser's main complaint is that Strauss and Corbin endorse techniques that force conceptualisation on data and preconceive the analysis of data instead of waiting for the emergence of categories, properties and their theoretical codes. His claim is that they add more methods and no methodology and "lose the abstract logic required to generate grounded theory" (Glaser, 1992, p. 8). One of the basic tenets of grounded theory is that categories emerge from the data and are not forced into preconceived categories. Glaser (1992) admonishes Strauss for breaching this ground rule and calls it "preconceived, forced, conceptual description, which can be very significant in its own right, but again it is not emergent grounded theory" (p. 4).

Juliet Corbin[83] acknowledges the influence, to some degree, of the writings of contemporary feminists, constructionists, and post-modernists (Corbin and Strauss, 2015). For her, there is no reality out there to be discovered, but rather concepts and ideas are invented which, however, "correspond to something in the real world" (p. 237).

Her focus is not the event itself but the "meaning given to events as evidenced in the action-interaction that follows" (Corbin and Strauss, 2015, p. 25). Corbin agrees with the constructivist viewpoint "that concepts and theories are constructed by researchers out of stories that are constructed by research participants who are trying to explain and make sense out of their experiences and lives, both to the researcher and themselves" (Corbin and Strauss, 2015, p. 26). She wants to "develop knowledge that will guide practice" (Corbin and Strauss, 2015, p. 27) and make peoples' lives better, drawing on her pragmatist and interactionist orientation which concurs with Strauss's philosophical background.

A third version of grounded theory is suggested by Kathy Charmaz who takes a constructivist stance and "adopts the methodological strategies of Glaser and Strauss's classic statement but integrates relativity and reflexivity throughout the research process" (Charmaz, 2011, p. 364). Charmaz (2011) argues that "constructivist grounded theory acknowledges the dual roots of the method in positivism and pragmatism and seeks to develop the emphasis on pragmatism" (p. 374).

The constructivist grounded theory acknowledges that knowledge is dependent on the circumstances under which the data is gathered and the influence of the researcher who constructs the theory. There is an active interaction between the researcher and the research subject. Constructivist grounded theory adopts a relativist approach in which multiple realities exist and the researcher is part of what is viewed (Charmaz, 2011). The aim of constructivist grounded theory is the interpretive understanding of what is being researched while maintaining reflexivity (Charmaz, 2011).

[83] Anselm Strauss, one of the co-authors of both the initial and the second and alternative version of grounded theory, passed away in 1996.

In agreement with Corbin and Strauss, Charmaz (2006) argues “that preconceived theoretical concepts may provide starting points for looking at” the data “but they do not offer automatic codes for analysing these data” (p. 68) yet they can “illuminate the properties of emergent categories” (Charmaz, 2011, p. 372).

Since the original version of grounded theory (Glaser and Strauss, 1967) seems to be too rigid in terms of its treatment of extant literature and preconceived questions, the current research follows the analytic techniques and procedures provided and described by Corbin and Strauss (2015). In line with the ontological stance of the current research (i.e. relativism) and acknowledging multiple realities, the current research adopts a constructivist view on grounded theory.

The reasons for choosing grounded theory as research methodology are five-fold. First, the generated theory is grounded in and derived from the data which demonstrates legitimacy. It is the direct interaction with the research subjects and with the data that are required in order to answer the research questions. Second, the reasons for the reluctant use of property derivatives emerge from the data and are not preconceived or subjectively determined by the researcher. Third, grounded theory uncovers the beliefs held by the investors active in the field, it explores their meanings and provides explanations for their present investment behaviour which is “likely to offer insight, enhance understanding, and provide a meaningful guide to action” (Strauss and Corbin, 1998, p. 12). This entails that the research findings are meaningful to the people in the field because the data stems from them. Fourth, the theoretical sampling technique, which will be explained in the next chapter, provides a certain automatism and logic to the sampling process and ensures that the identified categories are theoretically saturated. Fifth, the type of theory that is developed is usually a substantive theory, and hence useful to practice (Merriam, 2009).

It is worth mentioning that the various versions of grounded theory share some commitments such as systematic inquiry, inductive logic, conceptualising qualitative data, and grounding the emergent theory in the data (Charmaz, 2011) which are discussed in the next section.

## 3.7 Data Collection and Analysis

### *3.7.1 Technical Procedures of Data Collection and Analysis in Grounded Theory*

A special feature of grounded theory is the simultaneous analysis of data during its collection process. Data analysis is a process that implies analysing and interpreting what people say, and making sense out of the data (Merriam, 2009).

The research questions require a data collection method that captures the opinions, attitudes, interpretations, and sense-making of individuals in the field. They require a one-to-one interaction in order to elicit the reasons for the observed behaviour. Furthermore, in line with the ontological position of the present research, it is necessary to obtain an understanding of the multiple interpretations of what is going on in the field. This relativist view, that informs the epistemological position of constructionism, requires a qualitative data collection approach that allows one to enter into the perspectives of the people who are active in the field or otherwise knowledgeable. Therefore, in-depth interviews served as data collection method. In order to allow a maximum degree of freedom to the interviewees, while avoiding the risk of straying into unstructured and informal conversations, semi-structured interviews were conducted. They simultaneously provide flexibility and a minimum of structure.

The approach (i.e. grounded theory) suggested by Glaser and Strauss (1967) combines the analytic procedure of constant comparison and explicit coding with constantly redesigning and reintegrating the researcher's theoretical notions.

Following the methodology of grounded theory, the process of data analysis starts with the coding of the raw data, i.e. the transcripts of interviews or other types of data such as written, observed, or recorded material (Corbin and Strauss, 2015). Coding is the process of labelling data in a meaningful way, preferably with words that reflect action, and thus creating an analytic frame from

which to build the analysis (Charmaz, 2006). The coding is a result of the researcher's actions and understandings (Charmaz, 2006).

First, the data is broken down into incidents which are examined and compared for similarities and differences. Then the incidents are categorised through constant comparison. Conceptually similar incidents are named as a category and "dissimilar incidents can be given a name as a property of a category" (Glaser, 1992, p. 40). There is a systematic relationship between the category which "stands by itself as a conceptual element of the theory" and a property which "is a conceptual aspect or element of a category" (Glaser and Strauss, 1967, p. 36). Both are indicated by the data and form two elements of the theory. At this stage, the researcher applies an open coding approach without any preconception in order to discover categories and their properties. These are the "basic grounding approaches to the data and lead to emergent discoveries" (Glaser, 1992, p. 39).

Corbin and Strauss (2015) and Charmaz (2006) support a line-by-line coding in order to elicit as much meaning as possible from the data and to strengthen the foundation of the emerging theory. In contrast, Glaser (1992) advocates the search for patterns within the incidents instead of conceptualising the data on a sentence by sentence basis, or by giving each discrete incident a conceptual name. The current research followed the latter coding approach.

Once the core categories have been identified the open coding process ends and the coding of data becomes more selective in order to "delimit coding to only those variables that relate to the core variable" (Glaser, 1992, p. 75). Selective or focused coding is used to conceptually sum up the patterns found in the substantive incidents. Applying the procedure means using all the codes created in the first cycle and sifting through the data again in order to develop "a sense of the categorical and conceptual order arising from the open codes" (Easterby-Smith et al., 2015, p. 195).

In addition, Corbin and Strauss (2015) use axial coding which relates categories to one another. Charmaz (2006) sees in the axial coding procedure the application of an analytic frame to the data which "may limit what and how

researchers learn about their studied worlds and, thus, restricts the codes they construct" (p. 62). In the worst case, she argues axial coding "casts a technological overlay on the data" (Charmaz, 2006, p. 63) which means that it adds another layer of analysis. The current research established relationships between relevant categories which help understand the structure and connections of the discovered influencing factors.

Figure 3.1 provides an overview of the coding procedures applied in the development of grounded theory.

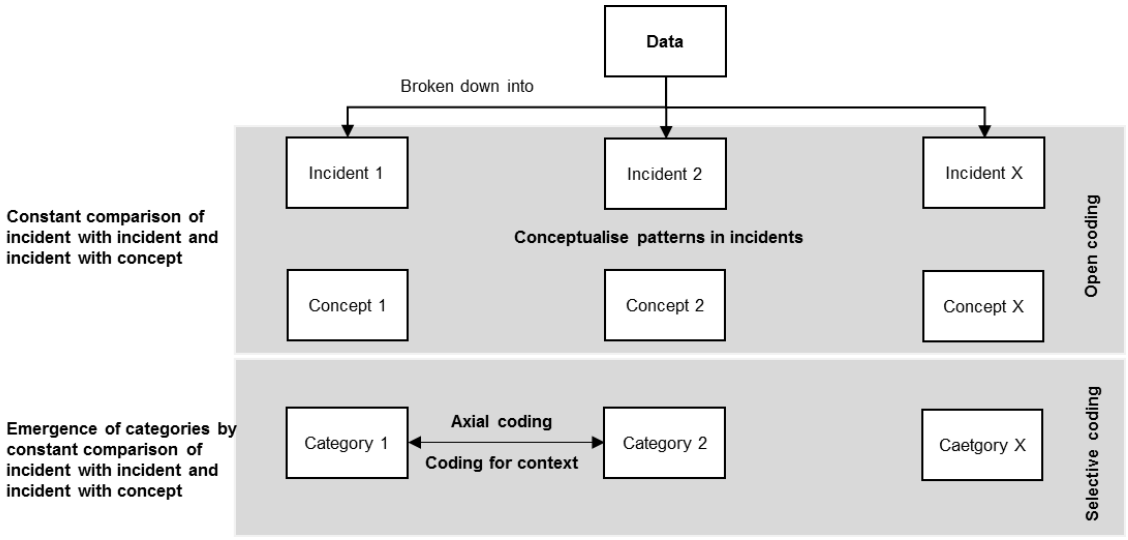


Figure 3.1: Coding procedure in grounded theory (own depiction)

The data analysis is accompanied by writing memos in order to synthesize relevant information and keep track of decisions made on coding, categories, concepts, and theoretical sampling. Writing memos aids theorizing and helps to increase the degree of abstraction (Easterby-Smith et al., 2015).

In addition to the constant comparative method, another key component in the grounded theory methodology is theoretical sampling. Theoretical sampling refers to the decision of the researcher as to which data to collect and where to collect them next "in order to develop his theory as it emerges" (Glaser and Strauss, 1967, p. 45). The comparison of groups which are "composed of respondents chosen in accordance with his emergent analytic framework" (Glaser and Strauss, 1967, p. 53) provides control over the conceptual level and the population scope. The selection of comparison groups is based on their

theoretical relevance “for furthering the development of emerging categories” (Glaser and Strauss, 1967, p. 49).

The sampling strategy of the current research is explained in section 3.7.3. The process of theoretical sampling approaches an end when the categories become theoretically saturated. Saturation means that no additional data is found that expands the properties of a category, that is, “all major categories are fully developed, show variation, and are integrated” (Corbin and Strauss, 2015, p. 135).

In the process of theory generation, collecting, coding, and analysing data is done simultaneously as much as possible since its separation would hinder the generation of theory (Glaser and Strauss, 1967). The researcher goes back and forth “between analysis and data collection because each informs and advances the other” (Charmaz, 2006, p. 361).

It is important to note that the generated theory is not based on the facts provided by the data, but on the conceptual categories and their properties that were generated from the data. The emerging theory is continually checked and compared as more data becomes available.

Figure 3.2 below summarises the process of grounded theory according to Glaser and Strauss (1967). Table 3.2 shows a seven-step procedure on how to generate grounded theory which the current research followed.

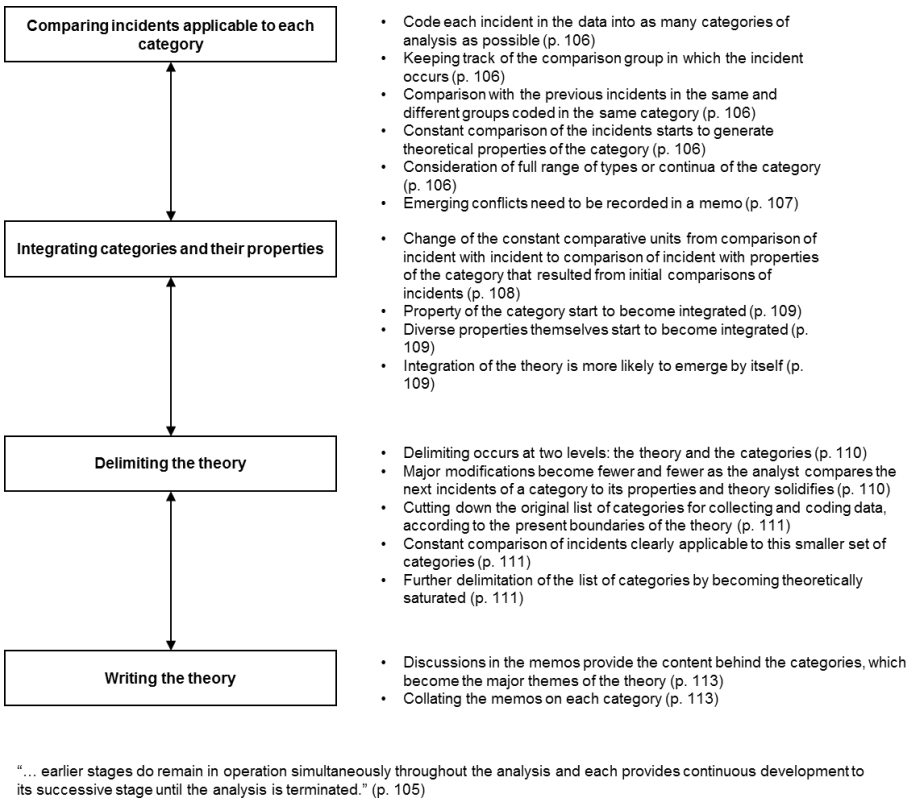


Figure 3.2: The process of grounded theory according to Glaser and Strauss (1967)

| Step | Description |
|---|---|
| 1. Familiarisation | Sift through all available data |
| 2. Reflection | Data evaluation in light of previous research<br>Dialogue between existing research and the research phenomenon |
| 3. Open coding | Summarising chunks of data with a word or short phrase |
| 4. Conceptualisation | Discover patterns among codes<br>Comparing them and organising them into different categories |
| 5. Focused re-coding | Re-coding with a limited number of more focused codes<br>More in-depth analysis |
| 6. Linking | Emerging patterns between concepts<br>Conceptualizing how key categories and concepts relate to one another |
| 7. Re-evaluation | Identification of areas that need more elaboration or have been over-emphasised |

Table 3.2: Summary of seven steps to grounded theory based on Easterby-Smith et al. (2015, pp. 192-193)

### *3.7.2 Pilot Study*

In 2011, the researcher conducted a pilot study in order to learn more about the development prospects of a liquid property derivatives market in the U.K., the existing obstacles in the market, and the conditions that would facilitate the evolution of such a market.

For this purpose, five practitioners were interviewed by means of in-depth interviews. They were employees of a stock exchange, a bank (active in the market at that time), a brokerage firm, a real estate investment firm, and an index provider. The duration of the interviews ranged from 30 to 40 minutes. Table 3.3 below displays the interviewees and the position they held at the time of the interviews.

| No. | Type of Organisation | Position of Interviewee |
|---|---|---|
| 01 | Stock exchange | Product Development |
| 02 | Bank | Property Derivatives Trader |
| 03 | Brokerage firm | Head of Property Derivatives |
| 04 | Real estate investment firm | Partner |
| 05 | Index provider | Senior Manager, Client Services |

Table 3.3: Interviewees for pilot study in 2011

The purpose of the pilot study was to gather information about the following aspects:

1. The personal opinions of the interviewees on the development prospects of a liquid derivative market;
2. The hurdles to a liquid market development and how they can be overcome;
3. Future outlook and how the current situation is going to change;
4. The risk awareness of investors dealing with property derivatives;
5. The effectiveness of property derivatives;
6. Investors' trust in commonly used indices;
7. The effects on the real estate market; and

8. The potential of misuse and index manipulation.

The results of the study are discussed in section 4.2.

### *3.7.3 Sampling Approach and Overview of the Conducted Interviews*

One of the main challenges faced with beginning the data collection process, was the identification of practitioners in the field who are knowledgeable about property derivatives. In order to answer the research questions and to allow drawing meaningful conclusions, a sufficient number of interviewees had to be found and their views to be captured through in-depth interviews.

For the purpose of learning more about the instruments from a users' perspective and to meet people who are interested in property derivates, the researcher joined a practitioners group which is called the Property Derivatives Interest Group (PDIG). This is a subgroup of the Investment Property Forum (IPF)[84] in the U.K. whose objective it is to support the development of the property derivatives market. The group meets irregularly and discusses issues that concern practical matters related to the use of property derivatives. Joining the group provided a good starting point for the data collection process.

In this way, the first ten individuals were identified and interviewed. These first ten interviews were conducted face-to-face between June and August 2016 and comprised nine individual and one group interview.

In addition, the member lists and fund overviews of the Association of Real Estate Funds (AREF)[85], the Investment Association (IA)[86], and the European

[84] The IPF is an individual members organisation in the U.K. for property investment professionals which has the aim to enhance the understanding and efficiency of property as an investment by undertaking research projects and effectively communicating its results, providing education, and by providing a forum for fellowship.
[85] AREF helps support and influence the evolution of the real estate industry by providing governance and transparency standards; informing, influencing and lobbying policy makers, tax and regulatory authorities, and other official bodies (Source: http://www.aref.org.uk).
[86] The Investment Association is the trade body that represents U.K. investment managers.

Association for Investors in Non-Listed Real Estate Vehicles (INREV)[87] were used to compile a list of potential interviewees. Moreover, a social networking service was used to identify and contact practitioners with relevant experience in the field of property derivatives. In total, a group of 118 people were contacted using both a snowball sampling technique and a purposeful sampling technique. The first contact was established either by telephone or via email, and sometimes a combination of both. From the 118 persons contacted, 52 (44%) did not answer, 20 (17%) refused to be interviewed, and 46 (39%) persons agreed to be interviewed. The latter number includes two group interviews with two and three practitioners, respectively. The 43 interviews were conducted in the period between June 2016 and March 2017. This ratio could be deemed fairly representative. Moreover, the researcher stopped the sampling process when he realised that new data did not provide any new conceptual and theoretical insights.

In terms of sample representativeness, it is worth mentioning that the sampling in the current research is aimed towards theory construction. The focus of the pursued research strategy is on selecting and comparing pertinent data to develop an emerging theory. A decisive factor in the sampling process is not the number of interviewees but their contribution to "the development of insight and understanding of the phenomenon" (Merriam, 2009, p. 105).

Table G.1 in Appendix G provides an overview of the types of organisations, positions of interviewees, durations, and types of interviews. There were two group interviews (with three and two practitioners, respectively) and 41 individual interviews conducted so that the views from 46 practitioners were considered in the current research. Forty-nine per cent of the interviews were conducted face-to-face and 51% via telephone. The meetings for the face-to-face interviews took place in London/U.K.

In the first ten interviews, open-ended questions were used as a guideline. The aim was to avoid short yes-no-answers. The main intention was to let the

[87] INREV is among Europe's leading platforms for sharing knowledge on the non-listed (unlisted) real estate industry. The association's goal is to improve transparency, professionalism, and best practices across the real estate sector (Source: https://www.inrev.org/).

interviewees speak in order to avoid any distortion of the interviews in a preconceived direction. For the subsequent interviews, the researcher added questions that were deemed necessary for the saturation of identified categories. The catalogue of questions is shown in Appendix H. It should be noted that the catalogue shows the final set of questions that were accumulated during the research. Consequently, not all questions were asked in each interview but only a selection of it that was deemed useful to saturate the emerging categories.

Since it became obvious during the research interviews that the reasons given by the interviewees for the reluctant use of property derivatives were not very different from each other, the researcher decided not to analyse the interviews by type of organisation. The reason for this decision is that a separate analysis by organisational type would not increase the understanding of the factors that influence the propensity to use the instruments. The only exception to this are the banks because their reasons for not using the instruments and for withdrawing from the market are different in nature from those of real estate investors.

## 3.8 Quality of Research Design

### *3.8.1 Introduction*

In the context of evaluating the quality of qualitative research design, there are four issues frequently mentioned in the literature which are: validity, reliability, credibility, and applicability.

### *3.8.2 Validity*

Validity refers to the accuracy of findings from the standpoint of the researcher, the participant, or readers of the study (Creswell, 2009). From a constructionist viewpoint, it needs to be ensured that a sufficient number of perspectives have been included (Easterby-Smith et al., 2015) and that the findings are congruent with reality (Merriam, 2009) as perceived by the research participants. There are

eight different strategies that help achieve validity. They are summarised in the table below with a comment on how they were considered in the current research.

| Strategy | Description |
|---|---|
| 1. Triangulation | Using multiple investigators, sources of data, or data collection methods to confirm emerging findings.<br><br>**In the current research:** 46 persons were interviewed, and emergent findings constantly compared from one interview to the next. Prior to commencing the data collection, an extensive literature review was conducted. |
| 2. Member checks | Taking data and tentative interpretations back to the people from whom they were derived and asking if they are plausible.<br><br>**In the current research:** Issues such as pricing were discussed with the advocates of the corresponding school of thought. Member checks were made whenever possible. |
| 3. Adequate engagement in data collection | Adequate time spent collecting data such that the data become "saturated"; this may involve seeking discrepant or negative cases.<br><br>**In the current research:** An extensive period of time was spent in the field to collect data and saturate categories. |
| 4. Researcher's position or reflexivity | Critical self-reflection by the researcher regarding assumptions, worldview, biases, theoretical orientation, and relationship to the study that may affect the investigation.<br><br>**In the current research:** Self-awareness in terms of assumptions held by the researcher affecting the data interpretation and awareness of the role that the researcher has when interpreting data. |
| 5. Peer review/ examination | Discussions with colleagues regarding the process of study, the congruency of emerging findings with the raw data, and tentative interpretations.<br><br>**In the current research:** Discussions with practitioners and academics throughout the entire research process. |
| 6. Audit trail | A detailed account of the methods, procedures, and decision points in carrying out the study.<br><br>**In the current research:** A special software for analysing qualitative data was used. All kind of information was stored in a software-specific file including interview transcripts, codes, memos, etc. |
| 7. Rich, thick descriptions | Providing enough description to contextualize the study such that readers will be able to determine the extent to which their situations match the research context, and, hence, whether findings can be transferred.<br><br>**In the current research:** The research findings are presented with many quotations and descriptions in order to link the data and its interpretation in a comprehensible way. |
| 8. Maximum variation | Purposefully seeking variation or diversity in sample selection to allow for a greater range of application of the findings by consumers of the research.<br><br>**In the current research:** Practitioners from various organisations (such as direct/indirect property investment managers, banks, REITs, and property companies) have been included to allow for maximum variation. |

Table 3.4: Strategies for achieving validity (Source: Merriam, 2009, p. 229) and their consideration in the current research

### *3.8.3 Reliability*

Reliability refers to the extent to which findings can be replicated (Merriam, 2009). Although the research settings cannot be replicated, other researchers should arrive at similar explanations and theories about the phenomenon studied. Since the data collection is based on human interaction it will be difficult to collect

exactly the same data. For this reason, it is more important to assess "whether the results are consistent with the data collected" (Merriam, 2009, p. 221). Comparing the theoretical framework with the collected data, namely; interview transcripts, should give some indication of fit.

### *3.8.4 Credibility*

Credibility refers to the correspondence between the perceived realities of respondents and the way the researcher portrays their viewpoints (Mertens, 1998).

In their seminal work Glaser and Strauss (1967) discuss the credibility of grounded theory and its practical application. Hence, both criteria can be used to critically analyse the present research. Credibility in the context of grounded theory refers to trustworthy and believable research findings in that they reflect participants' experiences with the phenomena (Corbin and Strauss, 2015, p. 346).

Credibility is the degree of congruence between the way research subjects perceive social constructs and what the researcher portrays. Strategies to enhance credibility are member checks and triangulation. Triangulating involves the use of multiple methods and multiple data sources (Mertens, 1998). Member checks[89] is the most important criterion in establishing credibility (Mertens, 1998). They ensure internal validity or credibility by checking the emerging findings with the research subjects in order to confirm that their opinions are captured in the right way (Merriam, 2009).

### *3.8.5 Applicability*

In terms of applicability of grounded theory, Glaser and Strauss (1967) define four interrelated properties which are:

[89] Going back to research participants and checking results of the data analysis and conclusions with them for correct representation of their views.

- **Fitness** – There must be a close fit between the theory and substantive area in which it may be applicable.
- **Understanding** – The theory must be understandable by the practitioners concerned with this area, meaningful and relevant to them.
- **Generality** – The theory must be sufficiently general to be applicable in various conditions.
- **Control** – The user must have control over structure and process as they change through time, giving him/her the possibility to predict and control consequences.

It can be argued that the criteria for judging the quality of research are partly ambiguous and implicit. This was remedied by Corbin and Strauss (2015) who propose checkpoints for evaluating the methodological consistency and the quality and applicability of a grounded theory study. Both check lists can be found in Appendix I and Appendix J. The checkpoints are supposed to be guidelines and not hard and fast rules (Corbin and Strauss, 2015).

## 3.9 Summary and Conclusion

The chapter began with recapitulating the research questions and continued with the discussion of the underlying philosophical assumptions of the research (i.e. ontology, theoretical research paradigms, and epistemology). The research was set within the framework of the different epistemologies and their philosophical underpinnings. The purpose of this setting was to establish the best way of inquiring into the research issues at hand which concern the factors influencing the propensity of real estate investors in the U.K. to employ property derivatives.

In addition, contrasting epistemological views in Social Science were discussed and the positioning of the current research in the realm of constructionism was underscored. In the section thereafter, the choice of grounded theory as the overall methodological approach was explained and justified. Also, the technical procedures of data collection and analysis rooted in grounded theory were

explained. Moreover, the sampling method used for the current research was described and an overview of the conducted in-depth interviews was given. The chapter concluded with thoughts on quality of the research design, in particular its validity, reliability, credibility, and applicability.

# Chapter 4. Findings and Analysis

## 4.1 Introduction

This chapter presents the main findings of the conducted research. As mentioned in chapter three, a set of data was collected from 43 in-depth interviews with 46 professionals in the field. The research goal is to determine the main factors that influence the propensity of real estate investors to employ commercial property derivatives in the U.K. The data collection took place between June 2016 and March 2017.

The chapter is organised in 11 sections. After a brief introduction in the current section, the chapter presents the findings from the pilot study which was conducted in 2011. Section three explains the background of the interviewees and their organisations. Section four presents an overview of the main factors influencing the propensity of property investment managers to employ property derivatives which are discussed in the subsequent sections successively. The endogenous factors are discussed in section five and six, and the exogenous factors are discussed in sections seven to ten. The chapter concludes with a summary and conclusions.

## 4.2 Findings from the Pilot Study

In 2011, the researcher conducted a pilot study in order to learn more about the development prospects of a liquid property derivatives market in the U.K., the existing obstacles in the market to using the instruments, and the conditions that would facilitate the evolution of such a market. For this purpose, five practitioners were interviewed representing a stock exchange, a bank, a brokerage firm, a real estate investment firm, and an index provider.

The findings of the pilot study showed that, with regard to the development prospects of a property derivatives market in the U.K., all the interviewees consistently held the view that such a market would be established in the medium term (i.e. in the following three to five years). One interviewee was even more optimistic and estimated a one- to two-year period for a liquid property derivatives

market to evolve. There was no doubt among the interviewees that property derivatives would become an established and recognized financial instrument in the future.

However, on the way to achieving this, interviewees identified four main hurdles that had to be overcome. These are: the regulatory framework, organisational setup, bad reputation of derivatives, and the need for education about the instruments. Furthermore, statements were made in the interviews that allowed the researcher to draw preliminary conclusions as to the perception of property derivatives, the underlying real estate index, and the pricing of these instruments.

The regulatory framework, which was in the process of change in the aftermath of the global financial crisis (GFC), caused some degree of uncertainty among practitioners. At the time the pilot study was conducted, it was not yet clear the extent to which regulatory changes would impact property derivatives trading.

The second hurdle that was brought forward was the appropriate organisational setup which enables companies to satisfactorily trade in property derivatives and to manage their positions accordingly. The effort and complexity of the organisational setup was regarded as being low but required resources in terms of time and capital.

Following the GFC, derivatives in general did not enjoy a great deal of popularity, which was also confirmed by the research results. Interviewees agreed that the bad reputation and negative feelings associated with derivatives led to an increased reluctance of practitioners to employ property derivatives.

A fourth hurdle that was identified and considered very important by the interviewees was the need for further education and learning about the instruments. The lack of knowledge and information about property derivatives, in combination with the bad reputation of derivatives, accounted for the two main reasons for the reluctance of real estate investors to embrace the instruments more wholeheartedly.

All the interviewees agreed that property derivatives are an effective and efficient tool to manage property portfolios. The main field of application was considered to be hedging rather than speculation. Interestingly, the study results indicated that investors were well aware of the costs of hedging which had an inhibiting effect on the use of derivatives.

When interviewees were asked about their level of comfort with the underlying IPD index and its quality, they did not have any reservations in that regard. They considered the index a reliable benchmark and the best one available in the U.K.

Interestingly, the pilot study showed that there were no major perceived impeding issues related to the pricing of property derivatives. Even though, these issues had been the subject of debates in the academic literature for quite some time.

In a nutshell, the pilot study confirmed both the feasibility of the current research and the positive market development prospects. However, the explanatory power of the findings of the pilot study is limited due to the small number of interviewees which did not allow drawing conclusions as to the relevant factors influencing the propensity of real estate investors to employ property derivatives. With the benefit of hindsight, the market did not develop as expected and envisaged by respondent practitioners in 2011, which gives rise to further questions as to the reasons for that.

## 4.3 Background of the Interviewees and Their Organisations

As discussed in the previous section, the number of interviews conducted for the pilot study was not sufficient to draw meaningful conclusions as to the reasons for the reluctant use of property derivatives by real estate investors. This is the reason why 43 in-depth interviews were conducted with 46 professionals from investment management organisations, banks, brokerage firms, and consultancy firms, among others. Figure 4.1 shows the weightings of the organisations of the interviewees in the current research. Moreover, a much more comprehensive set of questions (see Appendix H) was used for the interviews which lasted between

30 minutes and two hours. The average duration of the interviews was 51 minutes.

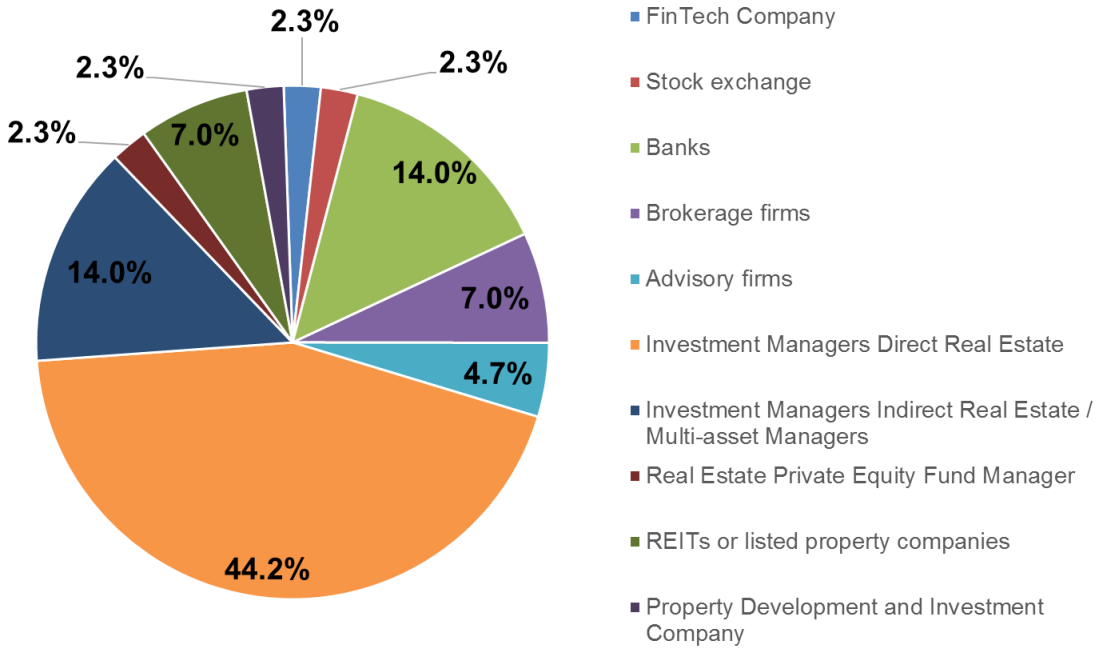


Figure 4.1: Weightings of organisations in the current research

It is worth mentioning that the business models of the investment management organisations represented by the vast majority of the interviewees are similar in the sense that they earn fees from investing capital, provided by their clients, in various asset classes. In the case of multi-asset investment management organisations, capital is allocated to various asset classes such as equities, fixed income, commodities, alternatives, and rea estate. These organisations usually have a real estate arm that is responsible for investing capital directly or indirectly in real estate. Direct investment means the acquisition of physical properties (i.e. buildings and obtaining ownership rights). Conversely, indirect investment is understood as investing in real estate through other vehicles (e.g. other funds, fund of funds, REITs, listed property companies). In order to provide breadth and depth to the research, both direct and indirect real estate investors were interviewed. Hence, it was possible to conduct a comparative analysis of the reported reasons for using or not using property derivatives.

In addition, the points of view from the bankers have also been included in the current research for reasons that are discussed in section 4.7.2 and 4.7.3. Also,

the views of a Fintech firm[90], an exchange, various advisors, and brokers have been included in order to analyse multiple "realities" which help understand the reasons for the illiquidity in the market.

It should be noted that most of the interviewees are professionally familiar with portfolio management or fund management, that is, they are responsible for running one or more funds or contribute in another way to the fund performance (e.g. researchers, advisors). The group of fund managers or property investment managers dominated the research population, and therefore their views are likely to influence the outcome of this research. Furthermore, it should be noted that the terms fund manager and investment manager (i.e. property investment manager) are used interchangeably.

In the next sections, the factors that have been discovered in the collected research data are presented and discussed.

## 4.4 Main Factors Influencing the Propensity of Direct and Indirect Real Estate Investors to Employ Property Derivatives

This section presents the main factors identified by the current research that influence the propensity of direct and indirect real estate investors to employ property derivatives. Hereafter, the terms real estate investor or property investor comprise both direct and indirect investors, unless otherwise indicated.

The analysis of the collected research data yielded a total of 29 categories[91] of factors that influence the propensity of real estate investors to employ property derivatives. Those factors were derived directly from the data as a result of the researcher's interpretation of the meaning expressed in the words by the interviewees. Thus, the factors are grounded in the data and form the structure of the theory.

[90] Financial technology firm.
[91] According to Strauss and Corbin (1998), categories are "concepts, derived from data, that stand for phenomena" (p. 114). A concept "is a labelled phenomenon" (Strauss and Corbin, 1998, p. 103).

As a first step, the recorded interviews were transcribed to enable working with text. The transcripts were then analysed and coded with the aid of a qualitative software program (NVivo). After reading a transcript, the coding procedure began with coding text passages into as many categories of analysis as possible. Each incident was compared with the previous incident and either coded in the same category or in a new one. This open coding process provided a wealth of categories and their properties. The data were then analysed for patterns among codes. In a next step, a more in-depth analysis was done by re-coding, i.e. selective coding, with a limited number of more focused codes. The emerging patterns between concepts were then conceptualised in order to show how categories and concepts relate to one another. Finally, areas that needed more elaboration or have been over-emphasised were identified. The analysis process evolved through each interview transcript and came to an end when all relevant categories and their properties were sufficiently developed and integrated, and the arrival of new data did not provide further significant development of either category or their properties. The data analysis process was accompanied by a constant comparison of incident to incident and incident to concept. The theoretical sampling technique, i.e. the decision of the researcher as to which data to collect and where to collect them next, defined the questions and issues to be raised and clarified in the next interviews.

In order to create order and structure in the discovered factors, they were grouped according to their topical affiliation. The first differentiation in this regard that was discernible in the interview data concerns both the internal (endogenous) organisational conditions of the interviewees and the external operational (exogenous) conditions of their organisations. Therefore, at the highest level of conceptualisation, the influencing factors can be divided into endogenous and exogenous factors.

Endogenous factors originate from within the organisation and its individuals and can be influenced at those two levels (i.e. at organisational and individual level). Exogenous factors, on the other hand, are those factors that have an origin from outside the organisation and lie outside the organisational sphere of influence. The organisation itself and the individuals within it are exposed to the exogenous factors and respond to and interact with them.

The group of exogenous factors can be further broken down into factors that are related to the market, to the property derivative instrument, to the clients from the investment management firms, and to the underlying value system. Figure 4.2 below provides an overview of the grouping of factors which helps structure the identified categories based on the factors that emerged from the collected data. The grouping of concepts provided the necessary structure and allowed a topical delimitation among the different factors.

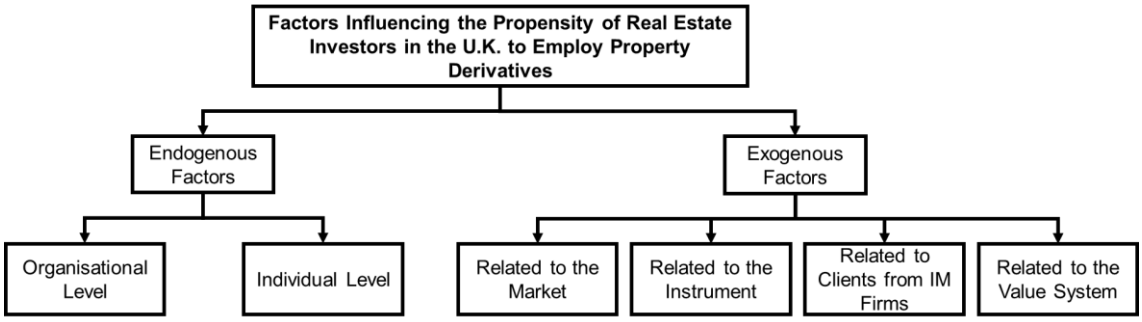


Figure 4.2: Topology of identified factors influencing the propensity of real estate investors to employ property derivatives (own depiction)[92]

Some of the 29 categories that were assigned according to their topical affiliation have, in turn, been divided into sub-categories. The categories and sub-categories are connected within and between each other which helps in understanding the process and the conditions under which property investment managers make their decisions. Table 4.1 provides an overview of the identified factors that influence the propensity of real estate investors to employ property derivatives and which are discussed successively in the next sections. Those factors that were already discussed in the literature, were tested as to their impact on the propensity to use the instruments. The tested factors are:

1. Administrative and Operational Requirements;
2. Understanding of Markets and Instruments – Need for Education;
3. Pricing of Property Derivatives;
4. Homogeneity of Market Views;
5. Importance of Real Estate Indices for the Use of Property Derivatives;

[92] IM stands for investment management.

6. Ambiguities Concerning the Taxation of Property Derivatives;
7. Induced Accounting Volatilities; and
8. Restrictions by Fund mandate.

The complete model of categories and sub-categories is illustrated in Figure 4.4 on page 114.

The weightings of the various categories, which are determined by the number of interviews and the breadth of their contribution to the corresponding category, are illustrated in Figure 4.3. The diagram shows the number of coding references in the interview transcripts as a set of nested rectangles of varying sizes. The larger the rectangle and the darker the colour, the more coding references were assigned to the corresponding category.

Table 4.2 provides an overview of the number of coding references and the number of items coded, i.e. the number of interview transcripts with coded text passages that were assigned to a certain category. The categories and their properties were discovered by examining the interview transcripts.

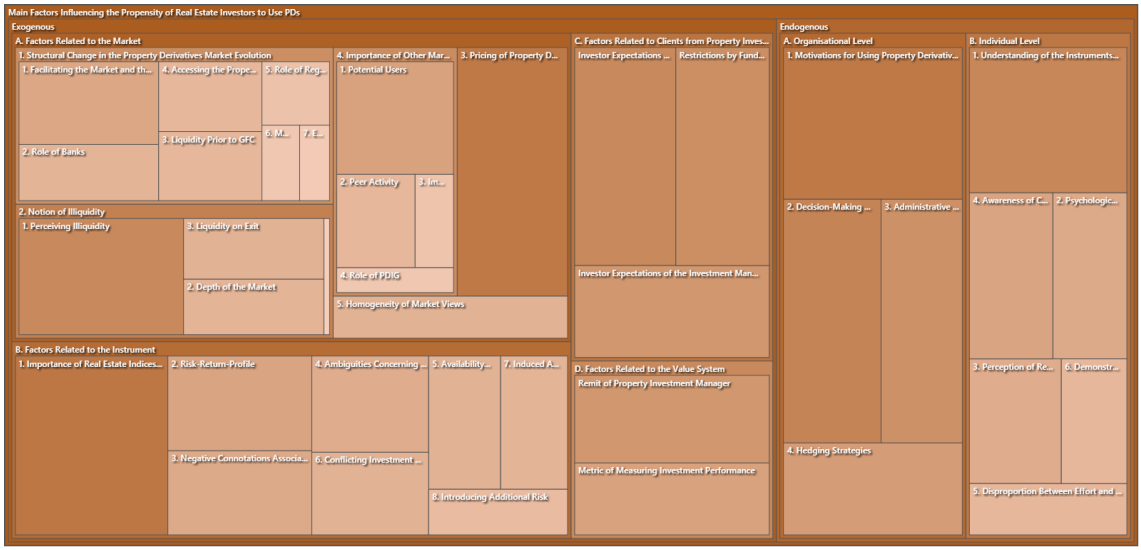


Figure 4.3: Tree map illustrating the weightings of the different categories generated by a qualitative data analysis software

| Origin of Factors | Sub-Level | Influencing Factor | Emerged from Data or Tested |
|---|---|---|---|
| **Endogenous** | Organisational Level | Motivations for Using Property Derivatives and Corresponding Return Expectations | Emerged |
| | | Decision-Making Process to Employ Property Derivatives | Emerged |
| | | Administrative and Operational Requirements | Tested |
| | | Hedging Strategies | Emerged |
| | Individual Level | Understanding of the Market and Instruments – Need for Education | Tested |
| | | Psychological Barriers | Emerged/Defined |
| | | Perception of Investment Managers Towards Property Derivatives | Emerged |
| | | Awareness of Current Instruments and Ways of Market Access | Emerged |
| | | Disproportion Between Effort and Impact | Emerged |
| | | Demonstrating Practical Competence | Emerged |
| **Exogenous** | Factors Related to the Market | Structural Change in the Property Derivatives Market Evolution | Emerged |
| | | Banks' Withdrawal from the Property Derivatives Market | Emerged |
| | | Notion of Illiquidity | Emerged |
| | | Pricing of Property Derivatives | Tested |
| | | Importance of other Market Actors | Emerged |
| | | Homogeneity of Market Views | Tested |
| | Factors Related to the Instrument | Importance of Real Estate Indices for the Use of Property Derivatives | Tested |
| | | Risk-Return-Profile | Emerged |
| | | Negative Connotations Associated with Derivatives | Emerged |
| | | Ambiguities Concerning the Taxation of Property Derivatives | Tested |
| | | Availability of Products | Emerged |
| | | Conflicting Investment Horizons | Emerged |
| | | Induced Accounting Volatilities | Tested |
| | | Introducing Additional Risk | Emerged |
| | Factors Related to the Clients of Property Investment Management Firms | Investor Expectations of Real Estate as an Asset Class | Emerged |
| | | Investor Expectations of Real Estate Investment Managers | Emerged |
| | | Restrictions by Fund Mandate, Fund Prospectus or Investment Management Agreement | Tested |
| | Factors Related to the Value System | Remit of Property Investment Managers | Emerged |
| | | Metric of Measuring Investment Performance | Emerged |

Table 4.1: Overview of factors influencing the propensity of real estate investors to employ property derivatives

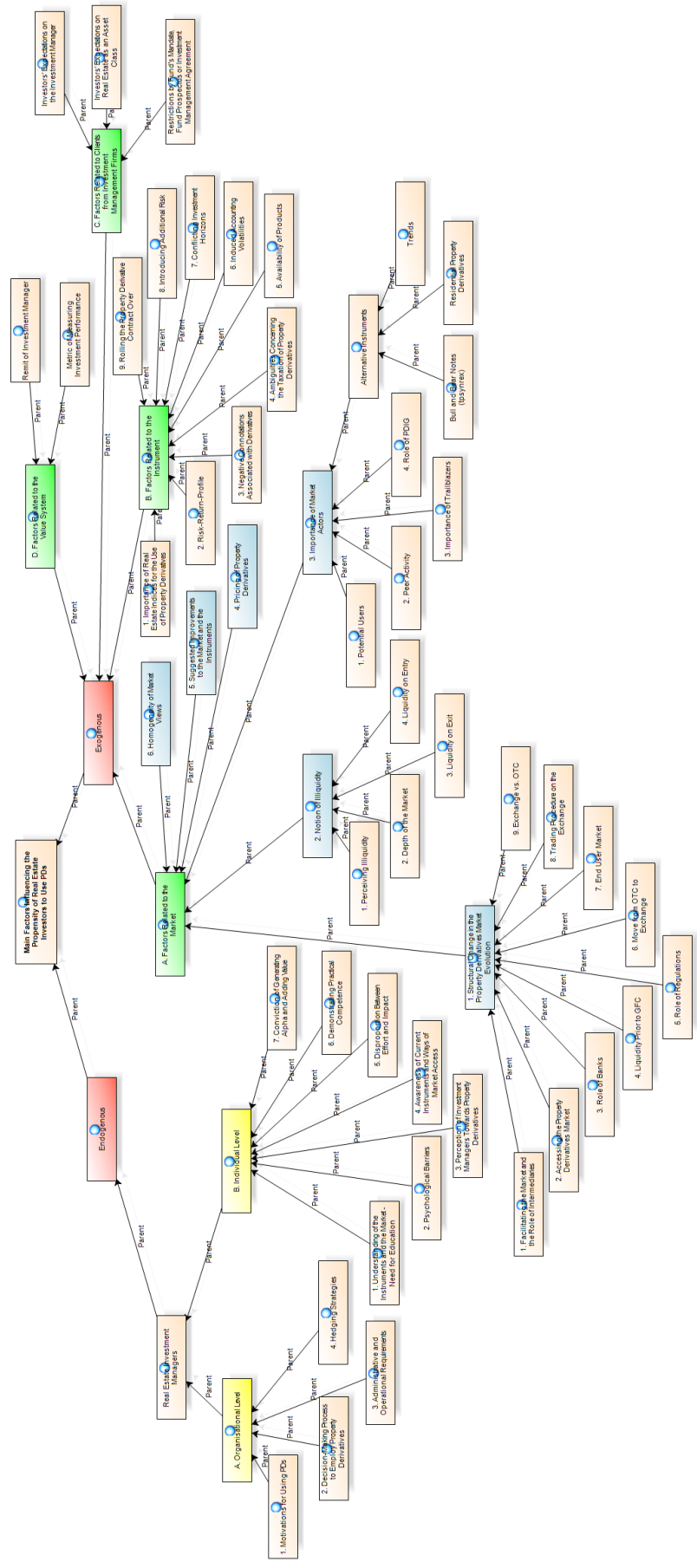


Figure 4.4: Model of factors that influence the propensity to employ property derivatives

| Nodes | Number of coding references | Number of items coded |
|---|---|---|
| Endogenous\A. Organisational Level\1. Motivations for Using Property Derivatives | 216 | 33 |
| Endogenous\A. Organisational Level\2. Decision-Making Process to Employ Property Derivatives | 136 | 29 |
| Endogenous\A. Organisational Level\3. Administrative and Operational Requirements | 47 | 24 |
| Endogenous\A. Organisational Level\4. Hedging Strategies | 58 | 20 |
| Endogenous\B. Individual Level\1. Understanding of the Instruments and the Market - Need for Education | 80 | 28 |
| Endogenous\B. Individual Level\2. Psychological Barrier | 41 | 15 |
| Endogenous\B. Individual Level\3. Perception of Real Estate Investment Managers Towards Property Derivatives | 49 | 14 |
| Endogenous\B. Individual Level\4. Awareness of Current Instruments and Ways of Market Access | 25 | 17 |
| Endogenous\B. Individual Level\5. Disproportion Between Effort and Impact | 19 | 10 |
| Endogenous\B. Individual Level\6. Demonstrating Practical Competence | 15 | 10 |
| Exogenous\A. Factors Related to the Market\1. Structural Change in the Property Derivatives Market Evolution\1. Facilitating the Market and the Role of Intermediaries | 41 | 16 |
| Exogenous\A. Factors Related to the Market\1. Structural Change in the Property Derivatives Market Evolution\2. Role of Banks | 20 | 11 |
| Exogenous\A. Factors Related to the Market\1. Structural Change in the Property Derivatives Market Evolution\3. Liquidity Prior to GFC | 33 | 10 |
| Exogenous\A. Factors Related to the Market\1. Structural Change in the Property Derivatives Market Evolution\4. Accessing the Property Derivatives Market | 19 | 10 |
| Exogenous\A. Factors Related to the Market\1. Structural Change in the Property Derivatives Market Evolution\5. Role of Regulations | 20 | 6 |
| Exogenous\A. Factors Related to the Market\1. Structural Change in the Property Derivatives Market Evolution\6. Move from OTC to Exchange | 6 | 4 |
| Exogenous\A. Factors Related to the Market\1. Structural Change in the Property Derivatives Market Evolution\7. End User Market | 7 | 3 |
| Exogenous\A. Factors Related to the Market\2. Notion of Illiquidity\1. Perceiving Illiquidity | 93 | 27 |
| Exogenous\A. Factors Related to the Market\2. Notion of Illiquidity\2. Depth of the Market | 24 | 11 |
| Exogenous\A. Factors Related to the Market\2. Notion of Illiquidity\3. Liquidity on Exit | 32 | 12 |
| Exogenous\A. Factors Related to the Market\2. Notion of Illiquidity\4. Liquidity on Entry | 3 | 1 |
| Exogenous\A. Factors Related to the Market\3. Pricing of Property Derivatives | 180 | 33 |
| Exogenous\A. Factors Related to the Market\4. Importance of Other Market Actors\1. Potential Users | 54 | 18 |
| Exogenous\A. Factors Related to the Market\4. Importance of Other Market Actors\2. Peer Activity | 19 | 10 |
| Exogenous\A. Factors Related to the Market\4. Importance of Other Market Actors\3. Importance of Trailblazers | 10 | 5 |
| Exogenous\A. Factors Related to the Market\4. Importance of Other Market Actors\4. Role of PDIG | 7 | 4 |
| Exogenous\A. Factors Related to the Market\5. Homogeneity of Market Views | 24 | 12 |
| Exogenous\B. Factors Related to the Instrument\1. Importance of Real Estate Indices for the Use of Property Derivatives | 94 | 34 |
| Exogenous\B. Factors Related to the Instrument\2. Risk-Return-Profile | 29 | 17 |
| Exogenous\B. Factors Related to the Instrument\3. Negative Connotations Associated with Derivatives | 33 | 15 |
| Exogenous\B. Factors Related to the Instrument\4. Ambiguities Concerning the Taxation of Property Derivatives | 18 | 14 |
| Exogenous\B. Factors Related to the Instrument\5. Availability of Products | 24 | 12 |
| Exogenous\B. Factors Related to the Instrument\6. Conflicting Investment Horizons | 21 | 12 |
| Exogenous\B. Factors Related to the Instrument\7. Induced Accounting Volatilities | 16 | 11 |
| Exogenous\B. Factors Related to the Instrument\8. Introducing Additional Risk | 11 | 8 |
| Exogenous\C. Factors Related to Clients from Property Investment Management Firms\Investor Expectations of Real Estate as an Asset Class | 86 | 27 |
| Exogenous\C. Factors Related to Clients from Property Investment Management Firms\Investor Expectations of the Investment Manager | 50 | 22 |

| Nodes | Number of coding references | Number of items coded |
|---|---|---|
| Exogenous\C. Factors Related to Clients from Property Investment Management Firms\Restrictions by Fund Mandate, Fund Prospectus or Investment Management Agreement | 61 | 25 |
| Exogenous\D. Factors Related to the Value System\Metric of Measuring Investment Performance | 29 | 18 |
| Exogenous\D. Factors Related to the Value System\Remit of Property Investment Manager | 64 | 22 |

Table 4.2: Number of coding references and items coded

In the following sections, the various factors discovered in the interview data are discussed and pieced together into a model that explains why property investment managers are reluctant to employ property derivatives.

## 4.5 Endogenous Factors at Organisational Level that Influence the Propensity to Employ Property Derivatives

### *4.5.1 Introduction*

This sub-section presents the research results with regard to the endogenous factors at an organisational level which encompass the following categories: “Motivations for Using Property Derivatives and Corresponding Return Expectations”, the “Decision-Making Process to Employ Property Derivatives”, “Administrative and Operational Requirements”, and “Hedging Strategies”. They are successively discussed below.

### *4.5.2 Motivations for Using Property Derivatives and Corresponding Return Expectations*

A key theme that emerged within the group of endogenous factors at the organisational level concerns the motivations of real estate investors for using property derivatives. The research data show that property investment managers are not fixated on one particular strategy when considering the employment of property derivatives. Rather, they look for a tool that can help them in a particular investment situation (i.e. whether real estate market exposure needs to be increased or decreased in order to achieve an optimal investment performance).

Moreover, there are different motivations depending on the fund type and its particular investment strategy and investment objectives.

The analysis of the interview data revealed six common motivations for employing property derivatives. They are:

**(1) Creating index exposure[93]**

One of the most common motivations to use property derivatives is the creation of index exposure as a cheap and efficient way to participate in the investment returns of commercial real estate. In other words, investors wish to go long the index as a proxy for bricks and mortar investments.

The underlying rationale of creating index exposure is the liquidity management within funds. Interviewees reported that for them a motivation to use property derivatives would be to manage the liquidity of the fund. By this they mean the cash flows from their investment activities. The control over these cash flows depends on the type of fund (i.e. whether it is, for instance, an open-ended[94] or closed-ended fund[95]). An important point to consider is the redemptions of the fund which require liquidity management in order to meet redemption requests[96]. Redemptions are common in open-ended fund structures.

For instance, when subscriptions are received from investors to participate in a fund, the fund manager usually faces the challenge of putting the capital to work as quickly as practically possible in order to provide property returns. Sometimes, however, market timing might be inconvenient (i.e. in a strong bull market) and property prices too high, or no properties are available that suit the fund's investment strategy. Even if the right property is identified, there is a time lag between receiving the investment capital and actually deploying it due to the lengthy transaction process involved in price negotiations and due diligence, among other things. This so-called "cash drag" has an adverse impact on the

[93] This theme came up in 17 interviews (interviews no. 3, 4, 8, 9, 12-15, 17-19, 21, 28, 29, 37, 41, and 42).
[94] In an open-ended fund there is no fixed number of investable units, and therefore the issuance and redemption depend on investor demand.
[95] A closed-ended fund has a fixed number of investable units and there is usually no obligation to redeem units before the end of the life span. The life span of the fund is usually limited.
[96] An example highlighting the importance of liquidity management for redemptions is the Brexit in 2016 when some funds were not able to meet redemption requests and consequently gated.

overall fund performance. In such situations, the fund manager may look for alternative possibilities of temporarily investing in real estate such as REITs, other funds, or property derivatives. Since the received capital is usually invested at the risk-free rate until its final deployment, the difference between the interest rates and the property yields plays an important role. The adverse impact of the cash drag (i.e. the return on uninvested cash is lower than on the real estate investment) is higher in a low interest rate environment than in a high interest rate environment and creates additional pressure to invest. The reason is that the lower return on the uninvested cash reduces the fund performance. As the quote below demonstrates, the use of property derivatives would buy time during the investment process in physical properties. However, due to liquidity constraints the strategy could not be adopted.

> *"We were keen to have a low cost, liquid index participation. So, what we didn't want to do was to purchase positions in REITs because obviously REITs behave in the near term much more like equities than like property. […] And a couple of years ago, we were facing significant inflows as people wanted to participate in the asset class and we didn't want to be rushed into buying properties that we fundamentally didn't favour. So, what we were hoping to do was to minimise the cash drag with index participation at low cost, buying us sufficient time to do detailed work on exactly which properties we wanted and to construct the optimal portfolio. And it didn't work as I say because we couldn't find adequate liquidity in [the] derivatives market."*
>
> *[Chief Investment Officer at investment management firm for direct property]*

Another interviewee referred to large cash holdings in the fund and explained his motivation as follows:

> *"The rationale at the time was, obviously, we had a property fund which had direct property, and which had cash, and obviously there's a cash drag position, so we had a position in 2008, where we had large 25-30% cash, so we wanted to increase the return from that […]."*
>
> *[Head of U.K. Property Pooled Funds at investment management firm for direct property]*

It is worth mentioning that not all funds suffer from cash drag. There are funds that do not have such a problem because they raise commitments to invest in the

fund first and deploy the capital once the properties have been identified, or they turn money away if they cannot deploy it in the short term. Moreover, three interviewees from REITs reported unanimously that cash drag is not a problem for them because they do not raise cash very often.

Interviewees were asked what their return expectations are when creating index exposure with property derivatives. The majority of the investors implicitly assume that the investment in the index will provide similar total returns to those of physical investments. Since the underlying real estate index is a total return index, that is, it consists of an income component and a capital component, the majority of investors expect exposure to these two return components as a proxy for the real property returns. The two views below exemplify that point.

> *"I think if we were going to do it [create index exposure with property derivatives], we would only do total return because again, our view is, the main driver of property performance is income, so if you're just going to do something that takes out the income and it's only capital then that's not investing, that's just speculating because no-one knows what the capital value is going to be in a few weeks' or months' time."*
>
> *[Global Investment Strategist – Property at investment management firm for direct property]*

> *"[…] if you're going to invest in real estate you should be receiving the capital return and income return that you would have been receiving had you invested in the underlying products."*
>
> *[Funds Development Director at investment management firm for indirect property]*

Interestingly, there are some investors who expect returns from the property derivative position to be higher or lower than the returns from the investment in physical real estate as the following quotes demonstrate. In the former case, there are two points to be considered as the interview data show. One concerns the fund strategies or investment strategies which usually aim to outperform the corresponding MSCI-IPD index. This index is a commonly used benchmark for measuring investment performance. In such cases, the property derivative position can only be used if pricing justifies it (i.e. if the instrument is mispriced) because providing only index returns would not be sufficient according to the

fund's strategy. The following two quotes underline the importance of outperformance to fund managers.

> *"So, from our perspective, no particular return expectation from derivatives. We'll look at the return requirements of the mandate, and then try to beat that using all the tools available to us."*
>
> *[Senior Fund Manager at investment management firm for indirect property]*

> *"But in terms of the expected return, most of the managers we invest with have a benchmark return they have to try and exceed, and I guess they would invest in derivatives if they felt that would exceed the benchmark return."*
>
> *[Head of Property Multi-Manager at investment management firm for indirect property]*

The other point concerns a return expectation that is higher than the one from the physical real estate investment because of perceived additional risk associated with the derivative position which is exemplified by the quote below.

> *"Well, subject to the appropriate premium being receivable from the derivative trade over the real estate trade. […] It would have to be a very compelling case. Very compelling case. And you need to be super confident. […] we'll be starting to look at it [property derivatives] when a derivative would deliver return above a real estate return. Plus, a margin, for the illiquidity and the risk that comes with that. Because it is your position. At least with a real estate asset you have something you can sell. And hopefully you won't lose everything. But with a derivative you could lose quite a lot."*
>
> *[Head of Global Real Estate at investment management firm for direct property]*

An example of an expectation that return will be lower than physical real estate is given in the quote below. However, it should be noted that the quote is not an expectation that the investor holds, but an expectation of what the return from the derivative will be in the current market conditions; this is an issue that was mentioned by various interviewees and which will be discussed next.

> *"Well, the return from the derivative I would expect to be less than the market return, because as I said they are contracts for difference, so, you're only ever getting the*

> *difference between market return and expectation at the point you take it out. […] But I think the standalone return, if you like, from the derivative is going to be less than investing in the direct real estate."*
>
> *[Senior Fund Manager at investment management firm for direct property]*

While for some of the interviewees the motivation for creating index exposure as proxy for bricks and mortar returns is straight forward and makes sense in a portfolio management context, other interviewees showed signs of disillusionment with regard to what can be achieved with the instrument when trying to create index exposure. In practice, it does not seem possible to receive property-like returns but only marginal upticks instead. The limitation interviewees talked about refers to the actual returns from property index futures which are lower than total index returns. One interviewee phrased it as follows:

> *"[…] you're trading at the margins, so you're not getting a property-like return. It's not like I could do a swap, say, the beginning of the year, I'll give you £1 and you'll give me £1.21 if the index does 21 per cent. […] so, you're betting just on the marginal uptick of the market moving one way or moving the other. So, you're not getting a property-like return, and because you're not really getting a property-like return, you're saying, 'Well, actually, I'm taking a bet on whether or not the market's going to be more positive or less positive.', and running the risk of a particular event happening in the market which will affect that. Now, that therefore adds extra risk to your portfolio. […] Well, actually, all you're doing is trading at the margins the whole time, and you can never get your IPD return, unless pricing justifies it at a given time. So, as a tool, it has some applications, but not as many as you would hope within a property world."*
>
> *[Property fund manager at investment management firm for direct property]*

The perceived problem of adding additional risk to the portfolio as described in the quote above is discussed in more detail in section 4.8.9. Because there is an additional perceived risk, investors might be hesitant to use the derivative instruments.

Evidence from other interviews seems to support the statement in the quote above in the sense that using property derivatives for the purpose of achieving property-like returns is very difficult or almost impossible. The core statement of

the critical voices (interviews no. 13, 28, and 35) is that only the difference between the current derivative price, which already contains any positive or negative market sentiments, and the index value at settlement date can be achieved, provided there are willing buyers and sellers in the market. In other words, it is not possible to achieve index-like returns because the market incorporates any positive or negative sentiment in the derivative price. The following two quotes are examples in support of this view.

> *"[property derivatives are used by the fund managers of the funds in which the interviewee's fund invests] [m]ainly as contracts for difference […], so they will have a certain duration and they would have a view on what the market return would be, and they would then decide whether the derivatives were going to be providing a better return than their forecast return […]"*
>
> *[Head of Property Multi-Manager at investment management firm for indirect property]*

> *"The other aspect, I suppose, is that derivatives are a contract for difference, so it's not an efficient way of taking a long position on the market. So, if we have a cash allocation which we're investing into property, it's not like we could say, 'Okay, well we think that's going to take us two years to invest, so let's just take a kind of derivative position first and get a real estate return through that.'. Actually, the return you get is clearly the difference between the outcome and the market return, and the expectations and the trade level at the point you enter into the trade. So, if you're buying at +5% or something and the market return's 7%, your return is 2% as opposed to a 7% exposure. So, I think it's just felt as not an efficient way to take a long position on the market."*
>
> *[Senior Fund Manager at investment management firm for direct property]*

A fair argument in this context is that if return can only be achieved at the margins, it would be virtually zero in case the index value pans out as implied by the current derivative price. This possibility, in turn, implies that the real estate investor would not be compensated for taking real estate market risk. The quote below demonstrates this point.

> *"[…] if the return is exactly the return predicted by the counterparty, no monies change. […] For that period, I've allocated it [the capital] to something, but it's given me no*

> *return. So, I'd be better off, assuming real estate had delivered the return expected, that was a positive return, I'd be better off buying a property. The only time you're going to do well on derivatives, I'd say, is if the market returns less than the counterparty thinks it will do. In which case you shouldn't buy property; you should buy the derivative."*
>
> *[Head of Global Real Estate at investment management firm for direct property]*

One interviewee reported on disappointing results when using property derivatives for liquidity management as follows:

> *"And the trades that we've done in the past have been successful for us. So, for example, even a trade that we took that was no liquidity for, it actually outperformed, it actually added value to the fund. But it was during the financial crisis and we needed cash. So, it did what it was supposed to do, right. But what it did not [do] for us was the liquidity that we wanted, to be able to pay redemptions on the fund."*
>
> *[Fund Strategist Real Estate at investment management firm for direct property]*

It seems that the instruments do not meet investor expectations associated with creating index exposure. What is more, in the current market setup where counterparties are matched mainly through brokers, a counterparty would have to be found who is willing to take a short position in the total return index and therefore who agrees to pay the index total return. The low standard deviation of the income component and the autocorrelation of the underlying index, which makes returns predictable in the short term, create additional difficulties.

Due to the fact that the index exposure would only be temporary and in many cases until the moment the right properties are found, sufficient liquidity would be necessary in the market to be able to unwind the long positions in the index in a cost-efficient way.

**(2) Hedging[97]**

The second most common motivation for using property derivatives, identified by the current research is that it allows investors to actively manage risk by taking out hedged positions. The basic idea is to use the derivative instrument to offset the adverse impact of the price movement in the underlying real estate market.

> *"[…] but the core remit for using it [the property derivative] from our perspective would be to provide some degree of hedging. […] It wouldn't be to try and out-perform, if that makes sense?"*
>
> *[Researcher at investment management firm for direct property]*

Interviewees were asked which return component they would like to hedge. Six of the fifteen interviewees, who raised this issue, would like to hedge capital returns[98] while four would like to hedge total returns[99]. Among the remaining respondents, one mentions income return, while others are more concerned with hedging against unfavourable market movements. Examples of their arguments are presented below:

> *"People would be looking for hedging capital returns. This would mean to short the IPD index which is a total return index. So, when using the instrument as a hedge, it would cover both the income and the capital return."*
>
> *[Head of Group Research at capital advisory firm]*

> *"I would say it's more about the capital return component. That's probably the more important piece of it that I think you would be concerned about. […] Because of the [contractual] nature of the income from real estate, that it's less likely that you'd need to be worried about that falling away. […] but it's probably more likely you'd worry about the capital value."*
>
> *[Director Fund Management at investment management firm for direct property]*

[97] This theme came up in 15 interviews (interviews no. 4, 5, 9, 10, 13, 14, 20, 23-26, 28, 30, 32, and 41).
[98] Interviews no. 23, 24, 26, 29, 30, and 35.
[99] Interviews no. 25, 26, 32, and 42.

The desire to hedge income returns was only expressed once. The data analysis showed that interviewees are more concerned about hedging capital returns and total returns. However, they showed no concern or interest in hedging income returns. There are indications that some investors might hold unrealistic expectations with regard to what can be achieved with using the instruments as the following two quotes demonstrate.

> *"And if I could fix my total returns and collect, let's say, 8.5% every year guaranteed, I would be very interested in doing that."*
>
> *[Senior investment consultant at capital advisory firm]*

> *"Ideally, we'd want just protection on capital and to get an income return. […] but I think primarily it'd be an income hedge that we'd be looking for. […] So, really what we'd want to do is retain capital value and get an income, a property income, in the intervening period."*
>
> *[Group Financial Director at U.K. REIT]*

Some practitioners interpret hedging as preserving return values against downside movements while giving up upside potentials. The interviews showed that it is usually difficult for investors to quantify what return they are willing to give up for a hedged position. Interestingly, one interviewee said:

> *"The return should be zero if you hedged away all the market risk."*
>
> *[Head of Group Research at capital advisory firm]*

This is a very important point and almost[100] consistent with financial theory that a riskless asset can only provide a return which is commensurate with the risk taken, i.e. the risk-free rate.

Among the interviewees, there were some critical voices of the effectiveness of property derivatives as a hedging tool. There were two issues addressed. The first one refers to the pricing level of the derivative instrument and the second one

[100] In the low interest rate environment, which was prevalent at the time the research was conducted, the return that a risk-free asset provided (e.g. U.K. gilts) was very low.

to the hedging effectiveness, as measured by the correlation between the index and the hedged portfolio.

With regard to the derivative price, it seems that market sentiment is already incorporated. This becomes a problem for a hedger because the derivative price already implies the decline that (s)he wants to have protection against. The following quote reflects the practical experience of a practitioner in this regard.

> *"[…] we looked at it, the forward price, it was so illiquid at the time, the forward price was showing a 40% drop in the underlying market and our problem was we didn't see the underlying market falling by that much. So, the derivative had already priced in the fall, so for us it wasn't a hedge, if you were going to hedge your position then you should have bought that downside risk before 2007."*
>
> *[Funds Development Director at investment management firm for indirect property]*

Another interviewee (interview no. 13) argued that if he wants to hedge the market beta of a particular sector, he would actually enter a derivative contract that already implies where the market beta is likely to be. In other words, he would be compensated only in case the index value ends up being lower than what the market already anticipated.

> *"Well, actually, if I can't use it to remove market risk, I've got to use it just to play around at the margins"*
>
> *[Property fund manager at investment management firm for direct property]*

One representative of a major U.K. real estate investment and development firm indicated that a standardised futures contract will not allow hedging the particular and unique location in which the firm is active as a business. Moreover, he added that the costs of hedging are prohibitively high, and that liquidity is generally low. This statement was supported by a representative of a U.K. REIT who said that the hedging effectiveness in his particular sub-sector (shopping centres) is not very high. It seems that with increasing granularity of the index, its correlation with a given portfolio (i.e. its hedging effectiveness) decreases.

*"Well, the hedging effectiveness is very poor because there isn't sufficient depth in a shopping centre market to give me direct correlation to my particular segment of the market."*

*[Group Financial Director at U.K. REIT]*

The REITs represented by the current research were very sector-specific when it comes to hedging. The low liquidity at the sector and sub-sector level, which is even lower than at the UK All Property Level, limits the use of property index futures as a hedging tool.

An important point to consider when hedging a portfolio on a total return basis is that in case the position turns out to be negative, the return from the underlying portfolio may be insufficient because it may contain only income to cover the loss incurred by the derivative position. Moreover, some fund managers noted that is necessary to collateralise the derivative position with cash in order to avoid any leverage in the fund which increases return expectations.

**(3) Switching sector allocations[101]**

A third motivation that was reported by interviewees is to switch between different real estate sectors[102]. Investors may want to switch their sector exposure between two sectors without the need to buy or sell properties in order to rebalance their sector weightings depending on their performance forecasts. What matters is the short-term differential between sectors when performing a sector switch. Within the scope of tactical asset allocations, property derivatives may be used to re-weight sector allocations. This may be necessary if a fund is overexposed to a sector which has a negative performance outlook according to the in-house research or a third-party market study. The individual sector weightings may be adjusted and the overall fund risk reduced. The same approach can be applied when comparing the risk[103] of a sector with those of other sectors. This comparison is done by taking the impact on the overall fund

[101] This theme came up in six interviews (interviews no. 6, 9, 14, 25, 35, and 41).
[102] See Figure 2.3 on page 18 for an overview of currently available sectors and sub-sectors as underlying indices for property derivatives.
[103] As measured by the standard deviation of the investment returns.

risk into account. By re-weighing sector allocations, the overall fund risk can be reduced.

> *"[…] we also look at […] the risk of the sector compared to other sectors and the impact on the overall fund risk and how that's been reduced."*
>
> *[Fund analyst at investment management firm for direct property]*

> *"Equally, if you take that position and it doesn't work out, I think you're really exposed to criticism and so on. Whereas if you've underweighted because you're already overweight to a sector with direct assets, then clearly you're just offsetting some of the gain you would otherwise [have] had."*
>
> *[Senior Fund Manager at investment management firm for direct property]*

**(4) Taking advantage of relative value pricing[104]**

A fourth motivation for using property derivatives that was identified by the current research is that property investment managers can take advantage of their relative value pricing. In particular, larger multi-asset management houses[105] monitor the market prices of direct, indirect, and synthetic real estate. They monitor the property derivatives market closely, seeking opportunities for the various funds under their management. Basically, they look and wait for an attractive investment opportunity to emerge which can be beneficial to one of the managed funds.

Potential mispricing is determined by comparing the derivative prices with the in-house forecasts. The futures market is considered as having significant performance opportunities, not available on the other markets. Interviewees said:

> *"Based on the pricing and our forecast, we felt that that trade was warranted. […] we expect the market to do better than what derivatives is pricing, and therefore we bought at a lower price and it paid off."*

[104] This theme came up in five interviews (interviews no. 4, 9, 25, 26, and 28).
[105] With assets under management in excess of 300 billion euros.

*[Fund Strategist Real Estate at investment management firm for direct property]*

*"Well, the first trade we did, we thought they [the counterparty] got their pricing completely wrong. We were proved right. Other trades we did, we thought that we would have been better holding the real estate allocation."*

*[Head of Global Real Estate at investment management firm for direct property]*

**(5) Switching asset allocations[106]**

In a multi-asset environment, it may be necessary to adjust the strategic asset allocation as a response to changing return levels and Sharpe ratios. In case the return expectations of other asset classes (e.g. equities or bonds) become more attractive, the weighting to the inherently illiquid property asset class can be adjusted accordingly with the employment of property derivatives. In addition, the conventional investment in bricks and mortar has an inherent slow transaction process, so that the re-weighting between asset classes would provide a time-efficient solution.

The speed of implementing asset allocation strategies is an important aspect to be considered because there are usually long transaction times involved when buying and selling buildings. The idea is to buy time with the derivative position for implementing the asset allocation strategy. One interviewee (interview no. 40) explained that the low speed of getting in and out of real estate was the historical reason why his firm began examining the use of property derivatives.

Another interviewee, who was referring to a total return swap and not to futures, described the process of switching asset allocations as illustrated in Figure 4.5. The idea is to enter a trade that provides a steady cash flow which is reinvested in a better performing asset class.

[106] This theme came up in four interviews (interview no. 7, 8, 16, and 40).


Figure 4.5: Switching asset allocations with a total return swap (own depiction)

One interviewee said:

> *"[…] the view was we need to reduce our exposure to real estate because at that point one of the other asset classes was actually going to do better. […] But other markets were going to outperform the real estate, and so you've got to accept that you're not, you know, always going to be the front runner. And better money can be made elsewhere. So, taking money off here, put it over there, you get a better return."*
>
> *[Head of Global Real Estate at investment management firm for direct property]*

Given the statements made on the marginal upticks that can be realised with property derivatives, it seems that switching asset allocations would only be possible if pricing is attractive. Otherwise there is no cash flow to be reinvested in the better performing asset class.

What may be achieved, however, is reducing the risk associated with the asset allocation to real estate by hedging against the downward price movements and thus reducing the overall risk of the portfolio.

**(6) Accessing certain sectors that cannot be accessed in form of physical real estate[107]**

Another motivation that was brought forward by four interviewees is that investors try to enter out-of-reach sectors in a cost-efficient way via derivative instruments. A sector may have a positive economic outlook but is capital-intensive (e.g. shopping centres). Compared to the physical investment, entering shopping centre futures, for instance, would require only a fraction of the investment capital.

Another point that was mentioned in the interviews was the situation in which the direct entry into a sector may be impossible. It would then be necessary to use

[107] This theme came up in four interviews (interviews no. 8, 9, 28, and 39).

derivatives to do so. Alternatively, if the sector cannot be entered because there are not enough sellers, then exposure to the sector can be created by using the corresponding derivative contract.

> *"I think at the moment that the market in general likes, for example, industrial, so there are typically quite a few potential buyers but very few sellers. So, if there was that imbalance between buyers and sellers, if there was another way of getting exposure to that market that might be quite interesting."*
>
> *[Head of Property Multi-Manager at investment management firm for indirect property]*

It is worth mentioning that entering capital-intensive sectors and sectors that cannot be accessed in a direct way is less an issue for indirect investors because they are able to invest smaller portions in indirect vehicles.

In summary, it seems that there is mismatch between what investors would like to achieve with property derivatives and what can be achieved with the instruments. The current research found that the two main motivations for using property derivatives are to create index exposure and to hedge. The instrument, however, does not provide the total index return consisting of income return and capital return, but only an uptick at the margins. It is the difference between the index value implied by the current derivative price and the index value at maturity that can be gained or lost. The reason is that the current property derivative price already contains the market sentiment. Conversely, the issue with hedging is that if the economic outlook would forecast, for instance, a 5% index drop, then the price of the derivative would already reflect this sentiment. Another point is that the long and short positions need to be matched in the current market setup. As the interview data has shown, some investors only require hedging the capital return component, which complicates the matching of the two counterparties.

A good summary of the issues discussed in this section is provided by the two quotes below.

> *"[…] if I'm looking at a derivative as something that I want to use to hedge my position in real estate or to invest in it as an alternative to investing in the underlying assets then I'm looking for a capital and income return, I see it as a total return play. Now, the issue is if I'm going to structure a*

*product or if I'm going to work on that as some form of a hedging tool then I probably need, in order to make that efficient, the ability to separate out capital and income. So therefore, my view is from an investment perspective, I expect to see total return, as an alternative to cash drag I expect to see total return, but if I'm then going to use the product as a hedging tool or as a structured products tool then I want the ability to separate between capital gain and income."*

*[Funds Development Director at investment management firm for indirect property]*

*"[…] we started off with an open mind to see, before we were looking at any particular elements, but in all cases, in our view, even in the most simple cases, they just don't provide what many people, who were promoting them, suggested they would provide."*

*[Head of Real Estate Investment at investment management firm for indirect property]*

One interviewee mentioned that people need to have a reason for using property derivatives. This topic is taken up in section 4.5.5 where hedging strategies are discussed.

*"Well, for us that would never arise because it would be very rare that we would have property liabilities which we would need to hedge."*

*[Global Investment Strategist – Property at investment management firm for direct property]*

### *4.5.3 Decision-Making Process to Employ Property Derivatives*

One commonly cited (by the interviewees) reason for the illiquidity of property derivatives markets is the illiquidity itself which acts like a negative feedback loop or vicious circle that discourages investors from entering derivative contracts. The term "chick-and-egg" was used quite frequently[108] to describe the alleged relationship between trading activity and trading volume (i.e. liquidity). A closer

[108] The term was used in interviews no. 1, 4, 5, 6, 10, 11, 14, 17, 19, 20, and 24.

analysis of the decision-making process within the investment management organisation, however, shows that liquidity per se would not automatically lead to a more widespread employment of property derivatives. There are a variety of conditions that need to be fulfilled before an organisation gives the instruments serious consideration. This stance is exemplified by the two quotes below. Even if all stars are in alignment, there is still no guarantee that property derivatives will be employed.

> *"So, there's a number of metrics that have to happen, right. First of all, the pricing has to be correct that we think the pricing is attractive for a hedge or the pricing is attractive for a long position, right. That's the first one. But then we have to see, 'Ok, well, what does it cost to get in and what's the liquidity profile.'. And obviously, we run sensitivity analysis around that if something happens."*
>
> *[Fund Strategist Real Estate at investment management firm for direct property]*

> *"I think that there is a process, this is the problem. So, indeed, the stars might align, and that's very well and good, but you've got an internal process. You've got due diligence. You've got a number of checks and balances that must be cleared and ratified before you can simply sign an instrument off and do a trade."*
>
> *[Researcher at investment management firm for direct property]*

The analysis of the interview data shows that three issues frequently recur in a number of interviews with regard to the decision-making process. The first one is sufficient liquidity levels[109] in the market, the second one is obtaining internal approvals from investment committees[110] and/or risk committees, and the third one is the right pricing level of the derivative instrument[111]. The notion of illiquidity and issues on pricing are discussed in detail in section 4.7.4 and 4.7.5, respectively.

While the decision-making process on physical property investments follows a certain routine and established procedures within an organisation (e.g. internal

[109] Mentioned in interviews no. 2, 12, 14, 20, 21, 22, 25, 29, 37, and 39.
[110] Mentioned in interviews no. 2, 4, 10, 12, 15, 20, 23, 25, 26, and 28.
[111] Mentioned in interviews no. 2, 9, 12, 16, 20, 23, 25, 37, and 39.

approval by investment committees or boards, technical, commercial, tax, and legal due diligence), the decision-making process for employing property derivatives is not a frequently recurring established process. Some of the organisations (interviews no. 04, 09, and 25) monitor the property derivatives market in order to keep abreast of its development, and others have decided on a more informal basis not to use the derivative instruments as the following quotes attest.

> *"It's not an active decision not to [use property derivatives]. It's almost like, well, we allowed for it, but the need has never arisen and there is no pressure to do it. There is no real benefit we can see to doing it."*
>
> *[Head of European Real Estate at investment management firm for direct property]*

> *"There was no single decision not to employ them. It was more a case that we put ourselves in a position that we could [use] them. But none of the fund managers actually came forward and said, 'Yes, that's a trade I want to do'."*
>
> *[Senior Fund Manager at investment management firm for direct property]*

> *"There is no decision process as such because the question to use the instruments has never arisen."*
>
> *[Head of Investor & Corporate Communications at U.K. REIT]*

> *"Before we go to any risk committee or product committee, we have to be, as investment managers, convinced with the reasons, and so weren't convinced, and so there was no formal application to change the operational set-up. We weren't convinced on the investment grounds."*
>
> *[Head of Real Estate Investment at investment management firm for indirect property]*

Interviewees from investment management houses reported that usually the investment committee and/or risk committee[112] needs to approve investments in

[112] The separation between the two committees is not always clear. There are organisations that have one committee fulfilling both functions, others separate the investment decision and the risk analysis.

property derivatives. The low liquidity in the market creates some discomfort because it has an adverse impact on pricing and on the ability to close out derivative positions. The quote below provides a good description of the function of the investment committee and its perception of liquidity.

> *"We have an investment committee within our team which governs strategy and our ordinary course of business in terms of fund selection and strategic allocation and things like that. And because derivatives have been one of the tools which we can invest in, there is at our meetings a very brief talk or review of what's happening in the derivatives market or what has happened in the derivatives market. […] We will monitor it, we will continue to monitor it, and if liquidity volumes improve or if market circumstances change then we will relook at it. But at the moment, there's no reason to and we focus our energies elsewhere."*
>
> *[Indirect Property Fund Manager at investment management firm for indirect property]*

Before submitting a proposal to an investment committee or risk committee, the liquidity of the instrument would have to be analysed in order to assess the liquidity bucket to which it belongs. The inability to unwind the position before maturity, at a reasonable price, creates a major problem because it renders the instrument even more illiquid than underlying physical real estate. Taking highly illiquid positions will naturally cause resistance from investment and risk management committees.

As mentioned in the quote below, the low transparency of the market (discussed in section 4.7.5 in more detail) in combination with an atypical underlying real estate index complicates the decision-making process. Among the first hurdles that practitioners encounter is the difficulty in obtaining current and correct information on property derivatives prices and trading volume.

> *"And, you know, part of it will obviously be us having discussions with the risk team, you know, as we should do as a necessary part of any investment business is to understand completely the risks and discuss those. But you can see that this information flow is not great and when you start to speak to people outside of real estate, not only do you have to explain how the index works and how it's not a transaction-based index, it's an appraisal-based index."*

*[Fund Strategist Real Estate at investment management firm for direct property]*

A major concern among potential investors in property derivatives is the assessment of the downside movement. Due to the illiquidity in the market and the lack of data, no conclusions can be drawn as to the costs, in case a position needs to be prematurely closed out.

> *"So, it's about knowing and understanding and appreciating the downsides, the costs, and I don't mean the transactional, frictional costs, I mean the costs that a potential contract that goes wrong, or goes awry, could have an impact in terms of basis points, loss on your performance."*
>
> *[Researcher at investment management firm for direct property]*

Given the current low levels of liquidity in terms of trading volume on the Eurex exchange, the liquidity risk is perceived as an additional risk. Therefore, pricing levels must provide a compelling reason to invest in the property derivative. This point is underlined by the following quote.

> *"And I would say there has to be quite a compelling investment case for it. Because there are, I guess, additional risks that people perceive, whether they're real or not is difficult, but the fact is they're perceived."*
>
> *[Fund Strategist Real Estate at investment management firm for direct property]*

Depending on the organisational type and investment vehicle there may be other stakeholders involved in the decision-making process such as fund investors, trustees, and shareholders from REITs. Obtaining approvals becomes more difficult the less knowledge stakeholders have about the market and the instruments. The knowledge issue, which is exemplified by the two quotes below, is discussed in detail in section 4.6.2.

> *"First of all, you're convincing people who probably don't know very much about it, and how it works, […] a learning process with them and a lot of information to them, and then you have risk, [individuals] who are nervous because it's a new type of investment, and how liquid is it, and what's your exposure, and derivatives, as you know, have a lot of reporting requirements, and AIFM, etc."*

*[Head of U.K. Property Pooled Funds at investment management firm for direct property]*

*"It's hard to convince the board that this [using property derivatives] is something that we should be doing or we want to do: 1) because no-one really understands property derivatives, and trying to get them to understand is one thing, and; 2) once they see the stats, the data, the question, obviously, is, 'it's quite illiquid, why do we want to do this?'."*

*[Group Corporate Finance Manager at property development and investment firm]*

The other point that was frequently mentioned in the interviews and which has a pivotal role in the decision-making process is attractive pricing. Property derivative prices are compared with physical real estate and other indirect ways of investing in property. The relative value of the derivative position defines the attractiveness of its price to potential investors.

*"I think you just have to be pretty confident that you're going to do better [with the property derivatives position] than the property […]"*

*[Head of U.K. Property Pooled Funds at investment management firm for direct property]*

In addition to market liquidity, investment committee approval, and attractive pricing levels, other conditions identified in the interviews are summarised in Table 4.3 below. These conditions may form parts of the internal decision-making process in organisations but vary from organisation to organisation. The table shows that liquidity and depth of the market are not sufficient conditions to trade.

| | **Controlled** | |
|---|---|---|
| **Conditions** | **Internally (within the organisation)** | **Externally (outside the organisation)** |
| Obtaining the internal approval from investment committee | x | |
| Fund must have cash available | | x |
| Fund is looking to hedge out some exposure | x[113] | |
| Fund mandate allows investment in property derivatives | | x |
| Market forecast needs to be in the right direction | | x[114] |

[113] Depending on the type of fund.
[114] Depending on market conditions which are not controlled by the organisation.

| | Controlled | |
|---|---|---|
| **Conditions** | **Internally (within the organisation)** | **Externally (outside the organisation)** |
| Attractive pricing of the property derivative (i.e. property index future) | | x |
| Sufficient liquidity in the market/market depth | | x |
| Can the position be held to term? | | x[115] |

Table 4.3: Conditions for Investing in Property Derivatives (own depiction)

It should be noted that the range of funds that come into consideration for investing in property derivatives is limited by the availability of suitable property derivatives products[116]. Funds vary in their geographic and sectoral focus, as well as in their investment strategy, which may allow or restrict the employment of derivatives and leverage[117]. In fact, there are currently nine future products available on Eurex; one based on an all commercial property index[118], three different sector indices[119], and five sub-sector indices[120] in the U.K.

In summary, there are multiple conditions that need to be fulfilled in order for a real estate investor to employ property derivatives. The conditions are diverse and depend on the investment objectives, the type of investor, the investment vehicle (e.g. type of fund, REIT), and a certain constellation of endogenous and exogenous factors. Therefore, the decision-making process is not a static procedure as such. The decision-making process is embedded in a complex structure of factors that are associated with one another. As previously mentioned, the process is not clearly definable as it depends on the type of organisation, the type of fund or investment vehicle, and the particular investment situation. However, it is possible to determine those factors that influence the propensity to employ property derivatives. They are discussed in the remaining sections of this chapter.

[115] Depending on the mandate, investment management agreement, or fund prospectus.
[116] The availability of products that meet investor requirements is discussed in section 4.8.6.
[117] The mandate, investment management agreement, or fund prospectus play important roles in this context and are discussed in more detail in section 4.9.4.
[118] UK Quarterly All Property Index Futures Calendar Year Returns.
[119] UK Quarterly All Office Index Futures Calendar Year Returns, UK Quarterly All Retail Index Futures Calendar Year Returns, and UK Quarterly All Industrial Index Futures Calendar Year Returns.
[120] UK Quarterly West End & Midtown Office Index Futures Calendar Year Returns, UK Quarterly City Office Index Futures Calendar Year Returns, UK Quarterly Shopping Centre Index Futures Calendar Year Returns, UK Quarterly Retail Warehouse Index Futures Calendar Year Returns, and UK Quarterly South Eastern Industrial Index Futures Calendar Year Returns.

### *4.5.4 Administrative and Operational Requirements*

The theme "Administrative and Operational Requirements" was discussed in section 2.2.4 as a disadvantage of using property derivatives. It refers to appropriate systems, policies, and procedures that need to be set up in order to manage the derivative positions and the associated risks on a day-to-day basis. In order to find out whether the administrative and operational requirements constitute a serious impediment for practitioners to trade property derivatives, the interviewees were asked about their experience in this regard. The main purpose of this question was not to quantify how many organisations are set up to trade, but to figure out whether the issue suggested by the literature is a "real-world" problem.

In this context, there were two issues brought forward by interviewees. The first one relates to the process that needs to be set up within the organisation to manage derivative positions and the second issue refers to the existing in-house knowledge that can be leveraged because a firm may already be trading in other types of derivatives. None of the interviewees[121] who commented on this topic mentioned the administrative and operational requirements as a first order problem or reason for not using property derivatives.

With regard to the process, interviewees mentioned the need to implement a process within the organisation that would take account of the fact that property derivatives may be alien to both property and derivative professionals. There needs to be a process in place within the organisation that allows proper control and clearly defined responsibilities. A case in point is provided by the two quotes below.

> *"Some people will bemoan the fact that managers don't take the initiative, but it comes down to my point, I think, where you're particularly busy as a bricks and mortar manager, not a REIT manager, not a derivatives manager, managing the mandate that you've been delegated, and therefore, yes, if it's to become a tangible instrument, it has to have somebody, or a team, who are going to be*

[121] This topic was touched upon in 24 interviews.

*responsible for the monitoring and the duty of care towards that instrument and, therefore, that's a cost. […] it has to be a prescriptive, repeatable, easily definable, easy to understand process and that is the kind of framework that you need."*

*[Researcher at investment management firm for direct property]*

*[…] because you have somebody that doesn't know derivatives, what[so]ever, and who's going to manage it, and you have to set up a whole new relationship and process to manage it, because it's so different from what you do; […] How do I know they're going to rollover the hedge? Or, how do I know they're going to [remind] me that this is coming to an end, and what do we want to do, and I suppose your own comfort, because it's not a market you work in; […].*

*[Head of U.K. Property Pooled Funds at investment management firm for direct property]*

With regard to in-house knowledge, there seems to be an advantage for those organisations that already trade in equities, bonds, and other derivatives such as currency or interest rate derivatives. Clearly, organisations with an existing setup to trade derivatives have an advantage over those which do not, because they can make use of an existing back office structure and knowledge in dealing with property derivatives. As the first quote below (from an interviewee whose organisation is currently not set up to trade derivatives) shows, there needs to be compelling reasons for an organisation to allocate resources and money to such a setup. The third and fourth quote are from two interviewees whose organisations are setup to trade and which have the ability to leverage existing in-house knowledge.

*"In terms of futures, we are not operationally set up to do that for our clients at this moment in time. In a way it's not been an issue really because there just hasn't been the liquidity. If liquidity volumes were to improve and if there was a market there for us to look at, then I think that would kick start any drive for us to get ourselves operationally able to trade these for our clients."*

*[Indirect Property Fund Manager at investment management firm for indirect property]*

*"So, it sort of feels like it's not quite the market or the world we're used to dealing in. And I think we're at a little bit of a disadvantage in that we're a real estate-only business rather than being a multi-asset investment house."*

*[Senior Fund Manager at investment management firm for direct property]*

*"Yes [we are technically able to trade property derivatives]. There's no issues on that side. Most of our clients have multi-asset portfolios. So, they already have relationships with the clearing banks. And we have a large support team that can help us with all the technicalities and administration. […] So, there is a lot of knowledge outside of real estate as well that we can lean on."*

*[Senior Fund Manager at investment management firm for indirect property]*

*"One bit there that probably helped us here is that […] we're part of a big insurance company [that does] derivatives."*

*[Senior Fund Manager at investment management firm for indirect property]*

The only hurdle to be overcome by those organisations that already have a setup to trade, is now to cultivate the inter-departmental collaboration and knowledge transfer between the property teams and the derivatives teams. Often, they are disconnected from each other because their daily operations have little in common. For organisations that enter unchartered territory, the situation is more difficult because they need to get all the internal approvals first. This requirement can be a lengthy process that can take as long as from 12 and 18 months.

It should be noted that the setup to trade is easier now than it was in the past. The market has become an exchange-traded market, whereas before in the OTC-market the counterparties had to agree on ISDA's[122] with banks and get CFA's[123] signed. Those requirements have been removed.

[122] Master Agreement from the International Swap and Derivatives Association that governs over-the-counter derivatives transactions.
[123] Credit Facility Agreement.

In summary, the administrative and operational requirements to trade property derivatives were not presented by interviewees as one of the main reasons why they do not use the instruments.

### *4.5.5 Hedging Strategies*

Although hedging is among the main motivations for using property derivatives, (as discussed in section 4.5.2), the low trading volume indicates that practitioners either employ other hedging strategies or do not hedge at all. Since the presence of an alternative hedging strategy would be a valid reason for not using property derivatives, practitioners were asked what their hedging strategies are.

The research data show that there are no hedging strategies used to hedge against systematic risk. Investment managers interpret their role as providing full and no hedged exposure to the real estate market through their investment vehicles (e.g. fund or REIT). The following three quotes exemplify this view.

> *"No [there is no hedging strategy in place]. We're providing real estate exposure – full stop."*
>
> *[Head of European Real Estate at investment management firm for direct property]*

> *"There is no hedging strategy. The hedging strategy is to sell."*
>
> *[Executive director at capital advisory firm]*

> *"No [we do not actively hedge our real estate investments]. No, we see ourselves as a long-only player. […] all of our investors are aware that we're long-only."*
>
> *[Funds Development Director at investment management firm for indirect property]*

Three reasons have been identified that explain why investment managers believe that there is no need to hedge real estate market risk. The first reason

refers to volatility associated with real estate investments. There is evidence[124] in the research data that some of the investment managers believe that there is no need to hedge real estate risk because of the perceived low volatility associated with bricks and mortar investments. In addition, the income component is perceived as being quite stable and the capital component becomes important only when the asset is sold.

The second reason refers to the possibility to invest through the cycle without the need to sell properties. In other words, to sit declining markets out. The argument used by the interviewees in this context is that real estate is a long-term investment which is held throughout the cycle. This means to avoid selling assets when property prices are low or when the market is declining. As the three quotes below show, control over the timing of divesting real estate stock seems to be one strategy to cope with in real estate market risk management.

> *"And if the price moves around in the manner that we don't consider to be consistent with the macro-environment we just have to accept that's the vagary and not trade."*
>
> *[Chief Investment Officer at investment management firm for direct property]*

> *"And I think, in a way, we are hoping that property derivatives could solve that, but, again, a lot of different factors. It's just, right now, it's not something that we think is a perfect solution yet. It is a solution, I think, for a lot of other companies, fund manager, hedge funds, potentially, for speculative, maybe. But for a property company, especially for the more niche players, it doesn't quite match up. […] we don't hedge […] because we are predominantly an investment company, property investment to buy to get recurring rental income; depending on how severe it is, we'd just hold it [the real estate stock] and wait for the cycle to pick up."*
>
> *[Group Corporate Finance Manager at property development and investment firm]*

> *"Most of them [the investors] are longer term investors, they invest throughout the cycle."*

[124] Interviews no. 29, 39, and Email correspondence with a fund manager from a multi-asset management firm who could not be interviewed.

*[Property fund manager at investment management firm for direct property]*

Not every investment manager, however, has control over timing divestments. There are types of funds, such as open-ended funds, that may be forced to sell properties at unfavourable prices in order serve redemption requests from their investors.

A third reason that was brought forward in the interviews as to why investment managers do not hedge real estate market risk refers to the argument that the hedging decision rests with the asset allocator, that is, with the investor in the fund or REIT. Asset allocators can actively control their real estate risk by reducing or increasing exposure to this asset class. The three quotes below underline the point that asset allocators invest in real estate by making a conscious decision to allocate capital to this asset class in order to receive returns commensurate with the risk taken.

> *"[…] our investors are very large global institutions that have a weighting, an allocation to real estate amongst many other asset classes and they make a decision [concerning] how much they want to invest in real estate and then they'll spread that allocation across different risk profiles and across different geographies to achieve the right risk-return balance that they're looking for, for whatever institutional purpose they have."*
>
> *[Chief Investment Officer at real estate private equity fund management firm]*

> *"[…] when the investor's allocating and making a decision to invest with you, they're making that systematic decision that they want the exposure to that risk."*
>
> *[Director Fund Management at investment management firm for direct property]*

> *"The responsibility of hedging systematic risk does not lie with the property fund manager but with the asset allocator. The task of the fund manager is to generate the best returns with the physical assets. The asset allocator has to decide to hedge or not. Property is viewed as a long-term holding and is not a systematic issue because falling prices in the past have rebounded over a certain period of time. There are bubbles occurring, but the decision on how much*

> *exposure to such a market is created lies with the asset allocators. […] The best way to hedge this risk is by deciding whether to be in this asset class or not."*
>
> *[Head of Group Research at capital advisory firm]*

Investment in real estate is often part of an asset allocation strategy that comprises other asset classes such as equities, fixed income, multi-asset, and the like. The asset allocators manage their investment risk through diversification across these asset classes. The view of the investment managers is that the allocation decision is made at the moment that they receive capital for investing in real estate. Investment managers are, in fact, capital allocators in property and not risk managers. Their investors do not expect them to manage systematic risk. The investor expectations of investment managers are discussed in section 4.9.3.

Other strategies to mitigate systematic real estate market risk mentioned by the interviewees are to hold quality assets, to diversify the real estate holding in order to keep return volatilities low, and to deleverage. Higher quality properties refer to properties in good locations and with tenants that provide a secure income over the longer-term and through a downturn of the market.

Diversification, on the other hand, is achieved through investment in different properties, funds, applying a fund of funds approach, and steering sector allocations in line with the in-house research outlook for the corresponding sectors, that is, to increase and decrease sector allocations accordingly.

In terms of deleveraging which was addressed in interviews no. 27, 29, and 32, investment managers could reduce the levels of debt in their investments if there is a need to reduce the investment risk. Typical debt ratios may be as high as 70%.

In summary, it can be said that investment managers do not use hedging strategies, but they use various strategies to mitigate risk. Research evidence suggests that investment managers do not feel the need to hedge the real estate investment risk because their clients want full exposure to the market. In addition, there is an awareness that income returns are quite stable and capital values will usually have positive increments in the long-term which obviates the need for

hedging. The investment managers view their role as deploying capital in real estate rather than managing real estate market risk.

As a side note, an interesting comment was made by one interviewee with regard to the investment management fee that the investment manager can charge for managing a hedged portfolio. His thought was that when the portfolio is hedged there is actually no entitlement to receive an investment management fee. This topic was not discussed further.

## 4.6 Endogenous Factors at an Individual Level that Influence the Propensity to Employ Property Derivatives

### *4.6.1 Introduction*

In this section, the factors at an individual level that influence the propensity of real estate investors are discussed. They are as follows:

1. Understanding of the Market and Instruments – Need for Education;
2. Psychological Barriers;
3. Perception of Real Estate Investment Managers of Property Derivatives;
4. Awareness of Current Instruments and Ways of Market Access;
5. Disproportion between Effort and Impact; and
6. Demonstrating Practical Competence.

### *4.6.2 Understanding of the Market and Instruments – Need for Education*

Previous research (Venter, 2007; Püntener, 2011) identifies end user lack of education and understanding of market mechanisms and instruments as one main barrier to growth in the property derivatives market and as a general hurdle to market entry. Hence, the current research also attempts to verify whether this lack of understanding and education could be accountable for the reluctant use of property derivatives. For that purpose, the researcher asked interviewees on the degree and extension of understanding and knowledge of the concept of

property derivatives among practitioners and on whether further education was necessary. In addition, the researcher asked who is responsible for educating the clients of the investment management firms in this regard.

The research results show that there is broad[125] consensus as to the need for further education. One interviewee compared the stage of the property derivative market to the equity market 25 years ago, as the following quote demonstrates.

> *"Property is like the equity market was 25 years ago in that they [real estate professionals] don't understand the benefits of derivatives; they see them more as gambling tool rather than a hedging tool which is obviously where we see most of the business is."*
>
> *[Non-executive director at a stock exchange]*

Generally, there is a perception that there is the need to explain property derivatives to potential users with regard to how the instruments work, how they can be used to minimise risk, and what strategies can be adapted with them.

One reason for the need for more education is that property fund managers are usually chartered surveyors and not derivative experts. Their activity encompasses purchasing and selling commercial properties, dealing with lease agreements, managing refurbishments, new constructions, etc. These activities require a different set of skills than trading derivatives. One interviewee stated:

> *"But I think it is true to say that it's a bit of a leap, for an investment professional in property, who is used to dealing with the illiquid product, if you like, or commodity, to embrace the investment thinking that derivatives require, and that is tricky […]"*
>
> *[Strategic advisor at investment management firm for direct property]*

In addition, two interviewees mentioned that there is a "status quo" bias in the industry on the part of those individuals who have been working in the field for 20 or 30 years. They are usually not very open to changing the way they have been doing things their entire working life.

[125] This was mentioned in interviews no.1, 2, 5, 7, 9, 10, 15, 17, 18, 20, 26, and 28.

When it comes to educating clients about property derivatives, investment managers seem to be reticent because they believe that this would complicate matters needlessly and because those discussions usually take place when the investment management agreement is set up. The three quotes below exemplify these two points. Another comment from an interviewee (interview no. 35) suggests that it depends on the sophistication of the client as to whether they introduce the concept of property derivatives to them or not.

> *"I think the problem you have is that, on the whole, as I was telling you before, you're keeping it simple in the approval process for an allocation from an investor. You want to try and explain as little as possible. As soon as you start introducing new concepts, you spend a lot of time explaining that. So, if I started including, let's say, student housing in a commercial portfolio, yes, it's becoming more established and might have a track record, but you'd spend probably 30 per cent or 40 per cent of your time explaining why that allocation's there. I think the same would be with derivatives. You would spend probably 90 per cent of your time explaining why something outside of your core competency is in the portfolio. Life's too short, you need to compose a fund that's probably easier just to get on and raise it without that, than to spend the time educating and explaining that. That's probably what it goes down to."*
>
> *[Director Fund Management at investment management firm for direct property]*

> *"[…] we don't want to put a client into a product that they don't understand."*
>
> *[Senior Fund Manager at investment management firm for indirect property]*

> *"The time to have those discussions really is when you've won a new mandate and take on new business. So, when you're setting up the parameters for a new mandate and agreeing [to] the outperformance objective, committed investments, that's typically when you have the conversation about the full range of opportunities you can invest into to get your real estate exposure, so that's typically where we would have our conversation with clients. And then over time, yes, I guess if we think there's a strong case to be made for derivatives or for another type of real estate exposure, we'd make that case and try and get client consent to do it."*

*[Head of Property Multi-Manager at investment management firm for indirect property]*

It can be argued that more education would certainly foster understanding and help to dispel concerns about the use of derivatives. The learning process is a lengthy one and requires the willingness of both the individual and the organisation which needs to provide the resources for it.

Knowledge about property derivatives varies from organisation to organisation and cannot be generalised. Institutional investors and organisations that have traded in the past usually have some knowledge about property derivatives or may draw on resources that are knowledgeable.

As discussed in section 4.5.3, the decision-making process within the organisation would benefit from individuals who are knowledgeable about the market and the instruments. Understanding is a condition for the decision-making process and concerns the decision-makers within the organisations (e.g. fund managers, investment committees) and outside the organisations (e.g. fund investors, trustees).

Understanding the market and instruments would also mitigate the impact of the administrative and operational requirements that constitute a hurdle for those organisations that do not have experience with trading other asset classes or other derivatives.

Even though interviewees acknowledged the need for more education about property derivatives which is in line with the literature on this topic, there were no comments that suggest that the need for education is one of the main reasons for the reluctant use of property derivatives. However, it is certainly a contributing factor.

The issues encountered by property and derivative professionals, such as having difficulties in understanding the world of property and derivatives, respectively, seem to be frictional effects of the two markets converging whereby professionals from both camps learn common metrics associated with the capital market and

the real estate market, respectively. It is a part of a learning process bringing both markets closer together.

### *4.6.3 Psychological Barrier*

The term psychological barrier appears in the academic literature in the context of derivatives (Davis, 1996; Shiller, 2008), but has been used loosely and it is not clearly defined. In order to find out if there are any psychological barriers involved and how practitioners would describe them, interviewees were asked about their opinions on the importance of psychological barriers in using property derivatives.

Naturally, the answers varied to some degree, but one concern that was mentioned multiple[126] times refers to the certainty to realise a gain or a loss. The possibility of realising a loss "if something goes wrong" causes major discomfort. The research results show that practitioners are more concerned about potential losses than potential gains. In addition to that, they seem to fear the reputational consequences of an unsuccessful trade, that is, a trade that loses money in excess of what would be possible when investing conventionally in real estate. In other words, when trading property derivatives the practitioner voluntarily takes the risk of potential loss that is far greater than the risks associated with their day-to-day business. Below are four quotes defining the psychological barrier more closely in the context of property derivatives.

> *"There is political risk associated for a fund manager to do this. So, they've got more to lose by being the person in the organisation to say, 'Let me do a trade' than they have to gain. They get it wrong, they could lose their job."*
>
> *[Director at a property derivatives brokerage firm]*

> *"And it is quite black and white in terms of there will be a winner and there will be a loser in the transaction and, you know, you don't want to be on the wrong side of it and regret it."*
>
> *[Fund analyst at investment management firm for direct property]*

[126] This issue was discussed in interviews no. 3, 9, 13, 24, and 35.

> *"You're then sticking your head above the parapet and getting back to that peer thing. It's fine if you're 100 per cent sure about it, but you run reputational risk if someone says, 'Well, are you absolutely sure you want to do that?' when, if it goes wrong, your head is on the block. […] But someone must be losing out by the very definition. There must be someone else on the other side of the trade."*
>
> *[Property fund manager at investment management firm for direct property]*

> *"[…] some of our other fund managers, just see it as an unnecessary risk to take, I guess. One of them quoted the other day, […] 'I can't quite imagine sitting down in front of my clients and saying look, I took this position and it hasn't worked out and it's cost X amount.'"*
>
> *[Senior Fund Manager at investment management firm for direct property]*

It should be noted that not all interviewees perceived psychological barriers as an issue when contemplate trading property derivatives. Those who did not were already familiar with the instrument and had experience with it. A representative of this group is quoted below:

> *"No [there are no psychological barriers]. From our point of view, we understand the index completely. The underlying index, we understand how it works and the mechanics, how that works, completely. How these behave in terms of expectation and how we would look to model them. We understand."*
>
> *[Fund Strategist Real Estate at investment management firm for direct property]*

In summary, it can be said that the fear of incurring a loss with property derivatives and the certainty of the outcome either in form of a gain or a loss creates a certain degree of discomfort among some practitioners. They did not, however, consider the psychological barrier as a major problem that keeps them from trading property derivatives. Rather, it is one contributing factor, among others.

### *4.6.4 Perception of Real Estate Investment Managers of Property Derivatives*

The perception of potential users of property derivatives of the instrument already appeared in the pilot study which was conducted in 2011. This theme reappeared in the interview data of the current research. The statements made allow drawing conclusions as to the supportiveness or potential hostility towards the instrument which would give an indication as to why investment managers do not use property derivatives.

Generally, the interviewees have shown, by accepting to be interviewed, that they are interested in derivatives and willing to talk about their experience. Consequently, the current research may be biased as it was not possible to interview those who are not interested and do not want to spend their time talking about property derivatives.

In the analysis of the research data, no signs of general hostility towards or aversion to property derivatives were detected. To the contrary, in various[127] interviews, individuals expressed their support of and interest in the instruments. In expressing their support, the interviewees sometimes considered them as a "useful tool" that should be used. Among the voices supporting the instrument were also some more critical ones as the following quote exemplifies.

> *"[…] I suppose my job is to help champion this asset class, this instrument […] I happen to think there is value in derivatives, as an instrument, but unfortunately I struggle to fully say, with absolute conviction, that they are the perfect tool to use to do X, Y and Z."*
>
> *[Researcher at investment management firm for direct property]*

In summary, it can be said that there is a positive perception of property derivatives among the interviewed practitioners, especially if their organisation had a positive experience with the instruments in the past. Therefore, it can be excluded that a negative perception or aversion to property derivatives is the reason or is among the reasons for not trading them.

[127] This topic was discussed in interviews no. 4, 5, 6, 9, 10, 16, 17, 21, 35, and 37.

### *4.6.5 Awareness of Current Instruments and Ways of Market Access*

A theme that emerged from the research data is concerned with the awareness of currently available instruments and the ways to access the market. The research results on that topic are somewhat mixed. During six of the interviews[128] evidence was found of awareness of the currently available property derivatives instruments and the ways of accessing the market. Nine interviewees[129], however, admitted that they were unaware of the currently available instruments or the ways accessing the market. Two examples from interviews which showed interviewee awareness are shown below.

> *"So, I know generally what is available."*
>
> *[Group Corporate Finance Manager at property development and investment firm]*

> *"I think awareness is pretty good. There are certain people we speak to fairly regularly and there's a reasonable market presence but, as you say, the actual volumes of derivatives are still pretty low."*
>
> *[Head of Property Multi-Manager at investment management firm for indirect property]*

On the other hand, those interviewees who are unaware are exemplified by the following two quotes.

> *"We sampled the market a couple of years ago, determined not to proceed because of illiquidity and structural incapacity to do what we wanted, and we don't have an ongoing perspective of how the industry is developing."*
>
> *[Chief Investment Officer at investment management firm for direct property]*

> *"I think probably I would need a refresher really. I've been introduced, as I say, every couple of years there's always a new service provider or someone who's trying it. I think I*

[128] Interviews no. 20, 21, 25, 26, 28, and 35.
[129] Interviews no. 8, 12, 13, 14, 15, 16, 24, 29, and 32.

*would, in principle, know the different options, but as I say, it's not really on my radar, it's not something we, as a group, think about regularly. I'm sure it's something we could pick up quickly if we decided it was something we needed. At the moment, no, it's not really something that we focus on."*

*[Director Fund Management at investment management firm for direct property]*

Those interviewees who are aware of the available instruments said that they were occasionally in contact with the single brokerage firm that is currently active in the market. The role of brokers in discussed in more detail in section 4.7.2.

It is necessary to emphasize that the number in either group has little bearing because the aim of the current research is not to provide statistical evidence on the factors influencing the propensity to employ property derivatives. The question on the awareness was not raised consistently in each interview because there were interviews in which awareness was demonstrated by answering other related questions.

In summary, due to the fact that the interview data is somewhat mixed as to the awareness of currently available instruments and ways of market access, it can be concluded that this factor is not a main driver influencing the propensity to employ property derivatives, but it is certainly a contributing factor. Since the research results provide evidence for the presence of practitioners who are unaware, another conclusion that can be drawn is that the industry should provide more training and information campaigns in order to close the awareness gap.

### *4.6.6 Disproportion Between Effort and Impact*

A perceived disproportion between the effort to get set up to trade and to obtain all necessary internal and external approvals (i.e. from investment committees and clients) on one side, and on the other, the limited impact property derivatives have on fund performance, came up in a number of interviews[130].

[130] Interviews no. 9, 12, 13, 15, 21, and 28.

Some interviewees consider only marginal fund performance enhancements possible, in a small market with only short-term exposure. The two quotes below exemplify this view. Moreover, there are funds that are limited in terms of the derivative exposure that they can take.

> *"The other issue, effectively, for a big fund, of any size, is we were only holding £60million, you know, and you think, 'it's hardly worth it'. […] it's £60million, I mean, it's too much of a hassle, why I've got to sit here and explain it to people, 'why do you want it?', and you think, it's not going to make any difference to the fund, so there was this little bit about why should I bother doing it?"*
>
> *[Head of U.K. Property Pooled Funds at investment management firm for direct property]*

> *"[…] for it to be really worthwhile, you want it to probably to be adding, I don't know, if it doesn't pay out probably 10 bps to the fund performance."*
>
> *[Fund analyst at investment management firm for direct property]*

Disagreeing with this view, others said:

> *"[…] for me that's not my perception at all. I think the impact that derivatives have on your portfolio is directly correlated to how much money you put into it, right? And if you're only to put half a per cent of your portfolio into it, it's going to have a small impact. But if you want to make a meaningful allocation to it, then it's going to have a meaningful impact on your portfolio. So, for me, no, it's not been an issue […]"*
>
> *[Senior Fund Manager at investment management firm for indirect property]*

The reason for the low impact on fund performance may also be ascribed to the lack of depth of the market which does not allow executing orders with larger notional amounts to make it worthwhile for the fund. The notion of illiquidity and issues concerning the depth of the market are discussed in section 4.7.4.

In summary, the effort and impact relation seems to be related to the tradable volume in the market and does not constitute an influencing factor on its own. The necessary requirements to make a trade attractive and therefore improve the fund performance are discussed in section 4.7.5 where the pricing of property

derivatives is examined. Figure 4.6 shows the relation between the effort that is necessary to be undertaken in order to trade property derivatives, the low depth of the market that does not allow placing larger orders, and the resulting low impact on fund performance.

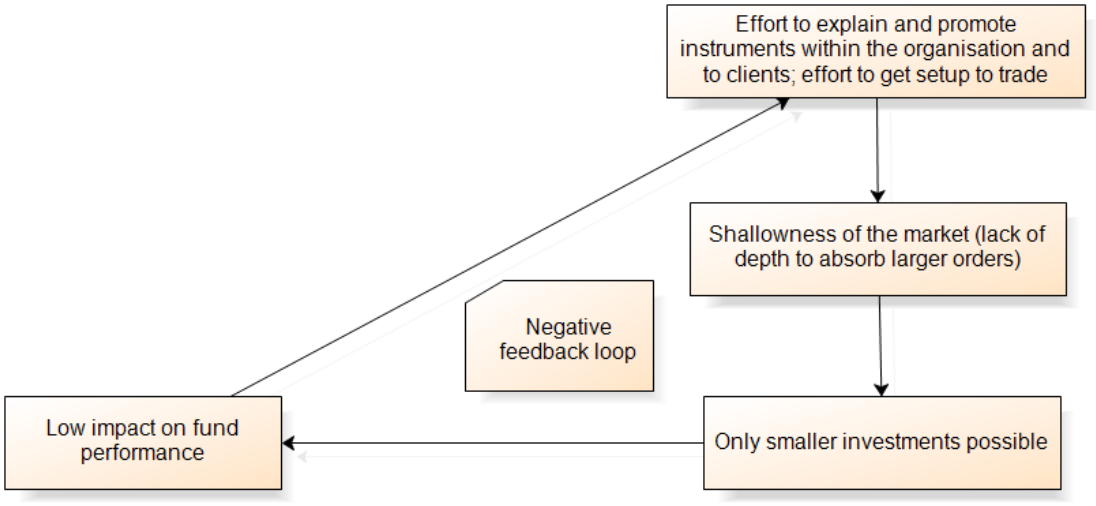


Figure 4.6: Disproportion between effort and impact of property derivatives on fund performance

### *4.6.7 Demonstrating Practical Competence*

The ability to demonstrate practical competence was picked up in interview no. 8 and refers to the relationship between the investment manager and the client (the investor). The interviewee said:

> *"Well I think, you see, their [trustees] trust in respect to the property asset class, has been built up because we have a competent, experienced, and proven team at running physical property. We can't demonstrate practical competence at trading property futures. So, there is a training competency issue that we would need to address with the trustees, so that they felt confident and comfortable."*
>
> *[Chief Investment Officer at investment management firm for direct property]*

The statement found some support in interviews no. 11, 24, 28, 29, and 35. A different approach was taken by the interviewee that is quoted below, which

seems to alleviate the problem associated with not being able to demonstrate practical competence in trading property derivatives.

> *"So, we're not selling a derivatives trading platform. What we're selling is, 'We think this is an opportunity to access some alpha in the next, say, nine months or 12 months'. So, all we need to be able to demonstrate in terms of the execution side is that we can execute a derivatives trade. We're not saying we're going to, you know, try and trade that minute to minute. So, for us it's not really something we sell to clients. We're just selling, you know, the fact that we can do them, we now have them, we have done them in the past, and we think there's a return opportunity."*
>
> *[Senior Fund Manager at investment management firm for indirect property]*

The statement above suggests that if an organisation is already trading other types of derivatives, clients may trust them more (and rely on their ability to handle derivatives positions more) than an organisation that does not have any in-house knowledge in this regard.

The limited breadth in which the practical competence issue was touched upon in the interviews and the diverse views on the topic, as the two quotes above show, lead to the conclusion that it is not a high-ranking factor that influences the propensity to trade property derivatives.

## 4.7 Market-Related Exogenous Factors that Influence the Propensity to Employ Property Derivatives

### *4.7.1 Introduction*

This section is one of four sections (Market-Related Exogenous Factors that Influence the Propensity to Employ Property Derivatives, Instrument-Related Exogenous Factors, Client-Related Exogenous Factors, and Value System-Related Exogenous Factors) that present the research findings on those factors that originate from outside the organisation. The exogenous factors are related to the following: the market, the instrument, the clients from investment

management firms, and the value system. But the findings presented in this section relate only to the market and comprise the following factors:

1. Structural Change in Property Derivatives Market Evolution;
2. Banks' Withdrawal from the Property Derivatives Market;
3. Notion of Market Illiquidity;
4. Pricing of Property Derivatives;
5. Importance of Market Actors; and
6. Homogeneity of Market views.

### *4.7.2 Structural Change in Property Derivatives Market Evolution*

The structural change that took place in the property derivatives market in the aftermath of the global financial crisis (2007-2009) is that of the withdrawal of the banks from the property derivatives market and that of the latter's transformation from an OTC market into an exchange-traded market. This issue of the structural change was addressed by more than 50% of the interviewees who discussed the role of banks in the market, the impact of regulations, or the market transformation and its perceived impact on liquidity levels.

The higher trading volume in the property derivatives market prior to and during the global financial crisis (GFC) is commonly attributed by interviewees to the involvement of banks as the two quotes below exemplify.

> *"[…] and in fact, when there was a swap market back in kind of 2007, 8, 9, it was banks trading most the time with each other. […] banks could run propriety positions […]"*
>
> *[Head of Property Derivatives at a bank]*

> *"[…] most of what we did was bank to bank. So, one bank would source a buyer and one bank would source a seller and we were buying the risk from another bank."*
>
> *[Executive director at capital advisory firm]*

The market was dominated by a so-called ring of banks (e.g. Deutsche Bank, Merrill Lynch, Morgan Stanley, and the Royal Bank of Scotland) trading mainly with each other in an interbank total return swap market. The market entry barriers for investors who wished to trade property derivatives in the OTC market were perceived by some interviewees[131] as being higher because investors had to sign ISDA agreements[132] with banks and they also had to set certain systems in place to handle the collateral management. This barrier has since been removed because there are no ISDA agreements necessary for exchange-traded derivatives.

Moreover, banks could take propriety positions before the GFC which became prohibitively expensive afterwards due to regulatory capital requirements. The banks' incentive to enter the property derivatives market was also analysed by the current research and is discussed in section 4.7.3.

From an end user perspective, one interviewee[133] explained that a drawback of this dispersed market structure of banks was that there was no concentration of risk takers and risk sellers which had an adverse impact on the depth of the market and did not allow investors to trade larger contract sizes (e.g. 350 million pounds and above).

The notional amounts of the contracts traded in the interbank OTC market were not very high with an average of £8.3 million according to trade data that was made available to the researcher by a broker active in the market at the time. The data show that most of the trades were based on the IPD UK All Property Annual Total Return Index. The associated contract durations varied between one and four years and had an average of two years. There were also residential property derivatives traded based on the Halifax House Price Index (HHPI). Figure 4.7 illustrates the maximum, minimum, and average notional values of all kinds of

[131] Mentioned in interviews no. 1, 6, 26, and 34.
[132] Usually, the parties involved in over-the-counter derivatives transactions use the standardised documentation from the International Swaps and Derivatives Association (ISDA). There is the ISDA master agreement which contains the general terms and conditions, and there is a trade confirmation, setting out the details of the trade. It was reported by the interviewees that negotiating all the details of the ISDA provisions is a time-consuming process.
[133] Interview no. 1.

property derivatives (swaps, options, funded notes, forwards, futures) which were traded by the broker's firm between 2005 and 2014.

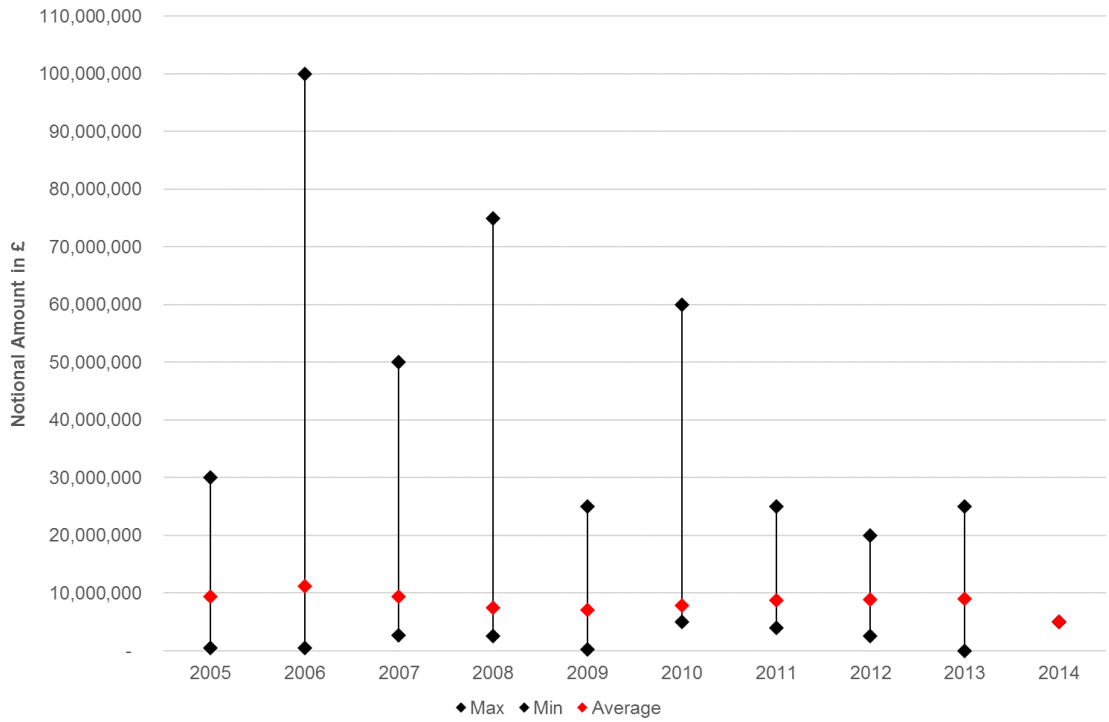


Figure 4.7: Maximum, minimum, and average notional amounts of property derivative trades between 2005 and 2014 for different instruments and underlying indices (Source: trade data made available to the researcher by a broker)

The figure above shows that the average notional amounts that were traded before and after the GFC did not vary to a great extent. The maximum notional amounts of trades after the GFC are lower than the ones before. A possible reason for this may be an increased risk aversion.

With regard to the trading volume of property derivatives, it is worth mentioning that two interviewees pointed out that the volume reported by MSCI-IPD was inflated due to double-counting of the notional amounts of a transaction (buyer and seller). This issue is explained in the two quotes below[134].

> *"[…] IPD released trade volumes and remember they're double-counted, everything is double-counted. So, if they*

[134] The double-counting issue seems to be the reason why MSCI-IPD make the following note in their property derivatives trade volume reports: "Note that the total estimate [of the total outstanding notional] is a sum of all market activity rather than the net matched notional position as it is not yet possible to cross-link inter-bank trades." (Source: IPD/IPF UK Trade Volume Report, Derivatives Traded on MSCI's IPD Indexes reported to end of December 2016, Reported on February 2, 2017).

*said there were a billion in derivatives, it was only 500. […] Because the bank would disclose, 'I have got a billion long' and another bank would say, 'I have got a billion short'. So, it was a one billion contract but when they added the total, it was two."*

*[Executive director at capital advisory firm]*

*"[…] there's a lot of double counting, so, let's say you did a trade with party, let's say you're bank D, you did a trade with counterparty A, on a hundred million and then, in turn, you turned around and traded not with counterparty B, but you traded with bank E, and bank E split the trade into two parts and they traded with a reinsurer, who then again traded with fund F. People were counting every leg of every trade. So, the numbers weren't inaccurate, but they were definitely, I think, reported to make it look as if the market was bigger than it was […]"*

*[Former Head of U.K. Insurance and Pensions, managing director at a bank]*

There is the perception among interviewees that banks stopped facilitating liquidity with the onset of the global financial crisis in 2008/2009 which is the perceived reason why trading volumes started to decrease and the market dried up considerably as can been seen in Figure 1.1 on page 2 in Chapter 1.

A common view of interviewees is that increased regulatory capital requirements for propriety derivative positions have led to banks leaving the market because trading has, as a result, become less attractive. The quotes below demonstrate the link perceived by interviewees between the banks and the provision of liquidity in the property derivatives market, on the one hand, and, on the other, the link between regulations and the withdrawal of banks from the market.

*"[…] the banks were regulated out of this space. There is no market making capacity."*

*[Director at a property derivatives brokerage firm]*

*"[…] when the banks stopped facilitating that liquidity, the market died. And that's when liquidity volumes dropped off."*

*[Managing director at fintech firm]*

> *"[…] they're [the banks] hamstrung because they can't then use the capital on their balance sheet for more shall we say, risk, risk bearing ventures which could include making markets in this type of instrument [property derivatives]."*
>
> *[Researcher at investment management firm for direct property]*

The banks' view on this topic is slightly different and is discussed in more detail in section 4.7.3.

Before leaving the property derivatives market, banks were able to make the market on their own and provide prices to interested clients. In the absence of a counterparty, they could hold a position (i.e. warehouse risk) in their books until one was found. This "warehousing" role changed in the aftermath of the GFC and it is no longer possible due to tightened regulatory capital requirements which require holding extra capital for each leg of the trade. As a result, it has become prohibitively expensive for the banks to warehouse risk.

A critical comment was made by an interviewee[135] with regard to the capital relief that banks do not get for hedging their loan book. According to the Basel III regulations, capital relief can only be granted if a loan has a specific good hedge. It is, therefore, not possible to hedge market risk and get capital relief. A hedge must be against a particular asset, such as a building which entails a very low hedging effectiveness due to the low correlation between the index returns and the returns of an individual building (see also Table 4.7 on page 208).

Aggregating buildings into a portfolio and then hedging the latter using a property derivative does not entitle the bank to get capital relief. To the contrary, the derivative position would require additional regulatory capital in addition to the capital requirements for the loans. The interviewee suggested that the bank ought to able to sell this risk to the fund management industry which is an inherently long-only industry.

[135] Interview no. 19.

This argument was supported by another two interviewees who are quoted below. The central statement is that the hedge position requires additional capital when a capital relief is not admissible.

> *"So, if you had 100 million long, let's say the bank had to hold 6% capital, they had to have 6% capital against that. If you put on a 100 million hedge to take off that risk, you have to put another 6% in capital down. Whereas you would say, 'I should have closer to nought', you know, you are going to have basis risk between your loan portfolio and the index, but it shouldn't be 12%. You shouldn't get twice the capital cost. You would expect it to be 3 and that would have worked, and it would have worked for society."*
>
> *[Executive director at capital advisory firm]*

> *"If you could trade synthetic risk on an individual building or specific portfolio and actually you would get capital offset but when you look at a bank's portfolio as a whole it might be fairly highly correlated and diversified along the lines of the index but if you hedge the index, if you hedge the risk with the index, you don't get the benefit."*
>
> *[Managing director at fintech firm]*

With Basel II and III the Basel Committee on Banking Supervision developed a set of reforms which require banks to increase their capital strengths and liquidity coverage ratios in order to ensure capital resilience in times of financial stress. The reforms also concern the capital requirements for counterparty credit exposures arising from banks' derivatives activities (BIS, 2011). Moreover, the reforms provide "incentives to move OTC derivative contracts to central counterparties [CCP], thus helping reduce systematic risk across the financial system" (BIS, 2011, p. 3). In addition, since 2012 the European Market Infrastructure Regulation (EMIR) requires "that eligible OTC derivatives between covered counterparties are cleared through an CCP [central counterparty] registered in Europe" (Gregory, 2014, pp. 48-49).

Regulatory push towards the exchange has also had an impact on the property derivatives market. Interviewees explained that property derivatives trading activity has been pushed to the Eurex[136] where capital charges for investors are

[136] Eurex launched property index futures as standardised products in the first quarter of 2009.

lower than in the OTC market due to the reduced counterparty risk. However, since the banks have left the market there are no longer any facilitators present. The market has turned into an end user market in which buyers and sellers negotiate the price and determine the market liquidity.

In the exchanged-traded market, there are two ways in which property index futures can be accessed. One way is through a broker and the second one is to post price and volume of a position on the exchange screen through a clearing member, which is the cheaper option because it does not incur brokerage fees. The more promising way, however, seems to be via a broker based on the evidence from three exemplary interviews shown below.

> *"The best form of liquidity in the market is now through the broker market where they in fact try and match trades up. So, what they're doing is effectively trying [to] work out who wants to buy and who wants to sell and then trying to close the price, so the trade can happen."*
>
> *[Non-executive director at a stock exchange]*

> *"Well, I don't think anyone's really looking at the screen on a daily or weekly basis. So, the best way seems to be using the brokers."*
>
> *[Fund analyst at investment management firm for direct property]*

> *"[…] say I've got a billion to do or something, what am I going to do? Put an order in for a billion on the exchange and then wait to see whether somebody sells it to me? It's never going to work that way. So, interestingly, the way in which this has manifested itself is almost, in fact not almost, I would say absolutely all of the business is negotiated over the counter and executed on exchange."*
>
> *[Investor Relations/Fund Manager at investment management firm for indirect property]*

The brokers try and match trades by bringing counterparties together who want to transact in a derivative. Before the trade can happen there needs to be agreement on the price which is reached through negotiation. Once a deal has been agreed upon conceptually between the parties, one party puts it into the exchange system and the exchange waits for the other party to come in. A

principal scheme of the relationship between the counterparties, the exchange, and the broker is provided in Figure 4.8.

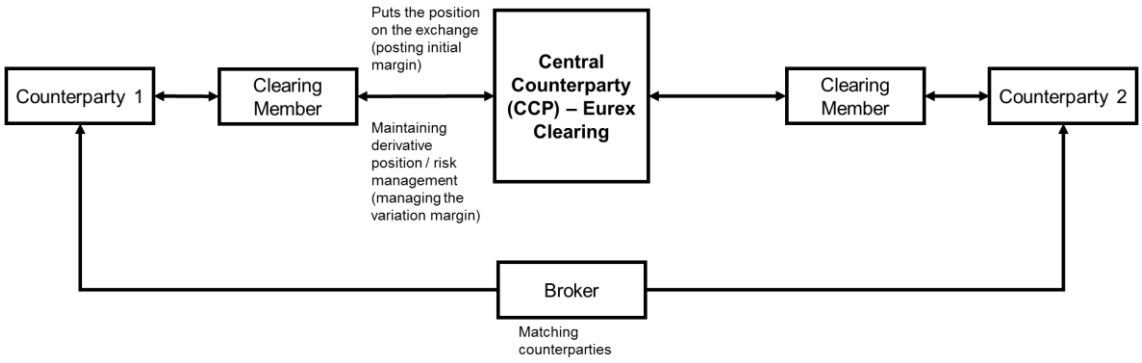


Figure 4.8: Accessing property index futures

The trade then receives a reference number and appears as a block trade. This means that no bid or offer was put into the exchange systems before, it was all negotiated between the counterparties. A special feature of the current property derivatives market is that the trades are negotiated between the counterparties and executed on exchange, which causes the perception of non-transparency in terms of pricing (pricing is discussed in more detail in section 4.7.5).

The only way to get a view on current pricing is through a broker. That is the reason why the prices on the exchange are not necessarily the ones at which the market is willing to trade because the trade price needs to be negotiated. If the end user is interested in trading property derivatives (s)he needs to approach a broker and enquire as to the price and volume at which another market player would be willing to trade or reveal their own price and volume expectation of the trade. One practitioner said in this context:

> *"Brokers do not go out there and create prices for you. You have to turn up and you have to say, 'This is what my price is' which means that now the property guys have to come up with what they are willing to pay."*
>
> *[Investor Relations/Fund Manager at investment management firm for indirect property]*

However, the brokers do not only focus on matching counterparties. As explained in a quote from a broker below, they spend a great deal of their time providing information and education to the market with the aim to attract more investors.

> *"We're brokers but we spend 2% of our time broking deals and 98% of our time building the market. Educating. […] we call people, we give educational programs, we go into companies, we talk to them, we advise them about how they could use the products. We help them get set up to trade. You know, we do everything we can to get people into market."*
>
> *[Director at a property derivatives brokerage firm]*

In the current market conditions, a seller and a buyer have to be found who have matching investment objectives. This is different compared to the time when banks were still active in the OTC market because they could take a trade on and warehouse the risk in the meantime until the second counterparty was found. In the new market setting, the seller and the buyer are not price takers per se, the price needs to be negotiated between them. Notwithstanding the facilitating role of the broker in the market, there is no guarantee that a second counterparty to the trade will be found as the following two quotes indicate.

> *"[…] now there is no one to facilitate activity, there is no liquidity. […] there are just not enough people looking at it to get involved."*
>
> *[Managing director at fintech firm]*

> *"[…] but the price formation is now done away from them [from the banks]. But unfortunately, it's quite hard for the buy side to do price formation because if you say to someone, 'Where would you sell two years' interest in property?', they go, 'What would you pay?'.*
>
> *[Non-executive director at a stock exchange]*

The transformation of the property derivatives market into an end user market entails two issues for practitioners as the interview data show. The first concerns the transparency of the market with respect to pricing, and the second issue concerns a perceived concentration of risk with only one brokerage firm being active in the market. Practitioners said in this regard:

*"[…] so, there is a risk committee here, right. And they come out of, 'Well, who can make the market for us?'. They say, 'Is there concentration risk in only having one real broker on the market and one bank that's trading?'. And that's a valid point."*

*[Fund Strategist Real Estate at investment management firm for direct property]*

*"[…] they are the main party connecting everyone at the moment and they are the only party connecting everyone at the moment, so there's, you know, a bit of a concentration there."*

*[Fund analyst at investment management firm for direct property]*

*"Arguably, you need more brokers in the market as well. The market, at the moment, is really, I think, from my understanding, there is really one broker. […] From a due diligence pricing perspective, that throws up some issues if you're doing your due diligence, if you're doing your price reviews at the end of a quarter or a year, or whatever it may be, if you've only got one broker you've got nobody else to comp[are] it to."*

*[Researcher at investment management firm for direct property]*

In summary, analysis of the research data shows that there is a perception among practitioners that the illiquidity in the market is caused by the withdrawal of banks from that market. The market has been transformed from an OTC interbank market into a peer-to-peer market where buyers and sellers currently need to negotiate the trading price which is unusual for an exchange-traded market. Since potential investors cannot readily access pricing data, they are critical of the current market structure with only one active brokerage firm which poses a concentration risk for them. Overall, the structural change in the property derivatives market and its impact on the end user, as discussed before, can be considered a factor with high explanatory power.

### *4.7.3 Banks' Withdrawal from the Property Derivatives Market*

As discussed in the previous section, one of the perceived reasons for illiquidity in the property derivatives market is the withdrawal of the banks from the market. A frequently made comment by interviewees, with non-banking professional background, was that the tightened regulations in terms of regulatory capital requirements have pushed the banks out of the market.

In order to understand the role of the banks in relation to market illiquidity, in-depth interviews were conducted with six representatives of banks which were active in the OTC market. They were able to give accounts of the motivations for the banks' involvement in the property derivatives market, the mechanism of warehousing risk, the role of regulations, and the influence of user demand on the banks' business activity in the field of property derivatives.

When interviewees with a banking background were asked about incentives for banks to get involved in property derivatives trading in the first place, and why the market was tapped, they unanimously explained that the incentive was to generate profits as the quotes below demonstrate.

> *"Well, the incentive is the same as any other product. You get a bid offer, so the banks are making money on the bid-offer spread."*
>
> *[Former Director Rates Sales at a bank]*

> *"So, they [the banks] wanted to try and develop a market, because then they could make money from it."*
>
> *[Former senior director at a bank]*

> *"Desire to make money."*
>
> *[Former Head of U.K. Insurance and Pensions, managing director at a bank]*

> *"It's just to make money!"*
>
> *[Former Senior Trader Property Derivatives at a bank]*

One interviewee[137] dilated on this topic and explained that there were basically two ways of generating profits for the bank from trading property derivatives. The first and more profitable one was to sell a position to a client and to warehouse the position with the expectation that the position would appreciate in value over the next three to six months. For an unhedged trade, the capital charge would be much larger. Therefore, the spread the bank was charging needed to be sufficient to pay for the capital that was consumed. The second option was to sell one position to a client and an offsetting position to another with a spread between the two that remained with the bank (less profitable but also less risky). Another interviewee[138] pointed out that even if the offsetting position was sold, it was not a risk-free profit because the bank was exposed to conditional credit risk from the two counterparties. Moreover, the bank is required to hold capital against the risks it puts on.

Often, the problem was that the offsetting position could not be sold immediately because of the difficulty in finding a counterparty that suits the contract term and size. Therefore, the banks had to keep positions on their books. It was necessary to warehouse risk in order to provide a certain degree of flexibility for clients. Moreover, traders were allowed to keep an inventory of positions which changed with the GFC. One interviewee said:

> *"[…] in 2007, traders would be allowed to hold a fairly large inventory and it would help them manage liquidity and allow them to trade, even without having to find the other side."*
>
> *[Former senior director at a bank]*

The reasons mentioned by interviewees for the banks' withdrawal from the market are threefold. The first reason is that the demand from end users dropped starting with the onset of the GFC in 2007 due to an increased risk awareness and other problems such as redemption requests from property fund investors. The second reason is that banks were trying to reduce risks and save costs which meant the closure of unprofitable property derivative desks. The third point (which is linked to the second one) is the increase in regulatory capital requirements necessary for derivative positions and which requires larger spreads to cover the

[137] Interview no. 38.
[138] Interview no. 36.

capital consumptions; with larger spreads, pricing becomes less attractive for end users. The quote below summarises these three points quite well.

> *"The clients after the global financial crisis were fighting their own fight, so they weren't looking at necessarily new products like derivatives, they had their own problems to deal with in their own funds, so things like property derivatives got shoved to the side. Hence, volumes after the global financial crisis dropped off, combined with regulation, combined with just the normal targets by the banks. So, you can now see why a lot of banks post-global financial crisis just pulled out because the bottom line is there was no money to be made out of property derivatives for the banks anymore."*
>
> *[Former Senior Trader Property Derivatives at a bank]*

Other interviewees shared the view that not only the regulations are responsible for the withdrawal of the banks from the market. The majority of professionals with a view from the banks perspective pointed out that there is a combination of viable reasons, of which tightened regulations are not necessarily the most important. The main reason seems to be a combination of increased risk awareness of banks and a low end user demand which did not justify maintaining costly property derivatives trading desks. The four quotes below provide accounts of the perceived role of regulations, the increased risk awareness, and the impact of end user demand.

> *"I think it's a combination of them and I'm not actually sure exactly which ones are the major. So obviously, banks are being forced to recapitalise, but there are a number of factors. […] I don't really know, though, it's a number of different regulations that combine, but obviously the banks, as well, are more cautious than they were before the credit crisis and not just because the regulator is telling them to be, but because they are, because of what happened."*
>
> *[Former senior director at a bank]*

> *"[…] I read histories of the property derivatives market, or articles, which talked about it, and the last point they say is, 'Oh, yes, and regulation came along and made everything more expensive.'. That's sort of true, but it's a very second or third order. […] Just saying, 'Oh, yeah, yeah, and regulation killed it.'. No. No. It didn't. If there had been enough demand, they were very profitable trades […] all regulations does is, unless it bans something outright, it*

*normally just increases the amount of capital you need to hold. If you need to hold 50% more capital, then if you can make 50% more profit, well then actually your return on capital stays the same. So, I don't think it was regulation that affected the market at all. I think it was fundamental flaws of lack of liquidity and underlying and lack of demand from end users."*

*[Former Head of U.K. Insurance and Pensions, managing director at a bank]*

*"It's hard to be specific on it. […] because obviously, each time you do a trade you have to hold a certain amount of capital against the trade. The amount of capital was fine, so it wasn't the regulation... well it wasn't even that, it's more the risk functions in the bank. The risk functions are saying, 'Look guys, you're holding that position for in excess of 90 days, why are you doing that? Shall we get rid of it now at whatever price?'. We would hold some positions for six to nine months, or even longer at times. So, that ability to hold positions and then on-sell it or on-buy it if you're on the other side of it, is made a bit more difficult.*

*[Former Senior Trader Property Derivatives at a bank]*

*So, where the market would stand for a bank if they were still involved, in that essentially it just comes down to what they call back-to-back trading where you line up both buyer and seller simultaneously. […] But it's actually quite a difficult thing to do. […] It's a combination of [things], ultimately driven by clients. […] Whilst there's regulation and things, there's flexibility enough to still do things that make sense and are profitable, but it's got to be client-led."*

*[Former Senior Trader Property Derivatives at a bank]*

The last quote indicates that banks could still engage in trading if the end user demand was there and it would be possible to line up both buyer and seller simultaneously. The lack of end user demand was mentioned frequently[139] as exemplified by the quotes below.

*"So, if the clients are not saying we want to use these, then the bank is not gonna consider it a priority. It's all driven now, as it should be, by what we are doing to help our clients. […] So, there is quite a few things that need to*

[139] Mentioned in interviews no. 6, 33, 34, 36, and 38.

*change but it needs to be driven by the people who should be using these."*

*[Head of Property Derivatives at a bank]*

*"Because the demand simply dried up. After the financial crisis, the market just collapsed. […] the volumes didn't simply drop by 20 or 30%. They disappeared. […] It was strictly demand. And if that demand were to pick up again, I'm sure we would be willing to participate in such a market. […] Well, it's demand-driven […]"*

*[Former Managing Director Property Derivatives at a bank]*

*"Demand. I mean banks exist to make money. They raise capital and then they look for attractive trades to do. If there was a demand, banks would be doing business. We […] set up a property derivatives trading desk, put eight people on it, worked at it for two years, and didn't do any convincing trades and shut it down. There was just a lack of demand. […] So, I think from a bank's perspective, there wasn't the client demand and it wasn't really big enough. Had there been the client demand and the growth had been there, then, I think the market would still be around."*

*[Former Head of U.K. Insurance and Pensions, managing director at a bank]*

*"The smaller issue for property derivatives is probably the regulation. The bigger issue is more the clients. Once they started to dry up then the market started to dry up and banks just couldn't make the money anymore."*

*[Former Senior Trader Property Derivatives at a bank]*

The views expressed above are contrary to what is perceived by the potential end users as discussed in section 4.7.2. They believe that banks were pushed out by the increased capital requirements but that is only a part of the banks' real motive for turning their back on the property derivatives market.

The lack of demand was explained by one interviewee with the remit of the fund manager which is to deploy capital in real estate that was allocated to this asset class within a wider asset allocation strategy. The investments usually have a long-term horizon and therefore have no need to use property derivatives.

In summary, the reason for the withdrawal of the banks from the property derivatives market, which is commonly cited as one of the main reasons for the illiquidity in the market, seems to be a combination of three factors that are interconnected. The first one is the lack of end user demand to use the instruments. This leads to the second point which is an increased focus of banks on reducing risks and costs. With no demand, there is no justification to keep trading desks operating. This situation is exacerbated by increased regulatory capital requirements. Therefore, it cannot be stated that banks are accountable for the illiquidity in the market. The reason is with the end user and their demand (or lack thereof) to use the instruments.

### *4.7.4 Notion of Market Illiquidity*

In order to better understand the notion that real estate investment managers have of market liquidity in the context of trading property derivatives, interviewees were asked what their perception of liquidity is and when would illiquidity become a problem for them.

In this context, interviewees used the terms “chicken-and-egg” or “catch-22” quite frequently[140] to describe the cause-effect relationship between the liquidity in the market and the propensity to trade property derivatives.

A common definition of liquidity evoked by interviewees is that liquidity in the market enables them to execute trades on a timely basis. In other words, it enables them to buy and sell a derivative position of a certain volume, when needed, at a price close to what they consider to be the fair value. If the price must be moved too much or if no counterparty can be found, then the market is considered to be illiquid. The quotes below provide two examples of their definition of liquidity.

> *“So, the definition for us, for liquidity, is that we can buy or sell at the price that we think is good for us, anytime.”*

[140] Either one or the other of these terms was used in interviews no. 1, 4, 5, 6, 9, 10, 11, 14, 17, 19, 20, 24, and 40.

*[Group Corporate Finance Manager at property development and investment firm]*

*"Liquidity is all about unwinding it if it starts going wrong, and at what cost you would have to do that."*

*[Property fund manager at investment management firm for direct property]*

Another feature of liquidity that was described by an interviewee was daily pricing of the positions held. For others, liquidity implied the ability to trade weekly or at least monthly in sizes, without affecting market prices as the quote below shows.

*"[…] but it would have to be enough that you could trade several million without moving the market quite easily. So, that would mean market volume in hundreds of millions a week […]"*

*[Global Investment Strategist – Property at investment management firm for direct property]*

When it comes to quantifying the required liquidity in terms of volume and clip size, interviewees have quite dispersed views, due to the various sizes and the liquidity requirements of their funds or investment vehicles (e.g. REIT). The table below summarises these views.

| Interview no. | Comment |
|---|---|
| 7 | Monthly or at least quarterly trade volume of 100 million pounds |
| 9 | 250-300 million pounds trade volume per year |
| 12 | Clip sizes of 250-300 million pounds |
| 12 | Being able to trade 3-5% of the fund size which is 2.5 billion pounds, i.e. 125 million pounds |
| 14 | Clip size of 100 million pounds (REIT) |
| 17 | One billion pounds trading volume per day |
| 21 | Clip size of 15-20 million pounds |
| 32 | One billion over a certain period in a sub-sector trade (e.g. shopping centres) |

Table 4.4: Answers to the question "When do you consider the market to be liquid?"

A commonly held view by interviewees is that the lack of liquidity in the property derivatives market prevents them from participating in this market which, in turn, maintains the illiquidity. Interviewees said:

> *"[…] until the market is developed, mature, and operates smoothly, people won't necessarily be interested in using it […]"*
>
> *[Senior investment consultant at capital advisory firm]*

> *"[…] because there's no liquidity and we have no confidence about it, therefore we don't do them [property derivatives] and therefore there's not much of a market."*
>
> *[Head of Investment at U.K. REIT]*

In other words, sufficient volume is considered as a perceived pre-condition for using property derivatives. The lack of liquidity makes it more difficult for investment managers to communicate investment ideas in-house with the board or investment committee[141] because they cannot base their analysis on trade data, as there are almost no trades. Liquidity is a decisive factor as discussed in the subsection on the decision-making process.

Behind the required liquidity stands the desire to enter and exit trades when necessary. This implies the desire of control over timing when trading property derivatives. One interviewee said:

> *"We certainly worry about the capacity to execute on a timely basis. So, we don't want to be in a long queue where we may or may not be able to access."*
>
> *[Chief Investment Officer at investment management firm for direct property]*

The ability to close out a position received special attention in the interviews. The main concern that interviewees[142] have in this regard is their inability to close out a position prior to maturity.

> *"It's about liquidity, so you've got to be able to get out."*

[141] This issue was mentioned in interviews no. 10 and 20.
[142] Mentioned in interviews no. 4, 6, 9, 13, 14, 15, 20, 29, 32, 39, and 40.

*[Group Financial Director at U.K. REIT]*

Not being able to close out a position when necessary, creates a lack of willingness to embrace the instrument as the quote below demonstrates.

> *"To have confidence in any kind of exchange-traded instrument, you need to have confidence that there is true market-making going on. And that therefore, when you need it the most, i.e. when you need the liquidity, you need to be able get it, to sell out the position, there is doubt. And as soon as there is doubt, then there is a lack of willingness to embrace them as vehicles, or instruments rather."*
>
> *[Head of European Real Estate at investment management firm for direct property]*

Another issue in this context is the concern that in order to get out of a position the price would have to be lowered too much, to the disadvantage of its holder as the two quotes below demonstrate.

> *"What you don't want to do is be holding it in your fund hundred, and you say, 'this is my liquidity bucket; I'd like to sell it in a week', 'well, we can only get you seventy-five', and you think, 'well, I'd be out of cash, because I've just wiped out any performance I've had, for liquidity'."*
>
> *[Head of U.K. Property Pooled Funds at investment management firm for direct property]*

> *"The liquidity is attractive, but if the price has fallen because that's where the market is and it's very liquid but the price is lower, it doesn't really help me, I'm still not going to want to sell if that's what I'm faced with, unless I need to get out because I need the money for something else."*
>
> *[Chief Investment Officer at real estate private equity fund management firm]*

Moreover, past experience[143] from the GFC showed that there was no willing buyer in the market when the property market was in decline, which ties in the homogeneity issue which is discussed in section 4.7.7.

Determining the potential exit value and having a track record of past liquidity is important for investment managers because it gives them an indication of the

[143] Mentioned in interview no. 4.

riskiness of their position. If it is not possible to determine the costs of closing out a position, uncertainty would be created which will, in turn, have an adverse impact on the propensity to trade.

Some interviewees[144] perceive that the property derivative positions become equally illiquid or even more illiquid than physical real estate if no counterparty can be found in the market and the position can therefore not be closed out prior to maturity. This becomes an issue if the invested capital is needed for either buying physical properties or paying fund redemptions.

One interviewee[145] had a more critical view on how investment managers view liquidity and the associated costs. He believed that liquidity came at a cost and it was certainly not for free. Moreover, he considered the combination of liquidity from a derivative and the high returns from physical real estate impossible. One has to be sacrificed. He argued:

> *"You cannot guarantee liquidity of anything. It will become more illiquid when you most need liquidity, that's how liquidity works. The other thing that people misunderstand is they think you get liquidity for free and of course you don't. Property has an enormous premium in its returns because of its illiquidity. If you can produce something that mimics property returns but in a more liquid form, that has a different risk premium. It therefore will have a different return. It won't give you the same high return because how can you be rewarded for the illiquidity if you don't have the illiquidity?"*
>
> *[Investor Relations/Fund Manager at investment management firm for indirect property]*

It is worth mentioning that there are some interviewees[146] who came to terms with the illiquidity of the market and the difficulty to close out a position prior to maturity. They hold the position to maturity, so the liquidity on exit does not play a role for them because the contracts are guaranteed cash-settled. One interviewee said:

> *"So, because they're so illiquid, we treat all our transactions as hold to maturity. So, we might be able to sell them or*

[144] Interviews no. 10, 15, and 21.
[145] Interview no. 19.
[146] Interviews no. 9, 18, and 26.

*close them out beforehand, but our view is we treat it as if we can't because you don't know, there's no guaranteed liquidity in it until maturity."*

*[Fund analyst at investment management firm for direct property]*

Another point that came up in the interviews was the shallowness of the market which constitutes a limitation for larger funds because they require usually larger trade positions. Practically, they are not able to trade the volume that they need.

*"You know, we're not gonna execute a trade for a small amount because of the time that it takes, and the effort doesn't make sense."*

*[Fund Strategist Real Estate at investment management firm for direct property]*

Some of them therefore show no interest:

*"[…] the depth of the market is too shallow really to be of a huge matter of interest […]"*

*[Senior investment consultant at capital advisory firm]*

The lack of depth is even worse at sector and sub-sector level where there is virtually no liquidity at all which limits their usefulness.

In a nutshell, the lack of liquidity curtails the range of applications that motivate real estate investment managers to use property derivatives. Among their chief concerns is the liquidity on closing out a position prior to maturity. Moreover, the shallowness of the market does not allow placing larger volumes of trade. This constraint excludes the larger funds[147] from the group of potential users.

The lack of depth and uncertainty of the costs of closing out a position, severely limits their usefulness for purposes such as mitigating cash drag. In the same vein, with the virtual absence of liquidity at sector and sub-sector levels, it becomes very difficult for investors to make meaningful use of this market. It can be argued that these issues have a high explanatory power as to why property investment managers do not use property derivatives. The first quote below

[147] According to the AREF/IPD Property Fund Vision Handbook from Q3/2016, the average net asset value of the 55 monitored funds is 1.1 billion pounds.

addresses liquidity as a trading condition. The second quote exemplifies the reduced usefulness of property derivatives for mitigating cash drag. The last quote addresses the limited usefulness for sector trades.

> *"That's what you use derivatives for, you want to go long or short. And if you can't do that at the time you most need to go long or short, which by definition is going to happen if there isn't liquidity in the underlying instrument, then it's going to prevent you using them."*
>
> *[Head of European Real Estate at investment management firm for direct property]*

> *"The main issue we've got is, let's say we decided to use it as a cash drag tool, when we invested in the underlying real estate we would want to immediately unwind the position and if you're in an illiquid market and you've got it in to mitigate cash drag and you invest in underlying real estate if you can't unwind that position, then you now end up in a geared exposure to the market when originally it was supposed to be a hedge against cash drag."*
>
> *[Funds Development Director at investment management firm for indirect property]*

> *"[…] if there were property derivatives there I would use them; there aren't in sufficient granularity and liquidity and availability to make it worth my while."*
>
> *[Group Financial Director at U.K. REIT]*

A side effect of the low liquidity is a reduced transparency on pricing which is discussed in section 4.7.5.

### *4.7.5 Pricing of Property Derivatives*

The pricing of property derivatives has received considerable attention in the literature. It was also central in the conducted interviews. In order to identify the challenges facing practitioners, interviewees were asked what, in their view, were the issues with regard to pricing property derivatives. Moreover, they were asked what information they infer from the derivative price.

Analysis of the interview data shows that four issues were addressed by interviewees which will be discussed succinctly in this section. The first issue concerns the reason for the perceived difficulties when pricing property derivatives. The second concerns market transparency and access to pricing data. The third is related to two different schools of thought on how to price the instruments. The fourth and last issue is encountered when determining the fair value of a derivative position, that is, in case it has to be sold under current market conditions (i.e. mark-to-market).

**(1) Reasons for the perceived difficulties when pricing property derivatives**

Concerning the question about perceived issues when pricing property derivatives, interviewees pointed out that pricing in this context is a difficult task since the index has a temporal lag and it is not investable. The latter feature inhibits the replication of the derivative position and the use of risk-neutral pricing to determine the fair value of the future. The most common comment concerned the fact that the index cannot be bought or delivered[148]. Since the index lags up to three months when the quarterly index is used, the current index value needs to be estimated by the investor taking a derivative position. One interviewee said in this context:

> *"You almost have to know where you think the market is now before you price this."*
>
> *[Non-executive director at a stock exchange]*

The issues perceived in relation to the index are discussed in detail in section 4.8.2.

**(2) Market transparency**

The second issue that came up in the interviews concerns the perceived lack of transparency around pricing because the prices published by the Eurex are not necessarily the current trade prices. The reason for that is the lack of liquidity in the property derivatives market and the price negotiation process in the peer-to-peer market. Since trades do not happen frequently, the price information from

[148] This issue came up in interviews no. 1, 2, 3, 33, 34, and 38.

the exchange may be stale and not reflective of the price movement and volatilities in the underlying market.

> *"[…] if you go on to Bloomberg what you see isn't what you gonna pay."*
>
> *[Fund Strategist Real Estate at investment management firm for direct property]*

When practitioners complain about market transparency they usually refer to access to pricing data and trading volume, both of which are displayed on the Eurex webpage or on the Bloomberg terminal. Due to the infrequent trades on the Eurex the price information, which is publicly available, provides only an indication as to the current price levels.

> *"Pricing, for example, doesn't exist. You can't go on to Bloomberg and get a pricing. And if you do, it's really accurate? So, this is the issue, […] we might say, 'Ok, well, the pricing is 5%.' but then when you go to trade it it's higher or lower and it's different than what you expected and so. And you having to go to investment committee or clients for this discussion and the pricing is ... you can never get a firm view on pricing, it is difficult."*
>
> *[Fund Strategist Real Estate at investment management firm for direct property]*

The intermediary function in the market is performed by brokers who facilitate price negotiations and the price formation by bringing different end users together. A current anomaly of the exchange-traded property derivatives market is that parties need to negotiate and agree on a price before they can put it on the exchange through their clearing banks. The negotiation procedure that this entails creates a certain non-transparency until the moment the exchange updates the derivative prices. The infrequency with which this happens results in a price trend that remains constant for considerable periods of time (i.e. months) and then spikes once a trade goes through the exchange systems.

The perceived lack of transparency leads to uncertainty as to where the current trade price might be. This means that the interested end user needs to enquire actively about the price, preferably via a broker.

> *"We're a bit blind on pricing, you don't really know what it is, but we have an idea of what we might like to pay and*

*then we'd go to the brokers and they, you know, see if that's possible and then there might be a negotiation on price and try and find another side."*

*[Fund analyst at investment management firm for direct property]*

Prior to their withdrawal from the market, banks were providing prices which made it easier for investors to obtain this information. The change in the market has contributed to the perception of non-transparency as the following quote demonstrates.

*"In some ways the shift away from banks acting as market makers has made it harder, because you don't get that kind of regular pricing. In the past […] banks acted as market makers and you'd see the pricing for each of the sectors on a regular basis. Now, you're just relying on brokers and intermediaries to say, 'Okay, this is the position I want to hedge or something, can you find me a counterparty? What sort of pricing might we get?'. It's much less transparent now than it was previously."*

*[Senior Fund Manager at investment management firm for direct property]*

**(3) Two schools of thought when pricing property derivatives**

The third issue that was addressed in depth by interviewees concerns the pricing of property derivatives and the choice of the right pricing model. The pricing issue received considerable attention, similar to the debate in the academic literature.

*"Nobody, I think, has ever got a handle on pricing."*

*[Former Senior Trader Property Derivatives at a bank]*

In the data, gathered by the current research, there appear to be two schools of thought. In order to define the differences between the two schools, interviewees were asked what information can be inferred from the property index futures price.

One school of thought, which enjoys great popularity among practitioners, uses a forward-looking approach and views current property futures prices as the market's expectation of total return values at the maturity of the corresponding

futures contract. Pricing is, thus, viewed as a stream of cash flows which is dependent on how the MSCI-IPD index settles. According to this approach, the current value of a property futures position is the year-to-date total return performance plus the expectation for the remainder of the contract period. Due to the fact that the income component of the index is relatively consistent, the pricing of a property index future starts at the index income level.

> *"With the property index, the IPD, you don't have a spot index, so the actual derivative is always going to be a forward-looking view as to what IPD is going to achieve."*
>
> *[Former securities broker at brokerage firm]*

The second school of thought, which is less commonly encountered, argues that the property futures price is not an expectation of the index performance in the future.

> *"It's not forecasting anything, but what it is telling you is something much more interesting than a forecast. It's telling you things about where the market currently is."*
>
> *[Investor Relations/Fund Manager at investment management firm for indirect property]*

Rather, it has to be calculated (as with any other asset class) as the spot price plus the cost of funding. In addition, one needs to consider the effects of the lagged index – which make the spot price not immediately visible – and the liquidity differences between property and the synthetic instrument (and some other minor effects). The key message of the second school of thought is expressed in the following quote.

> *"So, say it's [the MCSI-IPD index] done 5% so far, you should expect to pay 105 for the future today and then whatever happens after that is risk and therefore you deserve all the return. But what you find is, that 105, people compare it with the IPD and maybe what they end up doing is they end up paying 107. Some people will say that means that I've got an expectation of another 2% growth in the rest of the year and it's not, it's not the forecast, it's the 2% of extra growth has happened, it's just not been published yet. […] It's the only way you actually ever get to a point where you can use ordinary derivatives theory and apply it to property derivatives. And it works because nobody else has a derivative based on a lagging index. You never base your*

*derivatives on a lagging index, where you can't see what's really happening. That's caused all sorts of problems."*

*[Investor Relations/Fund Manager at investment management firm for indirect property]*

The argument is that if the futures contract was priced based on expectations and the expectations pan out exactly, the return for having taken market risk would be zero, which would not be a fair compensation for the investor. According to this view, the buyer of real estate market risk should be compensated for taking that market risk, but since (s)he is holding a more liquid instrument[149] than the illiquid physical property, (s)he needs to compensate the seller for the difference in liquidities. The liquidity premium is asymmetric which means that in a bull market, investors would be willing to accept a lower return for entering the market. Conversely, in a bear market, investors would be willing to sell at a discount to close out their position. It is primarily the valuation of liquidity that causes the property derivatives market to price differently from fair value. Hence, from the derivatives price one can infer what premium the market is willing to pay, which is not a forecast.

Both schools of thought disregard transaction costs in the price formation process. The second school of thought argues that they do not need to be considered because the benefit that both buyer and seller have is identical. This was explained in the following way.

*"So, the benefit of entering into a derivative contract from a transaction cost point of view is identical for the buyer and seller. So, it doesn't change the price because they both get the same benefit because the buyer is not buying a building, he is buying and then selling forward a building. The seller is not selling a building; he is selling a building and buying it forward. The two are doing the same thing, they're just doing it in a different order."*

*[Investor Relations/Fund Manager at investment management firm for indirect property]*

The second school of thought, also, casts doubt on the usefulness of an instrument that takes property risk but does not reflect the associated returns.

[149] Which normally would be the case, but not under current liquidity conditions.

The concluding thought of this school is that the price cannot be wrong but the way to derive it can.

> *"Because there's no cash and carry arbitrage, you can never tell somebody that they've got the wrong price, but you can tell people they've got the wrong method for getting to the price. The price is always right, it can't be wrong, but if you're not starting from fair value and understanding what the implication moving away from it is, then your reasoning is wrong."*
>
> *[Investor Relations/Fund Manager at investment management firm for indirect property]*

The way the market currently prices property futures seems to follow the first school of thought. There is a mismatch apparent between the motivations and expectations of investment managers when they contemplate using property derivatives and what they can achieve given that pricing approach. The following quote exemplifies this point.

> *"[…] in the past, people thought that property derivatives were some sort of ETF-like instrument where effectively you bought it and you just got what the IPD index did that year. Where, in actual fact, what you're really doing is, you're paying away the expected return […] If people think that the total return index or the total return of the index is going to be 9% then you're effectively paying 9% to get into the contract. You're not going into at a 100 and if it does 9%, you know, there's a misunderstanding about how they're priced and what you pay and what effectively, what price you're going in at and what your return is over and above what you're having to pay away. Because the nature of how they work is, if I'm buying, and somebody is selling, if they're selling a segment exposure, I'm paying away that potential, that expected return, for the year. If it outperforms I get the incremental above that and if it underperforms then I've paid too much, and I've lost X, however many basis points. It's that implicit pricing element that is often being misunderstood by the market."*
>
> *[Researcher at investment management firm for direct property]*

In other words, investors have to pay for what they are trying to achieve. This implies that they are not earning the return commensurate with the risk taken. In addition, they do not achieve what motivated them to trade in the first place. When they create index exposure they do not receive index returns, but the differential

between the index value implied by the current derivative price and the index value at maturity of the futures contract. Conversely, if they use property futures for hedging, they will not receive the difference in index returns between the initial date and maturity of the contract. Again, they will only receive the difference between the index value at which the contracts were entered and where the index will be at maturity.

> *"It doesn't necessarily work [hedging or switching sectors], because the way you want to switch, the market might already be there, so you're having to pay for what you're hoping to achieve in the first place, to put it in simple terms."*
>
> *[Strategic advisor at investment management firm for direct property]*

> *"[…] you're not getting a property-like return. It's not like I could do a swap, say, the beginning of the year, I'll give you £1 and you'll give me £1.21 if the index does 21 per cent. Dec[ember] 2015 pricing may have been sort of 19 per cent, so you're betting just on the marginal uptick of the market moving one way or moving the other. So, you're not getting a property-like return, and because you're not really getting a property-like return, you're saying, 'Well, actually, I'm taking a bet on whether or not the market's going to be more positive or less positive.', and running the risk of a particular event happening in the market, which will affect that. Now, that therefore adds extra risk to your portfolio."*
>
> *[Property fund manager at investment management firm for direct property]*

Comparing the discussion in practice with the debate in the academic literature, it can be argued that the second school of thought is closer to the equilibrium models' assumptions.

Historic evidence from the market seems to confirm that futures prices (for near-term contracts) already imply what investors are trying to achieve with entering a contract. This means that the instrument does not meet their requirements. The quote below provides an example from the period of the GFC when housing prices were in decline. Although reference is made to residential real estate, the quote below exemplifies that it was not possible to get protection against the fall in prices because the forward prices already implied the fall.

> *"It is very difficult for the investors, especially the retail investors, our potential clients, to understand the concept of a forward curve. So, most of the retail investors are exposed to downside risk in house prices. So, they would surely like to protect against this. But let's say, if you go back to 2007, 2008, if everybody's expecting house prices to drop by, let's say 10, 20, 25%, and/or if there are no buyers at the current level […] You have to hit a certain amount of backwardation[150] before you find some buyers. So, it's very difficult for the retail people to understand that, you know, if they sell short a forward contract, or if a product replicating a forward contract on a house price index and that the house price index drops by 20%, they will not get that 20% because it's already priced in."*
>
> *[Former Managing Director Property Derivatives at a bank]*

Another interviewee confirms the experience from above.

> *"The point was that you couldn't hedge, so the property derivatives were implying, say, a 30% decline in property, and the point was that you couldn't hedge that decline, because everyone expected it and it was priced into the derivatives market. There was a misconception that you could hedge that. What you were doing, essentially, was locking in that decline if you used property derivatives, and I don't think that was very well understood by a number of people in the market."*
>
> *[Former senior director at a bank]*

The arguments of the two schools of thought are summarised in the table below.

| Parameter | First school of thought | Second school of thought |
|---|---|---|
| Components of the futures price | Year-to-date performance plus expected performance of the total return index until contract maturity. | Spot price which requires an adjustment for the 3-month temporal lag in the total return index plus carry plus liquidity premium or discount for holding the derivative position. |
| Consideration of inherent illiquidity of the underlying real estate assets/liquidity in futures | No consideration. | The value of liquidity to the buyer and the seller is asymmetric depending on the condition of the market, i.e. whether there is a bear or bull market. In a bear market, the market values liquidity to exit a position held, and in a bull market, it values the liquidity to enter a trade that provides exposure to the real estate market. |
| Treatment of transaction costs | Do not impact the price of the future contract. | Do not impact the price of the future contract. Since a trade is considered a round trip, i.e. buying and selling real estate exposure, the benefits of |

[150] The future price is lower than the spot price indicating a bearish market sentiment.

| Parameter | First school of thought | Second school of thought |
|---|---|---|
| | | transaction costs is identical for both the buyer and the seller. |
| Reward for taking property market risk | Difference between agreed price and index value at maturity. | Property market total return. |

Table 4.5: Characteristics of the two schools of thought discovered in the data

One view that is shared by both camps is that pricing is subjective and depends on the investors' particular situation such as cost of capital and liquidity needs.

> *"There's no one price."*
>
> *[Former Senior Trader Property Derivatives at a bank]*

In summary, it can be argued that given the different views on pricing and the debate around it, there is still a misunderstanding as to what can be inferred from the current derivative prices and what should be a fair value for a property derivative. The forward-looking approach that is currently present in the market, is ultimately responsible for the unattractive pricing. The pricing levels do not allow earning property-like returns or hedging property exposure. Therefore, it is not possible to hedge a decline in asset values with the instruments because they provide less than necessary to cover. Moreover, the investors do not get compensated for the real estate market risk taken. This implies that property index futures do not price like those on any other investable asset class. If the use of the instruments is limited to betting on whether forecasts are correct or not, then this feature casts some doubts on who the willing end users would be.

**(4) Mark-to-market**

Another issue, that was raised by some interviewees, concerns valuing a property derivatives position at fair value, which is difficult in an illiquid market, because it is not clear at what price the position would sell. Since there is only one broker active in the market, the access to pricing information is somewhat limited as the following quotes demonstrate:

> *"[…] you can't rely on pricing […] there's only one broker and […] it's not really a survey if you're just asking one broker where the pricing is."*
>
> *[Fund analyst at investment management firm for direct property]*

> *"You're in a situation where you don't have any transparency, so your mark-to-market model, if you will, becomes literally a gauge of broker sentiment, and if you've only got one broker, that's a problem. So, you need a reliable group of brokers. But, of course, brokers will only exist if there are fees to be made, and if there are margins to be made and, of course, that was the chicken and egg, because you only have more brokers where there's more of a market. […] having a conversation with our risk and compliance department around how we marked to market is definitely an administrative hurdle. […] From an institutional perspective, I think how they're marked to market is an issue."*
>
> *[Researcher at investment management firm for direct property]*

In the absence of current market data, alternative ways of marking the instruments to market have to be found such as fair value valuation. This need adds another layer of complexity. The inability of marking to market creates a valuation issue which becomes a problem for the risk team, an internal hurdle to be overcome.

> *"It would be a problem; I suppose we could fair-value it, to a degree, ourselves, but again it's just adding another layer of complexity on something."*
>
> *[Head of U.K. Property Pooled Funds at investment management firm for direct property]*

If the market does not provide reliable pricing information, investors need to be able to run their own fair value models or use external consultants to manage the pricing problem. But in one way or the other, it complicates matters. The issues related to pricing require the acceptance of a certain degree of uncertainty which may constitute a serious hurdle for obtaining the approval from the risk and compliance departments within organisations. Moreover, it would require the organisation's acceptance of how the market works. The infrequent trading entails infrequent price updates and adjustments to information in the market which creates uncertainties among practitioners.

In summary, it can be argued that from the four issues (i.e. perceived difficulties when pricing property derivatives, perceived non-transparency of the market, two schools of thought when pricing property derivatives and misunderstanding of the

pricing mechanism, and marking the instrument to market) discussed in this section, the misunderstanding around pricing property derivatives has the highest explanatory power for the reluctance of investment managers to employ property derivatives. There are two points to be considered in this regard. First, the current pricing framework does not allow investors to earn returns commensurate with the property risk taken. Secondly, the return than can be earned from the index differential does not meet investors' return expectations when using the instrument for either creating index exposure or hedging.

### *4.7.6 Importance of Market Actors*

In order to determine the influence of peer activity on the propensity of investment managers to use property derivatives, interviewees were asked if the activity of peer organisations would have any influence on their decision-making process. They were also asked who they consider to be the potential main users in the market.

The interview data did not provide any results that support the proposition that peer activity will encourage users to join the market. The views on this matter are dispersed. One interviewee mentioned the lack of transparency on the type of instruments being used by peer firms. What ultimately would change the situation is, if by using the instrument, a peer organisation would significantly improve the performance of the funds under management and thus achieve a competitive advantage. The two quotes below provide examples against and in favour of the peer argument.

> *"And, if not very many people are using them then it just becomes unfashionable, unpopular to use them."*
>
> *[Property fund manager at investment management firm for direct property]*

> *"Oh, I think it does [play a role, the peer activity]. I think if there's momentum in the market, there'll be a lot more interest in the sector."*

*[Head of Global Real Estate at investment management firm for direct property]*

In terms of main users, it can be argued that especially those organisations that invest in various asset classes and not only in property could make use of property derivatives, for instance, to manage asset allocations. Table 4.6 provides a summary of the main users suggested by interviewees.

| **Suggested main user** | **Interview no.** |
|---|---|
| Pension funds | 1, 2, 6, 7 |
| Insurers | 7, 15, 17, 39 |
| Multi-asset managers | Email correspondence, 19, 22 |
| Property funds | 2, 14, 20 |
| Banks | 15, 19, 25 |
| REITs | 11, 19 |
| Hedge funds[151] | 1, 7 |
| Defined benefit pension scheme | 9 |
| Defined contribution pension scheme | 11 |
| Property companies | 14 |
| Open-ended property funds | 15 |
| Close-ended property funds | 19 |
| Loan businesses | 1 |
| Sovereign wealth funds | 19 |
| High net worth individuals | 19 |

Table 4.6: Overview of suggested main users of property derivatives (own depiction)

### *4.7.7 Homogeneity of Market Views*

The importance of a sufficient number of independent buyers and sellers and of diversity of viewpoints was mentioned as one prerequisite for a successful real

[151] Hedge funds usually require more liquidity and depth of the market before they join.

estate derivative markets in the literature in section 2.2.3. The reason for that is that too much homogeneity in the market makes trading difficult.

Therefore, the current research examines the situation in the property derivatives market as perceived by practitioners. Interviewees were asked if there is homogeneity in the market and if there is any group of end users that dominates the market.

Interviewees explained that there is a small group of investors active in the market with similar investment objectives. Moreover, there are more buyers than sellers of the index in the market because of the long-term investment horizons they usually have.

> *"Now, there should be sellers but there are no sellers because actually the industry is geared towards being a long-only industry, you know."*
>
> *[Managing director at fintech firm]*

Homogeneity seems to be the greatest in the UK All Property index. More diversity is expected at sector and sub-sector levels, but the liquidity there is currently zero.

> *"But on the segment level you start to get a lot [of] difference of opinion. […] generally, there can be a bigger difference of opinion with the sub-sectors than there can be with All Property."*
>
> *[Fund Strategist Real Estate at investment management firm for direct property]*

One explanation that was given for the homogeneity of market views is that the big investment management houses have in-house research teams which usually agree on the direction the market goes, even though they differ in quantifying that direction and the timing. They usually agree on the direction of the market for the coming year. Both the residential and commercial real estate markets are cyclical, which means that investors will have the same view driving sentiment and prices in the same direction. The same types of investor will have similar investment objectives. This phenomenon has an impact on the diversity of their views on the market.

Another explanation is the professionalization in the real estate market. This fact has led to more transparency and the sharing of data, which enforces the homogeneity of market views.

> *"[…] in the U.K. market […] there are less secrets, if you will. […] it's a very close community, the real estate market. Everybody kind of knows what's going on. People become aware of what their peers are buying and selling over time. […] real estate has really evolved, so there's a greater degree of research that goes into the sector now. There's a greater degree of sharing of views. […] over time, views that deviate from the consensus don't occur as often, and also, tend to disappear quite quickly, because houses will revise their forecasts as new numbers emerge, new economic data emerges, new transactions occur in the market. Like I say, there is just greater sharing and greater market evidence availability now."*
>
> *[Researcher at investment management firm for direct property]*

Past experience seems to indicate the presence of herd mentality in the market which means that all investors want to go long in the UK All Property index when the market is rising and to go short when the market is declining. This puts pressure on price levels and makes derivative trading less attractive as the following quote shows:

> *"[…] because of that everybody is looking at the same trade on the way in, everybody is rushing for the door on the way in and everybody is rushing for the door on the way out. And because of that it means that the pricing doesn't get as attractive and because of that people say, 'Well, if the pricing is the same to get into a derivative trade and to buy the building, well, I can add alpha to the building, I can generate excess growth, I can reposition it and I hold the physical asset.' which is different than the derivative […] the money is gonna come back to me in two years or one year."*
>
> *[Fund Strategist Real Estate at investment management firm for direct property]*

To sum up, it can be argued that the small number of market players and lack of diversity in their market views is a serious market impediment. What is needed is a two-way market with both buyers and sellers of real estate market risk. The lack of sellers in the market may suggest two things; the pricing is not attractive and/or

investors do not have the need to hedge. The need to hedge is discussed in section 4.9.3. It can be argued that speculators, such as hedge funds, would enter the market once there is more volume and more depth.

## 4.8 Instrument-Related Exogenous Factors

### *4.8.1 Introduction*

This sub-section presents those factors that can be related to the instrument. Among them are:

1. Importance of Real Estate Indices as the Underlying Instrument for Property Derivatives;
2. Risk-Return Profile of Property Derivatives;
3. Negative Connotations Associated with Derivatives;
4. Ambiguities Concerning the Taxation of Property Derivatives;
5. Availability of Products;
6. Conflicting Investment Horizons;
7. Induced Accounting Volatilities; and
8. Introducing Additional Risk.

### *4.8.2 Importance of Real Estate Indices as the Underlying Instrument for Property Derivatives*

The importance of real estate indices and their requirements as underlying instruments for property derivatives has received considerable attention in the literature and was discussed in sections 2.3.1.1 and 2.3.1.5. The temporal lags, autocorrelations, and smoothed volatilities of appraisal-based indices may invalidate them as underlying instrument for property derivatives. In order to test this proposition and to rule out that practitioners shy away from using property derivatives because of the indices, the current research examines the attitudes of interviewees towards the pertaining MSCI-IPD indices. For this reason, interviewees were asked how satisfied they are with the quality of the index in

terms of its ability to reflect the performance of the underlying real estate market. In this context, the following issues were addressed.

The majority of the interviewees[152] who commented on the index topic consider the MSCI-IPD indices in the U.K. credible and reliable. They are the most developed commercial real estate indices for the commercial real estate market in the U.K. The situation outside the U.K. seems to be different because for countries other than the U.K. the indices were considered unreliable due to their valuation methods and lower valuation frequencies. They smooth true market volatilities and lag the real development of the market. The lower index quality outside the U.K. limits the use of the index and its derivatives[153] for Pan-European investors. In this context, some interviewees said:

> *"We are fine with IPD. […] I would say that our reasons for not using them are not to do with the quality of the index. We recognise that it's not a perfect index but that's not the reason why."*
>
> *[Head of Investment at U.K. REIT]*

> *"[…] the U.K. works as an index perspective but France doesn't work, and Germany doesn't work."*
>
> *[Executive director at capital advisory firm]*

> *"The MSCI is worthy, it's not perfect but it's the best we've got."*
>
> *[Global Investment Strategist – Property at investment management firm for direct property]*

But there were also voices critical of the indices, who saw in addition to their low quality outside the U.K., the temporal lag, the basis risk, changing index compositions, the representativeness of the index, and issues around the index transparency as limiting factors.

[152] For instance, interviews no. 1, 11, 12, 14, 15, 22, 25, 29, 32, 39, 41, and 42.
[153] Which currently do not exist.

There are some negative comments[154] about the temporal lag in the index which is caused by the valuation process in which new market information seeps through slowly. This leads to situations where the market movement has not been captured by the valuations which, in turn, form the input data of the index. A very good example with historic context is given by the quote below which describes the inertia of the index and slow response to new market information with regard to the Brexit in 2016.

> *"So, for example, in the post-Brexit environment, we applied a fair value adjustment of funds of around 3.5% to accommodate what we felt to be a fair shift in the yield-risk-premium that should be afforded because of the Brexit uncertainties. The valuers said, 'We have no evidence; we are not going to do anything at all.'."*
>
> *[Chief Investment Officer at investment management firm for direct property]*

The basis risk was another concern of some interviewees[155] when they referred to notable differences between their portfolio and the corresponding MSCI-IPD index which show differences in terms of composition and correlation. The index is seen as an aggregated measure of average performance which can deviate substantially from the investors' own portfolios. The question then arises as to how well the index represents the market exposure that investors have in their portfolio. Another point that came up is that some portfolios cannot be hedged due to their specific geographic exposure (e.g. prime central London) as the following quote demonstrates:

> *"[…] you can't really hedge our exposure. […] There is no specific prime central London index […]*
>
> *[Group Corporate Finance Manager at property development and investment firm]*

In addition, interviewees[156] reported about index compositions that may change over time due to changes in the investor base which contribute with their data to the index. The change in the index composition may increase basis risk.

[154] For instance, interviews no. 8, 10, 24, 26, and 42.
[155] For instance, interviews no. 14, 20, 21, and 24.
[156] Interviews no. 13 and 17.

Moving the discussion to the representativeness of the index which is understood as showing how well the index tracks the underlying market, one problem that was reported by interviewees[157] in this regard is that the index seems to become less representative due to more foreign investors buying U.K. commercial real estate. Those investors do not necessarily sign up with MSCI-IPD and contribute with the performance data of their properties to the corresponding indices. The two quotes below give account of this issue.

> *"[…] the IPD index is becoming less like the market, because of, you've got a whole load of people, foreigners, coming in, buying U.K. commercial property. They don't sign up to IPD, and with 80% of all deals in the West End of the City being foreigners, they don't necessarily get the right data going through. […] So, the market's contracting in terms of the information."*
>
> *[Property fund manager at investment management firm for direct property]*

> *"One of the concerns at the moment might be, particularly with a lot of overseas buyers coming into the U.K., a lot of assets are probably now actually held outside of the index […]"*
>
> *[Head of Property Multi-Manager at investment management firm for indirect property]*

The reduced representativeness may lead to a disconnect between the real market performance and the performance represented by the index.

Another problem that was mentioned by interviewees is the non-transparency of the index which refers to the visibility on returns (i.e. cashflows) from individual buildings that comprise the index. MSCI-IPD publishes the index returns aggregated for various sectors and sub-sectors which does not allow a deeper analysis of the return contribution from individual buildings. This point is exemplified by the quote below:

> *"So, I think the awareness from our point of view as to what exactly makes up the components driving the index is crucial. […] You don't get transparency on the index, right, because you're not allowed to know the individual returns of individual assets, if that makes sense."*

[157] For instance, interviews no. 13, 28, and 35.

*[Fund Strategist Real Estate at investment management firm for direct property]*

A small number of interviewees[158] argued that the index is almost useless because of the low representativeness and the lack of transparency. Moreover, it was argued that property derivatives have fundamental flaws that are caused by the index which is not investable and makes pricing with no-arbitrage models impossible.

The discussion in this section has shown that despite the fact that the majority of the interviewees who commented on the index topic consider the MSCI-IPD indices in the U.K. credible and reliable, there are strong arguments to the detriment of the index which cannot be ignored. The features of the index such as temporal lag, basis risk, changing index compositions, issues around the representativeness of the index and its transparency are perceived as problems by practitioners and have high explanatory power as to why certain investors do not make use of the instruments. Since the index does not present a problem for all interviewees, it can be argued that the index is not the sole reason for the reluctance of investment managers to use property derivatives. However, it can be argued, given the evidence presented in this section, that the index is a main contributing factor that influences the propensity of investment managers to use property derivatives.

### *4.8.3 Risk-Return-Profile of Property Derivatives*

One theme that emerged in the interview data is the risk-return profile of property derivatives. After the first emergence of this topic, interviewees were asked whether the risk associated with trading property derivatives is perceived as too high or the return that can be reasonably expected from a trade too low. Moreover, interviewees were asked if they consider the risk-return ratio of property derivatives to be different from that one of physical real estate.

[158] Interviews no. 21 and 37.

Interviewees[159] identified the risk as the main problem in this context. More specifically, they are concerned about the downside risk. The downside risk refers to a situation where the index does not materialise as expected and the trade creates a loss position. The risk of loss and the immediate outcome of either loss or win at maturity are substantially different from an investment in physical real estate. One interviewee explained the difference in risk between synthetic and physical investments in the following way:

> *"If you buy a property asset it might go down in value, but there's no compulsion to sell it at that point. You might just think, 'Okay, we're willing to hold for the long-term, or there's means to asset manage to perhaps improve on that position or something'. Whereas it's really kind of binary and transparent that actually you can take a position and clearly lose money in a short period of time."*
>
> *[Senior Fund Manager at investment management firm for direct property]*

Another point that was mentioned[160] is that the expected return is disproportionately small to the risk taken. The quotes below exemplify this point.

> *"It might give you an extra one per cent but you're running a ten per cent downside risk […]"*
>
> *[Property fund manager at investment management firm for direct property]*
>
> *"All the risks that are involved; take liquidity risk, there's obviously downside risk if the index doesn't materialise like you expected. For a three and a bit per cent return, it's quite a lot [risk taken] actually."*
>
> *[Fund Strategist Real Estate at investment management firm for direct property]*

It seems that the investors feel that they are not compensated sufficiently for the risk assumed with holding the derivative position.

With regard to the risk-return profile, interviewees[161] held the view that the risk-return profile is different compared to physical real estate because it involves

[159] This was the case in interviews no. 4, 6, 13, 21, 26, 29, and 35.
[160] In interviews no. 4 and 13.
[161] Interviews no. 19, 23, and 24.

issues like downside risk, liquidity risk, lower transaction costs, and higher short-term volatilities when trading property derivatives. One interviewee said:

> *"You have different market risk in terms of sentiment and short-term volatility, I guess, on the derivatives side. But I mean the flip side, you don't have the specific risk of the asset, which is the vacancy risk, the potential for that micro-allocation, etc. So, there are, I think it's quite clear, differences."*
>
> *[Director Fund Management at investment management firm for direct property]*

It is worth mentioning that the risk-return preference depends also on the type of investor (e.g. pension fund as risk-averse investor).

In summary, these results show that the risk associated with trading property derivatives is important to some investors and the expected returns must outweigh the risks assumed. Moreover, the experience with the GFC has certainly led to a higher risk aversion among investors, especially when it comes to uncertainties around the outcome of an investment. Therefore, the risk-return profile is a contributing factor influencing the propensity to use property derivatives.

### *4.8.4 Negative Connotations Associated with Derivatives*

Another theme that emerged in the interview data is related to the negative connotations generally associated with derivatives. Those negative connotations may influence the way in which investors perceive property derivatives and therefore refrain from using them.

It is noteworthy that when interviewees were talking about the negative connotations of derivatives, they were usually referring to the attitudes and opinions of their clients and not necessarily their own.

Commonly mentioned arguments were that using derivatives is seen as speculation and taking high risks. There is a general mistrust towards derivatives

which is accounted for by historic financial disasters (e.g. Nick Leeson at Bearings Bank, Yasuo Hamanaka at Sumitomo Corporation) and the recent GFC.

There was a certain similarity in the comments on the negative connotations in the sense that the word "derivative" conjures up a lot of resentment as the following quotes show:

> *"And there is or has been a concern about the nature of derivatives in the broader market place. The trustees being inherently conservative."*
>
> *[Chief Investment Officer at investment management firm for direct property]*

> *"It's unfortunate, I think, the shadow that is cast over us after the global financial crisis, the word 'derivative' conjures up lots of nasty connotations and lots of bad memories."*
>
> *[Researcher at investment management firm for direct property]*

> *"Yes, there was so much bad publicity with derivatives; if you just mentioned the 'd-word' people would run, they just don't want to know about it."*
>
> *[Strategic advisor at investment management firm for direct property]*

> *"[…] investors are against the use of derivatives because they see it as risky."*
>
> *[Head of European Real Estate at investment management firm for direct property]*

These results suggest that the negative connotations associated with derivatives do not have a high explanatory power for explaining the reluctance of real estate investors to use property derivatives. Moreover, there is no evidence in the interview data for a contributing role. Therefore, it can be argued that the negative connotations associated with derivatives have a low explanatory power. In addition, any restrictions in fund mandates or investment management agreements that are imposed by clients are discussed in section 4.9.4.

### *4.8.5 Ambiguities Concerning the Taxation of Property Derivatives*

Potential uncertainties as to the fiscal treatment of property derivatives were mentioned in the literature as a potential hurdle (see Ducoulombier, 2007; Syz, 2008). Therefore, the current research tested this proposition and asked interviewees whether there are any issues with taxation.

The research results indicate that the taxation of property derivatives is not viewed as a problem. Moreover, some interviewees do not know how the instruments are taxed, so it is not a first order issue for them. It seems that taxation is a subject that would be dealt with once all conditions for using property derivatives are fulfilled. One interviewee highlighted the importance of showing income and capital gain of a derivative contract separately for taxation purposes. He said:

> *"We never had an issue about taxation. I mean, within the fund there are the different headings where you put income and capital, and as long as it's clear, and you can agree that with HMRC[162], then that's fine."*
>
> *[Head of U.K. Property Pooled Funds at investment management firm for direct property]*

At the time the research was conducted there were discussions ongoing about changing the taxation of swaps. In the past, gains and losses could be offset and thus reduce the amount of tax to be paid. But this issue was not followed up since it seems to have little importance to practitioners.

> *"I had heard from people involved in those discussions, that the tax rules that they changed were never really used. So, maybe it is not an issue."*
>
> *[Managing director at fintech firm]*

[162] Her Majesty's Revenue and Customs.

In summary, there was no evidence found in the research data in support of the proposition that taxation issues act as hurdles or limit the use of property derivatives.

### *4.8.6 Availability of Products*

The theme in this section emerged in the interview data and denotes the satisfaction or dissatisfaction of real estate investors with the currently available product, i.e. property index futures, and whether they believe that there should be other derivative products available.

There is a dispersed view on this matter. Some interviewees are content with the index futures but require more volume in order to trade especially at sector and sub-sector levels. Others demand more products and a wider geographical coverage. Currently, all nine available property derivative contracts are based on the U.K. market. This limits their use to investors in this market. One interviewee said that the ability to use the instruments only for the U.K. market would not make a difference for a global portfolio. His words were:

> *"[…] in a context of a global portfolio, the U.K. is relatively small. So, you know, what difference would it make if I have 5% of my assets in real estate and I have only 20% of that in the U.K. and I'm hedging half of that? And what difference is that gonna make?"*
>
> *[Senior investment consultant at capital advisory firm]*

Interestingly, two interviewees representing REITs stated that none of the currently offered MSCI-IPD indices would be useful for them because their portfolios and the indices differ widely. The same comment was made by a representative of a property development and investment firm.

In terms of the range of products, some interviewees[163] expressed interest in options which are not yet available.

[163] Interviews no. 6, 20, and 38 (among them one current and one former representative of a bank).

Two comments were made with regard to the suitability of futures to protect the bank's commercial property exposure which is created by loans. The comments indicate, as shown below, that a future is not the ideal instrument to get protection against falling asset prices. The instrument of choice would be an option.

> *"Because obviously you would think, well, we're lending to commercial property therefore we should hedge them. To hedge it, the ideal product that you want is not a future, you want some kind of option […] you want to be buying a put option, so, if property prices fall a certain amount then you're protected."*
>
> *[Head of Property Derivatives at a bank]*

> *"Also, ultimately for a loan book as well, […] the whole market was pretty much just a plain vanilla swap market, so a loan book would really benefit from an options market and there wasn't really an options market at all."*
>
> *[Former Senior Trader Property Derivatives at a bank]*

Option markets usually develop after markets for futures and swaps "because the option writers require these markets to be liquid in order to offset their positions" (Euromoney, 2007, p.7).

In summary, despite dispersed views on the range of products that are currently available, there was no evidence found in the research data that substantiates the assertion that the limited range of products is the reason for, or a contributing factor for the reluctance of real estate investors to use property derivatives.

### *4.8.7 Conflicting Investment Horizons*

A theme that emerged from the interview data is the conflicting investment horizons of long-term real estate and short-term property futures. Interviewees confirmed the long investment horizon which is typical when investing in real estate. It is not uncommon to invest for 10 years and longer as the following quotes show:

*"If they're pension funds they'll invest in property for, you know, tens of years."*

*[Property fund manager at investment management firm for direct property]*

*"[The average holding period is] [t]en years at least. We assume at least ten years, well, from our point of view."*

*[Global Investment Strategist – Property at investment management firm for direct property]*

The investment horizons when using property derivatives are much shorter. The currently offered property futures contracts on Eurex have most of their liquidity in the one-year contract. The liquidity in futures contracts beyond this is virtually zero as can been seen in Figure 4.9.

| Product name | Expiry | Diff. to prev. day last | Last price | Date | Time | Traded contracts | Open interest (adj.) | Open interest date |
|---|---|---|---|---|---|---|---|---|
| IPD® UK Quarterly All Property Index Futures Calendar Year Returns | FEB 2018 | +0.00% | 103.65 | 03/23/2017 | 18:55:59 | 0 | 600 | 02/13/2017 |
| IPD® UK Quarterly All Property Index Futures Calendar Year Returns | FEB 2019 | +0.00% | 103.50 | 03/23/2017 | 18:55:59 | 0 | 0 | 11/04/2016 |
| IPD® UK Quarterly All Property Index Futures Calendar Year Returns | FEB 2020 | +0.00% | 103.00 | 03/23/2017 | 18:55:59 | 0 | 0 | 11/04/2016 |
| IPD® UK Quarterly All Property Index Futures Calendar Year Returns | FEB 2021 | +0.00% | 103.00 | 03/23/2017 | 18:55:59 | 0 | 0 | 02/08/2016 |
| IPD® UK Quarterly All Property Index Futures Calendar Year Returns | FEB 2022 | +0.00% | 103.00 | 03/23/2017 | 18:55:59 | 0 | 0 | 02/08/2017 |
| **Total** | | | | | | **0** | **600** | |

Figure 4.9: Open interest in property futures with different expiry dates (Source: Eurex web page[164])

When asked for their desired investment horizons, interviewees mentioned a variety of contract periods ranging from months to three to five years.

*"It might be effective to consider quarterly contracts […]"*

*[Researcher at investment management firm for direct property]*

*"[…] [it] would be shorter term, six months to a year, as opposed to anything else. […] so, for us it's more shorter term rather than longer term."*

[164] http://www.eurexchange.com [Accessed on March 24, 2017].

*[Group Financial Director at U.K. REIT]*

> *"I think it would probably be more than a year […] And I think three- and five-year horizons would perhaps be valuable."*
>
> *[Head of European Real Estate at investment management firm for direct property]*

One issue that was mentioned multiple times[165] concerns the reinvestment risk and the uncertainty related to the redeployment of capital after contract maturity in case the contract is supposed to be rolled over. There is a concern among interviewees that in rising markets a redeployment of capital will be too expensive because the contract prices will then reflect the bullish market sentiment. Moreover, it may be difficult to find a counterparty as the quotes below exemplify.

> *"[…] if you go speculatively into a segment, you get your money back in two years. And if that segment is still rising, somebody will probably say, 'Well, why didn't you buy the building two years ago?' and then you would have had a building, you know. And you pay away a bit to get in but at least you have the building."*
>
> *[Fund Strategist Real Estate at investment management firm for direct property]*

> *"So, effectively, at the moment if you have your one-year contract and you decide actually that there's an opportunity, potentially, to extend it for another year, obviously given the liquidity in the market, you're faced with issues [of] trying to find another potential buyer or seller on the other side to extend that contract, but you're also faced with pricing issues as well because […], invariably, you're going to have to reset the contracts and that's another issue."*
>
> *[Researcher at investment management firm for direct property]*

Another point to be considered when entering future contracts with longer contract periods is that the volatility may be higher during this time as compared to a one-year contract.

[165] Interviews no. 4, 10, 13, 19, and 39.

Given the availability of futures contracts with contract periods ranging from one to five years, it can be argued that conflicting investment horizons between the long-term physical investment and the short-term synthetic investment do not explain the illiquidity in the market. In the same vein, the uncertainties related to rolling contracts over could be reduced by entering a longer term contract if there was liquidity.

### *4.8.8 Induced Accounting Volatilities*

Accounting volatilities induced by the mark-to-market process of property derivatives was mentioned in the literature as a general hurdle and entry barrier. Therefore, the current research tested this proposition and asked interviewees about their experience with accounting volatilities when using property derivatives.

Although this topic did not receive much attention from the interviewees, there was one issue that came up in some interviews[166] which is hedge accounting. Interviewees reported on difficulties in qualifying for hedge accounting when using property derivatives.

> *"So, it [property derivative position] never qualified for hedge accounting […]"*
>
> *[Executive director at capital advisory firm]*

A reason seems to be that "the regression of changes in the hedged item on changes in the derivative should have an adjusted coefficient of determination ($R^2$) of at least 80 per cent" (Ducoulombier, 2007, p. 12) in order to qualify for hedge accounting. The problem is that in order to achieve such a high $R^2$-value the investor must have a large portfolio as can be seen in the table below. It would have to comprise 50 properties.

[166] This issue was mentioned in interviews no. 1, 14, and 17.

| Portfolio Size | 1 | 5 | 10 | 20 | 50 | 100 | 200 | 500 |
|---|---|---|---|---|---|---|---|---|
| $R^2$ | 0.17 | 0.45 | 0.57 | 0.69 | 0.82 | 0.89 | 0.94 | 0.97 |
| Average tracking error (annual, % points) | n.a. | 5.35 | 4.06 | 3.06 | 2.09 | 1.54 | 1.14 | 0.78 |

Table 4.7: Tracking error within a sample of 1,700 properties (Source: Ducoulombier, 2007, p. 12)

Another concern was the initial margin that the exchange requires and that may be moved up if volatilities in the market increase. Two interviewees said:

> *"What they [clients of the exchange] do ask is information about how often things change, not the variation margin, the P&L, but how often the initial margin changes because that's the one thing they can't anticipate."*
>
> *[Non-executive director at a stock exchange]*

> *"[…] it's fair to say that it's [accounting volatilities] been a talking point in our investment committee. Because they're looking at, 'How many pounds are we paying out of our bank accounts?', so looking at the capital employed, and, 'What is the effective leverage on that?' and it, you know, ends up being about 91 and a half per cent, or something if you just pay eight and a half per cent in the margin account."*
>
> *[Senior Fund Manager at investment management firm for indirect property]*

The results of the current research show that the accounting volatilities induced by the changes in the fair value of the derivative position are not perceived as a major problem, but rather a second stage problem.

### *4.8.9 Introducing Additional Risk*

In order to get a better understanding of the perception of risk, interviewees were asked what additional risks they perceive when investing in or contemplate investing in property derivatives.

A surprising finding was that some interviewees[167] are still concerned about counterparty risk although this risk has been minimised because the property futures are cleared through a central counterparty (CCP) which is Eurex Clearing.

Other risks that interviewees perceived are a general risk of the unknown due to the illiquidity in the market, the fear of loss of capital that is higher than with physical investment, basis risk, introduction of volatilities into the portfolio, not being able to exit the contract, and generally the introduction of a kind of risk that is different from the physical investment.

One interviewee summarised this issue as taking additional risk and not getting compensated for the risk assumed. He argued:

> *"[…] obviously if the volatility is greater or the risk is greater, then you'd expect the return to be higher, but that isn't the case. […] So, what you're doing is giving up return to ideally de-risk. And the problem is, you're actually not de-risking at all, you could be increasing your risk for those other reasons, and so it's not a perfect hedge. And that's why you'll find few people in property companies would be prepared to go into that."*
>
> *[Group Financial Director at U.K. REIT]*

In summary, the additional perceived risks play an important role insofar that they are a contributing factor influencing the propensity to use property derivatives. The additional risks discussed in this section are not new in the sense that they were already discussed in previous sections.

## 4.9 Client-Related Exogenous Factors

### *4.9.1 Introduction*

Research results have shown that the investor base plays an important role in influencing the actions of property investment managers. There is a relationship between the client as investor and the investment manager who acts like a service provider. The provisions of these services are governed by the fund

[167] Interview no. 26, 29, and 39.

mandate, investment management agreement, and fund prospectus or similar documents that define the contractual basis between the client and the service provider, i.e. investment manager. There are two factors that emerged from the interview data which can be related to the client and his/her expectations of real estate as an asset class and his/her expectations of the investment manager as service provider. In addition, the mandate which was mentioned as restricting factor in the literature, was tested as to its influence on the propensity of investment managers to use property derivatives.

### *4.9.2 Investor Expectations of Real Estate as an Asset Class*

The expectations that investors have with regard to real estate as an asset class emerged as an often-reoccurring theme in the interviews. It refers to the drivers of the decision to invest in commercial real estate in the first place. Moreover, the theme sheds some light on the needs investor might have to make use of the instruments. The term investor refers in this context to the investor in the fund and not to the investment manager himself/herself.

Notwithstanding the fact that each investor may have different investment motives, investment objectives, and requirements (e.g. absolute return or return expectation relative to an index), interviewees[168] highlighted the long-term and stable income return of commercial real estate as the main reasons for their investors' interest in this asset class. It can be argued that the return of property investments relative to other asset classes in combination with income stability seems to be the prime reasons why investors choose to invest as the following quotes show.

> *"[…] investors will look to real estate for its stable, kind of hybrid returns between bond and equity. You've got this consistent pre-definable income stream in many cases, and then you have this equity volatility aspect which is the capital growth element which, provided there is a little bit of timing and a bit of clever asset management, etc., and so forth, could conspire together to provide very attractive returns, but quite stable returns."*

[168] The income stream as motive to invest was mentioned in interviews no. 3, 10, 22, 23, 24, 28, 39, 41, and 42.

*[Researcher at investment management firm for direct property]*

*"Well, one of the reasons, particularly pension funds but also other investors, are looking at real estate is because of the yields that it offers, that income return is attractive relative to bonds and indeed equities, and so there's been an increase generally in the allocation to real estate."*

*[Chief Investment Officer at real estate private equity fund management firm]*

*"[…] they look at return prospects, but they're also looking at that yield premium over gilts typically and yield premium over equities."*

*[Senior Fund Manager at investment management firm for direct property]*

Moreover, it was reported that the fact that income returns have very low volatilities, is especially attractive for investors with liability matching needs such as pension funds. Other types of investors are more focused on the total return which means that for them the capital return would be equally important.

*"London property is bought for stable income but also for capital appreciation."*

*[Head of Group Research at capital advisory firm]*

A commonly applied investment strategy is to buy and hold the investment for long periods of time (e.g. 10 years and longer). The attraction of income producing property comes from the tenants who either have long-term lease contracts which are often inflation-indexed or from short-term leases where they pay higher rents.

Interviewees reported that the investment in real estate is made in the knowledge that real estate is cyclical and that asset values may drop during a trough but will swing back in the long-run. Two interviewees said:

*"Now, we are obviously aware of how market cycles work and we're aware of the capital upside-down element within a cycle, but, fundamentally, when we buy and sell our assets, we buy and sell them based on a large component*

*of income performance and expected income performance […] there are too many end users, too many investors that have an income focus. By and large, that is more than 70% of the reason for buying commercial real estate in the long run, it's income."*

*[Researcher at investment management firm for direct property]*

*"And if they're not forced to sell at the wrong point in time they will be able to get back the capital value, or indeed achieve capital value growth. So, the income component is very important, particularly for pension funds who need to match their liabilities with an income-producing asset."*

*[Chief Investment Officer at real estate private equity fund management firm]*

One strategy to cope with the cyclicality in real estate markets is to choose good quality properties in preferred locations.

Another important point to consider is that very often the decision to invest in real estate is part of a wider multi-asset portfolio allocation strategy with the aim of diversification. Therefore, investors are looking for a pure real estate investment either directly in bricks and mortar or indirectly through another fund or another suitable investment vehicle. It can be argued that hedging real estate against short-term swings is not in their interest because they require a return commensurate with the risk of this asset class. They manage real estate risk by limiting their exposure from the outset or by reducing the exposure through selling real estate if necessary. A possible reason for limiting the real estate exposure is related to the illiquidity of real estate and the time it takes to unwind positions as the following two quotes suggest.

*"And I imagine they're [investors] thinking that, you know, equities they can liquidate the whole thing tomorrow, whereas property they know there's a cost in terms of price and timing to liquidity. So, you can't liquidate a five hundred-million-pound direct portfolio in six months. Not unless you want to take a massive price hit. So, you know, we can provide better liquidity on the indirect side. And there's all the arguments there. But I suspect that's the main reason why they don't. They don't, you know, use their full allocation."*

*[Senior Fund Manager at investment management firm for indirect property]*

*"But the liquidity thing still means it's probably only ever going to be five, ten per cent of the portfolios unless regulatory changes on things like Solvency II […]. The capital requirements that are held against real estate mean that it's always going to be five, ten per cent of the portfolio, but that's still huge."*

*[Director Fund Management at investment management firm for direct property]*

The interview data suggests that investors prefer physical real estate over the derivative because of its income performance, potential upside performance, simplicity, and because of its tangibility as the following quotes exemplify.

*"Because people like the idea of holding and clients especially like the idea of holding the bricks and mortar over the derivative."*

*[Fund Strategist Real Estate at investment management firm for direct property]*

*"But even when they are doing that they prefer to actually kind of have exposure to physical assets rather than an index."*

*[Head of Property Derivatives at a bank]*

*"Now, I would say that the majority of end investors in our funds are themselves conservative in outlook and approach, who like the concept that they can identify the individual properties we hold, they can see the photographs, they can read the lease documents, there is a tangible connection to the asset class."*

*[Chief Investment Officer at investment management firm for direct property]*

*"There is a general perception in the market that when people want to buy in in a fund, they want to have bricks and mortar."*

*[Head of Group Research at capital advisory firm]*

In addition to that, physical real estate investment provides the option to either hold the building, to reposition it on the market, or to sell it, which the derivative does not offer.

With regard to the use of property derivatives, some interviewees explained that there is no need to manage short-term liquidity. Investors do not seem to have this short-term thinking when they invest in real estate. Therefore, there is no need to use derivatives. Due to long-term investment horizons, investors do not invest and divest frequently.

> *"When they come out of the funds, they give us a redemption request, and we say, 'Thank you very much, we'll let you know when your money is coming back.'. And if we ultimately have to sell a building, there could be a delay in that. And they have accepted that up front. So, there is no short-term liquidity matching need to use derivatives […]"*
>
> *[Head of European Real Estate at investment management firm for direct property]*

> *"They're [investors] not really making a bet that values are going to increase over the course of a year which I guess is what you might do if you take out some sort of derivative to get exposure to the sector."*
>
> *[Chief Investment Officer at real estate private equity fund management firm]*

To sum up the discussion in this section, investors who invest directly or indirectly in real estate appreciate the stable income stream in combination with an upside potential of the capital values. Moreover, especially institutional investors are long-term investors who do not think short-term when it comes to assessing capital values. They are aware of the cyclicality of real estate which is often only one part of a wider asset allocation strategy. Real estate risk is managed by limiting or reducing real estate exposure if necessary. The use of property derivatives, which are rather short-term investments, for creating long-term exposure seems to be a contrast to the expectations that they have when investing in real estate. Conversely, there is no need to hedge or quickly adjust real estate exposure because of the long cycle investment and divestment as ultima ratio.

### *4.9.3 Investor Expectations of Property Investment Managers*

A second theme that emerged from the interview data and that bears on investors is the expectations that they have with regard to the property investment manager.

The expectations of investors are shaped by what the investment manager promised to deliver in terms of investment performance. The scope of investment management including admissible financial tools are set out in the investment management agreement, fund prospectus, or mandate. There needs to be an alignment between what was expected and promised at the outset of the relationship and what was effectively delivered in terms of fund performance.

> *"So, the role is to meet the expectations and, in the first instance, to set those expectations at the right level to suit the client."*
>
> *[Director Fund Management at investment management firm for direct property]*

> *"They [investors] expect that the fund delivers what it promised to deliver. So, the fund managers stick to their mandates."*
>
> *[Head of Group Research at capital advisory firm]*

What investors are getting offered by the investment managers is a full exposure to a certain sector of commercial real estate. The active management role of the investment managers comprises identifying properties, buying properties, developing properties, enhancing value by refurbishing properties, renegotiating rental terms, and selling properties in line with the mandate. In other words, the investment manager is commissioned with investing capital in real estate by identifying and buying quality properties. The involvement of derivatives seems to run counter to the simplicity of this approach. In this context interviewees said:

> *"[…] is that [investing in property derivatives] what […] our investors are wanting us to do? I've met 500 clients over the last five years, probably. At least 500. So, I go out raising*

*money quite often. Not one of them has ever said, '[…] I want you to be really smart and clever and start betting the performance of the fund on the derivative contract.'. I have had 500 people saying to me, 'Go and buy a good quality-built let building, which is going to give me long-term secure income with a little bit of growth potential.'. […] There's no incentive to put extra risk in your portfolio."*

*[Property fund manager at investment management firm for direct property]*

*"[…] the real estate industry is tasked with investing in real estate, so tend to do that rather than derivatives."*

*[Property fund manager at investment management firm for direct property]*

Interviewees explained that their investors do not expect them to manage systematic real estate market risk by using property derivatives as the following two quotes exemplify.

*"As a general kind of comment, probably no [investors do not expect the investment manager to hedge any market risk]. I think usually in asset management, generally investors look for you to actually have a direct or indirect investment in the underlying asset. I don't think European investors are generally looking for managers to provide derivative exposure. I think they'd look to do that themselves."*

*[CFO, Alternatives and Real Assets at investment management firm for indirect property]*

*"They [clients] know that I've got investments in Spain and I'm hedging against the euro because they expect me to hedge against the euro because I've got currency risk but they don't expect me to demonstrate any great knowledge in being able to hedge or any great hedging strategy, they just see that as part of the everyday job of being an asset manager."*

*[Funds Development Director at investment management firm for indirect property]*

What investment managers do, in fact, is provide full exposure to the asset class.

> *"The other point is that our investors are looking for real estate exposure. So, if we hedge out all of the market movement then we're potentially not giving them what they want."*
>
> *[Chief Investment Officer at real estate private equity fund management firm]*

Therefore, there is no reward for taking extra risk with a derivative position provided they are allowed to make use of the instrument according to the investment management agreement or mandate. The decision to invest in real estate was made by the investor at an asset allocation level. Interviewees explained that if their investors wanted to reduce their real estate exposure they would do this themselves by divesting as the following quotes demonstrate.

> *"[…] I think the problem is you start going outside of what it is that you're representing in the first instance, which is a real estate manager, and becoming a more financial market, capital market manager. And really that's where most clients are actually, it's not a better place, that's their decision basically, they're making an allocation to real estate. If they didn't want real estate and they wanted to trade different exposures, they would do that differently in the first instance. So, that probably sits more with the client than with the real estate investment manager. […] So, I think it's more a capital allocation decision initially and then it's difficult to start changing that view because if you start representing you don't believe in the market, I think the simple answer is, 'Okay, we'll we won't continue the investment.'."*
>
> *[Director Fund Management at investment management firm for direct property]*

> *"So, if you think of it, big pension fund might have a number of buckets of capital allocated of which real estate is one, derivatives might be another, equities might be another, bonds might be another, private equity might be another. And what they want from us is to manage the real state. […] but sometimes, for example, in some other funds the investors say, 'This is a property fund; this is all we want.'."*
>
> *[Fund Strategist Real Estate at investment management firm for direct property]*

Since the focus is on deploying and managing capital in physical real estate there is no expectation to use property derivatives.

> *"It's that circular thing, that I suppose there isn't a demand from people, or an expectation, that a manager will use property derivatives."*
>
> *[Strategic advisor at investment management firm for direct property]*

In summary, it can be argued that property investment managers do not have an incentive to use property derivatives because their task is to provide full exposure to the real estate asset class, or a certain sector of it and to manage that investment. Moreover, there is no benefit in reducing the exposure because that is something the investor would do at an asset allocation level. What investors usually want from an investment manager, is a prudently managed property portfolio that provides returns in line with the mandate and commensurate with the real estate market risk taken.

### *4.9.4 Restrictions by Fund Mandate, Fund Prospectus, or Investment Management Agreement*

Restrictions in mandates to use property derivatives was a barrier identified in the literature. The fund mandate, fund prospectus, investment management agreement (IMA), or other similar documents setting out the scope and objective of the fund may restrict the use of derivatives and/or leverage in the fund.

In order to determine the influence of the mandate on the propensity to use the instruments, interviewees were asked what role the mandate plays in this context and if it could be changed to include the use of property derivatives.

The results of the research show a dispersed picture of investment managers who can use property derivatives and others who cannot due to restrictions in the fund mandate. An example for the former and latter case, respectively, is given below.

> *"And we have the ability to do it [to trade property derivatives] but we don't. So, my prospectus enables me to trade in derivatives."*

*[Property fund manager at investment management firm for direct property]*

*"Well, it's partly because we're not permitted to [trade property derivatives] through our mandates."*

*[Head of Property Multi-Manager at investment management firm for indirect property]*

Some of the interviewees explained that they promote the simplicity of their investment approach which would be unduly complicated if the use of property derivatives were included as the following quotes show.

*"If you do include it [the use of derivatives] in your prospectus, it's very much with the reassurance of 'derivatives will not be used for speculative purposes but only for efficient portfolio management'. And actually, my experience has been that even that leads to lots of pesky questions. So actually, we are just taking out that clause and that ability within our prospectus for our European fund. And the only derivatives we will now use are for currency hedging or interest rate swaps."*

*[Head of European Real Estate at investment management firm for direct property]*

*"And I think it goes down to the point of, if you're raising a fund, either you want it as smooth as possible and the approval process and the pitch needs to be as easy to understand as possible. And I guess the end position means that we don't really have the remit to make a decision on trading those products."*

*[Director Fund Management at investment management firm for direct property]*

Moreover, there are mandates that have not been changed for many years and the use of property derivatives was not envisaged when the fund was set up. However, the mandate could be changed if there were merit in doing so. If the fund has been successful without the use of property derivatives, it becomes difficult to argue for changing the mandate as the quote below demonstrates.

*"The majority wouldn't allow us to do derivatives. That partly goes back to a number of these mandates being created over the last 20 years or so, so some of them are very historic. And from time to time we do go back to clients and*

> *try and get more flexibility but if you're delivering outperformance with your current strategies, then the client push-back might be, 'Well, why change when we're doing quite nicely already?'"*
>
> *[Head of Property Multi-Manager at investment management firm for indirect property]*

Usually, the interviewees do not see great difficulties in changing the mandate if there is a good reason to do so. However, depending on the complexity of the client's organisations and the involvement of governing bodies such as trustees, the process can be a lengthy one (e.g. up to 12 months).

It is worth mentioning that some more risk-averse investors (e.g. pension funds) do not allow the enhancement of investment returns through leverage in the mandate. A derivative position would qualify for a leveraged position because it requires only an initial and a variation margin, say 10 per cent, while creating exposure to the notional amount of 100 per cent. Such a position would have to be ring-fenced with equity which means that the return on equity cannot be increased by the derivative.

> *"[…] we can't have any leverage on the funds, so they've got to be 100% cash-backed. […] So, like 10% of that will be with the exchange, the rest will be ring-fenced internally because otherwise you're creating leverage in the fund, which you don't want to be doing."*
>
> *[Fund analyst at investment management firm for direct property]*

To sum up the discussion of this section, the research data showed that indeed existing mandates may restrict the use of derivatives and leverage. However, mandates can be changed if there is a good reason to do so. For this to happen, the investment manager must be convinced and approach the investor who, in the end, has the final word. But because investment objectives are often achieved without the use of property derivatives there is no real incentive to include them.

> *"But that's not the key reason for doing it or not doing it at the moment; we haven't got as far as that."*
>
> *[Global Investment Strategist – Property at investment management firm for direct property]*

## 4.10 Value System-Related Exogenous Factors

### *4.10.1 Introduction*

There are two themes that emerged from the interview data that concern the self-conception of the fund manager on the one side, and on the other, the metric of measuring investment performance. Both have an influence on the propensity to use property derivatives and are discussed in the next two sections.

The value system is understood as a system of established actions as to how to perform property investment management, and generally accepted metrics of measuring its success.

### *4.10.2 Remit of Property Investment Managers*

A limiting factor that emerged in the interview data, is the common definition of the remit of property investment managers. They understand their role as managing prudently the capital they are entrusted with by their clients through investing it in quality properties that generate income and that have a potential for capital growth. Investing in property derivatives is often considered as something outside their remit.

The focus of the property investment manager is to add value to a physical real estate portfolio by identifying and buying a property, developing or refurbishing it, and increasing its rental income. These activities require a technical skill set which is exemplified by the quote below.

> *"But when you actually buy that building, and have to manage it, and knock it down, refurbish it, design it, develop it, everything else, that's a whole different skill set. […] And if you really want to make money from property you've got to actually get on and deal with it, like buy buildings and use your skillset to do that by asset managing a building or developing it. So, the way to make money in property isn't*

*necessarily to do a derivatives trade. You can add risk in other ways, so you add risk by doing it yourself as opposed to buying into a company who might be doing it […].”*

*[Property fund manager at investment management firm for direct property]*

In addition to the technical skill set, there is the educational background and a practical competence of most of the interviewed property investment managers which is geared towards investing in physical property.

*“[…] first and foremost, they’re [property fund managers] bricks and mortar managers. They’re not derivative experts.”*

*[Researcher at investment management firm for direct property]*

From their educational background, fund managers are often surveyors and do not have expert knowledge in the field of derivatives. Moreover, the use of derivatives would curtail part of their core remit which is adding value to the physical real estate. Adding value is an essential part of the business model of investment management organisations because this is one way to generate fees and increase basis fees as the quote below demonstrates:

*“[…] if you’re buying a physical property, you can have a business plan, strategy, add value to it. The property derivative, once you’ve got it you’re just sitting on it. You can’t add value to it, and the way they generate their active fees, if you like, is by adding value […]”*

*[Fund analyst at investment management firm for direct property]*

Therefore, investing in an instrument that provides only market return might not be enough because the investment manager’s performance is often measured relative to a benchmark index or the peer fund performance. The metric of measuring investment performance is discussed in section 4.10.3.

The traditional role of the fund manager entails creativity within the bricks and mortar investment. Therefore, shifting this activity towards trading property derivatives is alien to many investment managers.

> *"[…] but it comes back to what is our sole remit? What are we here to do? How can we best effect the job that we've got to do? How can we best go about affecting that, and generate positive results? Often, at times, it's being creative within just the direct bricks and mortar space and, at times, also perhaps using listed real estate and both of which are fairly transparent, easier to understand and more established."*
>
> *[Researcher at investment management firm for direct property]*

Betting on market timing as would be the case with the use of property derivatives is not part of their perceived traditional remit and pushes them out of their comfort zone. And because there is no pressure from outside, that is, from clients, there is no need to get familiar with the concept and to change the way things are done.

The core remit of the property fund manager is understood as deploying capital that is received from fund investors by identifying and purchasing properties that provide attractive income streams where values compound over time. The value is derived from the physical asset and not from a synthetic investment. This understanding is reflected in the quote below.

> *"[…] our task is to have good quality properties where value will compound over time […]."*
>
> *[Chief Investment Officer at investment management firm for direct property]*

Applicable knowledge about synthetic property investments is considered ancillary to the core remit which is to manage physical real estate. Looking after derivative positions in addition to the day-to-day business of a property fund manager would require the involvement of other departments of the organisation that provide knowledge and active support.

Another part that belongs to the core remit of the property fund manager is, as already mentioned, to add value to the portfolio either by stock selection or other measures such as refurbishments, re-negotiation of leases, property development, or repositioning of the property on the market. Therefore, time and effort are invested in activities that belong to the core remit or are close to it.

> *"I think one of the main reasons really is that our role is to be active asset managers of the real estate that we buy and to drive return through what we do to the assets and to not try to overcomplicate things too much with other financial products, leverage, and some of the interest rate swaps and more complicated debt products, being one."*
>
> *[Chief Investment Officer at real estate private equity fund management firm]*

Employing property derivatives removes an essential tool from the fund manager's tool box; the control over timing of investing in property and divesting again. With the property derivative, the contract term and the settlement conditions are fixed.

An alternative to physical real estate investment is the investment in a property company, other fund or a REIT which is considered to be within the remit of the investment manager. However, investing in derivatives is perceived by the property fund manager as too far away from his or her core competencies. The fund manager is not expected to actively manage real estate risk, but to put the received funds to work. The investment in derivatives may even be perceived as a distraction from the day-to-day job as the following quote suggests.

> *"My focus is making sure I can buy a good property that I think is undervalued or whatever, and I can add value to that, and when I buy something I will appraise the cash flow in five years, or whatever it is, depending on the property. That's my focus, that's my day job and that's what I'm doing. You know, it would possibly be, kind of, almost side tracking a little bit from what I've got to do, and I've got to still manage all the investments that we have which, you know, takes some time. There's tenants and then sometimes they're leaving and sometimes you've got people who, you know, let the vacancies. So, you know, it's just managing time."*
>
> *[Property fund manager at investment management firm for direct property]*

In summary, according to the views of the interviewees, the core remit of property investment managers is to invest directly or indirectly in physical real estate and to get the best investment performance out of it. This requires a technical skill set which is different from trading derivatives. In addition, they do not feel the need to use the instruments because they are considered alien to their core domain

which is physical property. Moreover, the core remit is to deploy capital in physical real estate and not to manage property derivatives. Using property derivatives is not part of their core competencies or conventional investment universe. There is no need felt to engage in property derivatives trading.

### *4.10.3 Metric of Measuring Investment Performance*

When interviewees explained the importance of their investment management agreements that govern property investments, they referred commonly to different ways of measuring the investment performance. Two commonly applied ways are either as a relative or an absolute return measure. The relative total return is often based on a MSCI-IPD benchmark index that needs to be outperformed by a specified percentage. The second investment performance measure is the absolute return such as an IRR, for instance.

Commonly applied success metrics in commercial real estate are to compare the investments against either the IPD benchmark index, the historical performance of the fund, or the performance of peer funds. An example for each type of the performance measurement is given below.

> *"For us, for our mandates, we are benchmarked against an IPD index in itself. So, our clients are looking for long-only exposure to property. If we start hedging, we have to be careful about what we're doing because the client is there because he wants long-only exposure to property; he has a multi-asset portfolio and we're here to give him a property exposure."*
>
> *[Indirect Property Fund Manager at investment management firm for indirect property]*

> *"None of our clients are directly benchmarked, so it's all about absolute performance. But it's obviously useful to know how the broader market has been performing."*
>
> *[Director Fund Management at investment management firm for direct property]*

Especially the first case with focus on providing total returns in excess of a benchmark index would actually exclude the use of property derivatives because it would not allow the investment manager to outperform the index. An exception to that is if there is mispricing detected in the futures price which can be exploited for the fund.

The same limitation with property derivatives is given in the second case. If the investment manager provides only market returns and not the target IRR hurdle return, then (s)he might underperform. The consequence in both cases would be to earn less fees because the investment targets were not reached. To the contrary, it might even be that a property derivative position turns out to be a loss, in which case they lost clients' capital. Therefore, given the existing metrics, a fund manager that hedges the market risk with property derivatives would run the risk of underperforming the reference index if the hedge goes wrong.

In summary, the use of property derivatives would actually jeopardise the performance of the investment manager under currently applied performance metrics. There is no guarantee that the use of property derivatives will help the property investment manager to deliver contractually agreed returns. To the contrary, their use might turn out to be a loss, in which case the property investment manager has underperformed and has grounds to fear that clients will not invest in his/her fund anymore.

## 4.11 Summary and Conclusions

This chapter presented the findings of the research into the reasons for the reluctance of real estate investment managers to use property derivatives. The research identified 21 factors that influence the propensity of investment managers to use the instruments and tested eight factors which were suggested by the literature.

The factors were grouped according to their origin into endogenous and exogenous factors. Those two groups were further broken down at their sub-levels and according to their topical associations. The influence of these factors

on the propensity to use property derivatives was assessed based on the explanatory power of each factor. The assessment is summarised in Table 4.8.

| Origin of Factors | Sub-Level | Influencing Factor | Assessment of the Explanatory Power |
|---|---|---|---|
| Endogenous | Organisational Level | Motivations for Using Property Derivatives | High |
| | | Decision-Making Process to Employ Property Derivatives | High |
| | | Administrative and Operational Requirements | Low |
| | | Hedging Strategies | High |
| | Individual Level | Understanding of the Market and Instruments – Need for Education | Contributing factor |
| | | Psychological Barriers | Contributing factor |
| | | Perception of Investment Managers of Property Derivatives | Low |
| | | Awareness of Current Instruments and Ways of Market Access | Contributing factor |
| | | Disproportion Between Effort and Impact | Low |
| | | Demonstrating Practical Competence | Low |
| Exogenous | Factors Related to the Market | Structural Change in Property Derivatives Market Evolution | High |
| | | Banks' Withdrawal from the Market | Contributing factor |
| | | Notion of Illiquidity | High |
| | | Pricing of Property Derivatives | High |
| | | Importance of other Market Actors | Low |
| | | Homogeneity of Market Views | High |
| | Factors Related to the Instrument | Importance of Real Estate Indices for the Use of Property Derivatives | High |
| | | Risk-Return-Profile | Contributing factor |
| | | Negative Connotations Associated with Derivatives | Low |
| | | Ambiguities Concerning the Taxation of Property Derivatives | Low |
| | | Availability of Products | Low |
| | | Conflicting Investment Horizons | Low |
| | | Induced Accounting Volatilities | Low |
| | | Introducing Additional Risk | Contributing factor |
| | Factors Related to the Clients of Property Investment Management Firms | Investor Expectations of Real Estate as an Asset Class | High |
| | | Investor Expectations of Investment Managers | High |
| | | Restrictions by Fund Mandate, Fund Prospectus or Investment Management Agreement | Low |
| | Factors Related to the Value System | Remit of Property Investment Managers | High |
| | | Metric of Measuring Investment Performance | High |

Table 4.8: Assessment of factors as to their explanatory power with regard to the reasons for the reluctance of real estate investment managers to use property derivatives

The following influencing factors with high explanatory power have been identified:

1. Motivations for Using Property Derivatives;
2. Decision-Making Process to Employ Property Derivatives;
3. Hedging Strategies;
4. Structural Change in the Property Derivatives Market Evolution;
5. Notion of Illiquidity;
6. Pricing of Property Derivatives (suggested by the literature);
7. Homogeneity of Market Views (suggested by the literature);
8. Importance of Real Estate Indices for the Use of Property Derivatives (suggested by the literature);
9. Investor Expectations of Real Estate as an Asset Class;
10. Investor Expectations of Investment Managers;
11. Remit of Property Investment Managers; and
12. Metric of Measuring Investment Performance.

In addition, the following factors have been identified as having a contributing role for explaining the reluctance of property investment managers to use property derivatives:

1. Understanding of the Market and Instruments – Need for Education (suggested by the literature);
2. Psychological Barriers;
3. Awareness of Current Instruments and Ways of Market Access;
4. Banks' Withdrawal from the Market;
5. Risk-Return-Profile; and
6. Introducing Additional Risk.

A low explanatory power has been found for the following factors:

1. Administrative and Operational Requirements (suggested by the literature);
2. Perception of Investment Managers of Property Derivatives;
3. Disproportion Between Effort and Impact;
4. Demonstrating Practical Competence;
5. Importance of other Market Actors;
6. Negative Connotations Associated with Derivatives;

7. Ambiguities Concerning the Taxation of Property Derivatives (suggested by the literature);
8. Availability of Products;
9. Conflicting Investment Horizons;
10. Induced Accounting Volatilities (suggested by the literature); and
11. Restrictions by Fund Mandate, Fund Prospectus or Investment Management Agreement (suggested by the literature).

First and foremost, no one individual factor has been singled out as being solely responsible for the reluctant use of property derivatives by investment managers.

The chapter began by explaining the main motivations of the interviewed practitioners for using property derivatives. There were six motivations discussed which are creating index exposure, hedging, switching sector allocations, taking advantage of relative value pricing, switching asset allocations, and accessing out-of-reach sectors. The two main motivations are to create index exposure and to hedge. Both motivations are associated with certain return expectations and hedging needs. When creating index exposure with property index futures, property investment managers expect to receive a return equal to or higher than the one from physical real estate. In the latter case, they require additional compensation for the additional perceived risk taken when entering a derivative contract. Conversely, when they hedge they either require hedging total return or the more volatile capital return component as opposed to the more stable income component. In this context two issues have been found. The first point is that according to interviewees, property index futures do not provide the total index return consisting of income return and capital return, but only an uptick at the margins. The uptick is the difference between index value implied by the current derivative price, or the price at which the counterparties enter the contract, and the index value at maturity. In other words, it is very difficult or almost impossible to achieve property-like returns with property index futures. The reason is that the current property futures price already contains the market sentiment. Therefore, hedging becomes equally complicated because the current futures price already implies a potential downswing of the market that the investor wants to hedge.

The second point is that in the current market setup the long and the short positions need to be matched, which is made difficult by asymmetric return

expectations between the long and the short side of the derivative contract. The reason is that some hedgers require hedging only the capital return component and not the total return which would be necessary in order to meet the expectation of the long side when creating index exposure. Based on the experience that practitioners made with property derivatives, it can be concluded that the instruments currently do not meet investor expectations.

The analysis of the decision-making process within property investment management organisations has shown that the often-cited illiquidity in the market is not the only condition that needs to be fulfilled in order to trade property derivatives. The conditions are diverse and depend on the investment objectives, the type of investor, the investment vehicle (e.g. type of fund, REIT), and a certain constellation of endogenous and exogenous factors. Therefore, the decision-making process is not a fixed procedure as such. The decision-making process is embedded in a complex structure of factors that are associated with each other. Important in this context is that the fund or investment vehicle must have the need to use the instruments. Among the most important external conditions is attractive pricing and sufficient liquidity levels in the market. An important internal hurdle is to obtain approvals from investment committees and/or risk committees allowing the use of the derivative instrument.

The research results show that investment managers do not use hedging strategies when managing property investments. What they do use instead are various strategies to mitigate risk. The interviewed investment managers believe that there is no need to hedge real estate market risk. Their arguments to justify this statement are threefold. The first one refers to low volatilities associated with real estate investments. In other words, the income component shows low volatility and the capital component plays only a role when properties are sold. The second argument against hedging is that properties are held throughout the cycle which obviates the need for hedging. The third argument is that the hedging decision rests with the asset allocator and not with the investment manager because the former consciously allocates capital to real estate in order to receive returns commensurate with the real estate market risk taken (i.e. full and not hedged exposure to the property market).

The property derivatives market has turned into an end user market in which buyers and sellers negotiate the price and determine market liquidity. A special feature of the current property derivatives market is that the trades are negotiated between the counterparties (matched by a broker) and executed on Eurex which causes among practitioners the perception of non-transparency in the market in terms of pricing. The only way to currently get a view on pricing is through a broker. That is the reason why the prices on the exchange are not necessarily the ones at which the market is willing to trade because the trade needs to be negotiated. Currently, there is only one broker active in the market which is perceived by interviewees as a concentration of risk and inhibits them to conduct price reviews and price comparisons. This, in turn, makes it difficult to obtain internal approvals from investment and risk committees.

The lack of liquidity in the property derivatives market curtails the range of applications that motivate real estate investment managers to use property derivatives. In addition, the lack of liquidity impedes the mark-to-market process. Among the chief concerns of the interviewed investment managers is the liquidity on closing a position out prior to maturity. Moreover, the shallow market depth does not allow placing larger volume trades, which excludes the larger funds from the group of potential users. The lack of depth and uncertainty around the costs of closing out a position severely limits their usefulness for purposes such as mitigating cash drag. In the same vein, with virtually no liquidity at sector and sub-sector levels, it becomes very difficult for investors to make meaningful use of this market.

One of the most intriguing factors with a high explanatory power is the pricing of property derivatives. It can be argued that, given the different views on pricing and the debate around it, there is still a misunderstanding as to what can be inferred from the current derivative prices and what should be the fair value of a property derivative. Two schools of thought have been identified. On the one hand, there is a forward-looking pricing approach and, on the other hand, a more market equilibrium-based approach. The first school of thought, which seems to be popular among the interviewed practitioners, views the current future price as the year-to-date performance plus the expected performance of the total return index until contract maturity. The second school of thought, which is closer to the

equilibrium models discussed in the literature, views the future price as the spot price, which requires an adjustment for the 3-month temporal lag in the total return index, plus carry costs, and plus a liquidity premium or discount for holding the derivative position. The liquidity premium or discount is dependent on the market cycle and whether investors value more the contract entry or the contract exit. The forward-looking approach, which is currently present in the market, is ultimately responsible for the unattractive pricing. The pricing levels do not allow earning property-like returns or hedging property exposure. Therefore, it is not possible to hedge a decline in asset values with the instruments because they provide less than necessary to cover the hedged assets. Moreover, the investors do not get compensated for the real estate market risk taken. This implies that property index futures do not price like those on any other investable asset class. The pricing issue also confirms the observations made by practitioners that only marginal upticks are traded at maturity of the derivative contracts. If the use of the instruments is limited to betting on whether forecasts are correct or not, then this feature casts some doubts on who the willing end users would be.

The biggest problem under which the pricing mechanism of property derivatives suffers is that the index itself is not tradable or investable, and it is hence impossible to determine the price with a no-arbitrage approach. Despite the fact that the majority of the interviewees who commented on the index topic consider the MSCI-IPD indices in the U.K. credible and reliable, there are strong arguments to the detriment of the index which cannot be ignored. The features of the index such as temporal lag, basis risk, changing index compositions, issues around the representativeness of the index and its transparency are perceived problems of practitioners and have high explanatory power as to why certain investors do not make use of the instruments. However, since the index does not present a problem for all interviewees, it can be argued that the index is not the sole reason for the reluctance of investment managers to use property derivatives.

In terms of influencing factors related to the market, the research results show that the lack of hedgers in the market and the small number of market players lead to homogeneity of market views which constitutes a serious impediment. What is needed is a two-way market with both buyers and sellers of real estate

market risk present. The lack of sellers in the market may suggest two things; the pricing is not attractive and/or investors do not have the need to hedge. The research results indicate both.

Concerning the investor expectations of real estate as an asset class, it can be argued that especially institutional investors are long-term investors who do not think short-term when it comes to assessing capital values. They are aware of the cyclicality of real estate which is often one part of a wider asset allocation strategy. Real estate risk is managed by limiting or reducing real estate exposure if necessary. The use of property derivatives, which are rather short-term investments, for creating long exposure seems to be a contrast to the expectations that they have when investing in real estate. Conversely, there is no need to hedge or quickly adjust real estate exposure because of the long cycle investment and potential divestment as ultima ratio.

Therefore, property investment managers do not have an incentive to use property derivatives because their task is to provide full exposure to the real estate asset class, or to a certain sector of it, and to manage that investment. Moreover, there is no benefit in reducing the exposure because that is something the investor would do at an asset allocation level. What investors usually want from an investment manager is a prudently managed property portfolio that provides returns in line with the mandate and commensurate with the real estate market risk taken.

With regard to the core remit of property investment managers, research results show that they comprise investing directly or indirectly in physical real estate and managing property investment prudently in order to get the best investment performance out of it. This requires a technical skill set which is different from trading derivatives. In addition, they do not feel the need to use the instruments because they are considered alien to their core domain which is physical property. Moreover, the core remit is to deploy capital in physical real estate and not in property derivatives. Using property derivatives is not part of their core competencies or conventional investment universe. There is no need felt to engage in property derivatives trading. What is more, the use of property derivatives would actually jeopardise the performance of the investment manager

under currently applied performance metrics. There is no guarantee that the use of property derivatives will help the property investment manager to deliver contractually agreed returns. To the contrary, their use might result in a loss, in which case the property investment manager has underperformed and has grounds to fear that clients will not invest in his/her fund anymore.

Other factors identified by the research with a contributing role are the following:

1. Understanding of the Market and Instruments – Need for Education (suggested by the literature);
2. Psychological Barriers;
3. Awareness of Current Instruments and Ways of Market Access;
4. Banks' Withdrawal from the Market;
5. Risk-Return-Profile; and
6. Introducing Additional Risk.

Even though interviewees acknowledged the need for more education about property derivatives which is in line with the literature on this topic, there were no comments made that suggest that the need for education is one of the main reasons for the reluctant use of property derivatives.

Similar to the understanding of the market and instruments is the awareness of current instruments and ways of market access. The research data is somewhat mixed on this topic, but it can be concluded that this factor is not a main driver influencing the propensity to employ property derivatives, rather it is certainly a contributing factor. Because the research results provide evidence for the presence of practitioners who are unaware of currently existing instruments and ways of market access, one conclusion that can be drawn is that the industry should provide more training and information campaigns in order to close the awareness gap.

Contrary to the common belief that the banks stopped facilitating liquidity of the property derivatives market because of increased regulatory capital requirements, research results show that there seems to be a combination of three factors that are interconnected. The first one is the lack of end user demand to use the instruments which leads to the second point, which is an increased

focus of banks on reducing risks and costs. With no demand, there is no justification to keep trading desks operating. This situation is exacerbated by increased regulatory capital requirements. Therefore, it cannot be stated that banks are accountable for the illiquidity in the market. The reason is with the end users and their lack of demand for property derivatives. The withdrawal of the banks has certainly exacerbated the problem of the perceived non-transparency in the market with regard to current pricing data which was criticised by many interviewees.

Moreover, the research results show that the risk associated with trading property derivatives is important to some investors and the expected returns must outweigh the risks assumed. The experience with the GFC has certainly led to a higher risk aversion among investors, especially when it comes to uncertainties around the outcome of an investment. Therefore, the risk-return profile is a contributing factor influencing the propensity to use property derivatives. It can be said that the fear of creating a loss with the property derivative position and the certainty of an outcome, which crystallises either a gain or a loss, creates a certain degree of discomfort among some practitioners. This psychological barrier, however, was not considered a major problem that keeps investment managers from trading property derivatives. Rather, it has a contributing role and there are additional perceived risks that influence the propensity to use property derivatives.

# Chapter 5. Conclusions and Recommendations

## 5.1 Summary of the Research

This study extended the research on property derivatives and the reasons for their reluctant use by investment managers. The aim of the research was to specify the motivations of potential investors to use property derivatives and to define their reasons for not employing the instruments. Furthermore, the perception of illiquidity was analysed, and the usefulness of the instruments examined.

The analysis of the literature underscored the importance of the underlying appraisal-based index and the negative impact of certain index features, such as the temporal lag and the volatility smoothing, as underlying instruments for derivatives. Another focus of the debate in the literature concerns the pricing of property derivatives with the aid of no-arbitrage models and equilibrium models. Moreover, the possible reasons for the reluctant use of property derivatives were identified in the literature and eight of these factors were tested as to their influence on the propensity of investment managers to employ property derivatives.

The research strategy chosen for examining these reasons was grounded theory because of its methodological and theoretical advantages. Among them are the simultaneous data collection and analysis, and the theoretical sampling technique. Moreover, the generated theory is grounded in and derived from the data which demonstrates legitimacy. In addition, grounded theory helps uncover the beliefs held by the investors active in the field; it explores their meanings and provides explanations for their present investment behaviour. To this end, 43 in-depth interviews were conducted with 46 investment managers, bankers, advisors, property investors, and brokers. The interviews lasted between 30 and 120 minutes.

The research results show 29 factors that influence the propensity of direct and indirect real estate investors in the U.K to employ property derivatives. Out of the 29 factors, the current research identified 12 factors with high explanatory power, 6 with a contributing role, and 11 with low explanatory power. Moreover, factors

previously discussed in the literature were tested and assessed as to their explanatory power. The total of 29 factors were divided into endogenous and exogenous factors based on their origin either within the property investment management organisation or outside of it. The endogenous factors were further broken down into two sub-levels which are the organisational level and the individual level. The exogenous factors, on the other hand, were further broken down into factors related to the market, to the instrument, to clients of investment management firms, and to the value system.

Three reasons have been identified as the sources of investor reluctance to trade in property derivatives. The first and main reason is related to a mismatch between motivations of property investment managers and what can be achieved with the instruments. The pricing level plays a very important role in this context, which prevents investors from meeting their return and hedging expectations.

The second reason, which ties in with the first one, is a general misunderstanding as to the right pricing technique of property derivatives. A commonly applied pricing technique is the forward-looking approach which considers the property index futures price a de facto forecast of where prices will be at maturity of the contract. The problem with this approach is that the futures price already implies the market sentiment which does not allow to earn the same total returns as with physical real estate. In addition, hedging becomes difficult because the market movement, that the hedge is supposed to protect against, is already implied by the futures price.

Finally, the third reason is a general lack of hedging demand from the investor base owing to the long investment horizons through market cycles. Investors in funds generally do not expect their investment managers to hedge against systematic real estate risk. Conversely, investment managers do not use property derivatives to manage systematic real estate market risk because they believe that their role is to provide full exposure to the real estate market via prudently managed properties that generate long-term stable income and capital growth.

## 5.2 Contributions to Theory and Practice

The research contributes to the literature on property derivatives in various ways. First, it extends the literature on market hurdles in property derivatives markets by testing and extending the hurdles that were proposed previously. This extension should help shifting the focus from analysing market features to examining the features related to the derivative instrument, especially the way in which it is priced.

Second, the research shows that the existing price models need to be extended in order to account for the risk perception of practitioners and their concerns with regard to liquidity levels.

For both theory and practice, the research has shown some limitations in using property derivatives for purposes such as creating index exposure or hedging. These limitations seem to run counter to the way the instruments were marketed in the past and the way in which some promoters would like to see them.

Another contribution, in this case to practice, is that this study provides a clearer picture as to the reasons that keep property investment managers away from using property derivatives. This picture should help those organisations involved in the market whose business model is to generate profits from transaction volume in the property derivatives market. It should help them to market the instruments in the right way and not to create false expectations among potential investors. Furthermore, it has been shown that liquidity per se is not a universal remedy for the problems in the market. In addition, practitioners should give more thought to the notion of real estate market risk and the commensurate returns that can reasonably be expected when they take or reduce it.

With regard to the existing regulations, it is the banks that come to mind as natural sellers of commercial real estate risk because of their commercial loan books and dependency on real estate market cycles. The current regulation under the Basel framework makes it difficult for banks to reduce regulatory capital when portfolios of loans are hedged with a property derivative. It would be recommended to allow them to sell their risk to other long-only investors that currently dominate the market.

## 5.3 Limitations of the Research

The aim of the current study was to identify and to better understand the main factors that influence the propensity of commercial real estate investors in the U.K. to employ property derivatives. The study is qualitative and exploratory in nature which entails certain limitations.

The limitations are in the areas of the research method (a), the data collection and sampling process (b), and the data analysis process (c) which ran simultaneously with the data collection and sampling.

(a) A limitation of the current research is that the factors which have been discovered branch out widely, which is due to the adopted qualitative research methodology, i.e. grounded theory. Additional focus could have been given by adding a quantitative part to the research in order to collect data on the weightings of the discovered and tested factors.

(b) Another limitation is, in this case with regard to the data collection and sampling process, that there is a bias towards practitioners who are knowledgeable about property derivatives and who showed a certain degree of interest in the instrument. Therefore, it was not possible to interview those who have basically no interest in property derivatives. In addition, only a small fraction of the interviewed practitioners did indeed trade property derivatives because of the reasons discussed in Chapter 4. An implication of this is that it is not possible to generalize the results beyond the given population and speak for all direct and indirect commercial real estate investors in the U.K. Moreover, the research could have tried to include asset allocators from pension schemes or insurance companies. The approaches that were made to interview representatives of these institutions remained, however, fruitless. Therefore, no conclusion can be drawn as to their motives and reasons for not using property derivatives.

(c) With regard to the data analysis process, a limitation is that, due to the number of factors that either emerged from the data or that have been tested, it was not possible to establish all the relationships and dependencies among the discovered and tested factors.

Lastly, not all themes or discovered influencing factors could be saturated due to constraints set by the number of interviewed practitioners and time spent in the field.

## 5.4 Recommendations for Product Improvements

There are a few considerations that might help improve property index futures. The first remark in this regard concerns the access to the instrument and the market. The lack of transparency around pricing was often criticized by interviewees. To improve this situation, there should be an open and easy-to-access IT system allowing those who are interested in the market to exchange their views on pricing. Such an IT system could, for instance, be provided by an exchange that has already the necessary infrastructure in terms of software, apps, and the like. In this way, both counterparties (i.e. the short and the long position of the trade) could express their views by posting price and volume of the positions they are willing to trade. At this stage, trade information would be exchanged on an informal and non-binding basis, however, visible and transparent for other market players. Once matching counterparties are found, they could be given, in a next step, the opportunity to enter legally binding contracts with the central counterparty sitting between them. This would improve the transparency of the price formation process and provide indications as to where fair values are prior to maturity. Moreover, data transparency could be improved by showing historical trade data from property index futures, for instance, on the web page of the stock exchange, which enables investors to run their analysis and to draw their own conclusions as to volatilities and historical losses.

Another area of improvement is the underlying appraisal-based index with its inherent issues such as temporal lag and volatility smoothing. Reducing the temporal lag and increasing the transparency as to the constituent cash flows from the data contributing properties would certainly improve the situation. Moreover, some of the interviewees were calling for a separation between the income and capital return components of the index. Due to lower volatilities in the income part of the index, the capital return component only could be used as the underlying instrument.

Currently, the geographical coverage of property index futures is limited to indices based on commercial real estate in the U.K. An extension to include other countries may be, therefore, interesting for investors and increase the attractiveness of the instruments. This, however, would require an alignment of the real estate appraisal techniques which are not consistent across countries. In addition to a wider geographical coverage, it may prove useful to have property index futures written on residential real estate. A challenge in this context would be to find an index that fulfils the requirements of a stock exchange in terms of reliability, transparency, consistency, and integrity.

## 5.5 Recommendations for Future Research

Future research should focus on the following three areas. The first area is the improvement of the underlying index in terms of index lag and volatility smoothing. The index creates a lot of difficulties when pricing property derivatives. Since neither appraisal-based nor transaction-based indices provide satisfactory results, alternatives should be pursued that allow, for instance, the market to price property yields directly via an electronic platform. The second area is the pricing of property index futures and other derivative instruments. The equilibrium models which started to emerge in the literature seem promising but should be adjusted by using real trade data in order to determine the influence of transaction costs, index lag, and different perceptions of liquidity. The third area is the further analysis of asset allocators and the potential reasons for their reluctance to use property derivatives because they could make use of the

instruments for rebalancing asset allocations (e.g. between real estate, equities, and bonds).

# Appendices

## Appendix A: Development of the Property Derivatives Market from a U.S. Perspective

Besides the impact of changed regulations on the banking sector, there are not many similarities in the development of the U.S. and U.K. markets. The year 2005 was an important milestone when the National Council of Real Estate Investment Fiduciaries (NCREIF)[169] granted an exclusive license to Credit Suisse First Boston (CFSB), today Credit Suisse, allowing them to use the NCREIF Property Index (NPI) as underlying index for commercial property derivatives in the U.S. (Clayton, 2007). The license was made available for more banks in 2007, removing CFSB's monopoly position in this field. CSFB offered swaps on the appreciation return of the NPI and on the total return component of two different NCREIF property sectors (Fisher, 2005; Clayton, 2007).

In 2006, the first and thus far only U.S. stock exchange, the Chicago Mercantile Exchange (CME), began offering residential property index futures and options. Currently[170], the electronic trading platform CME Globex provides a Composite Index Future contract and 10 metropolitan area futures contracts for the major U.S. cities based on the S&P/Case-Shiller Home Price Index[171]. The contracts mature in February, May, August, or November. Interestingly, the final settlement prices for the S&P/Case-Shiller index futures are equal to the corresponding index values as determined for the three-month period (data period) ending two calendar months prior to the contract month. A possible reason for this procedure is to lessen the effect of potential index revisions which are discussed in section 2.3.1.4. The trading activity, however, remains very low as depicted in Figure A.1 for the daily trading volume and in Figure A.2 for the monthly trading volume for the period from 2011 to 2015.

[169] The National Council of Real Estate Investment Fiduciaries (NCREIF) is a not-for-profit trade association that collects and processes commercial real estate data and that produces performance measurement indices for the U.S. market. Their flagship index is the NCREIF Property Index (NPI). For further information, see https://www.ncreif.org/index.aspx.
[170] As of March 2017.
[171] The S&P/Case-Shiller Home Price Indices are repeat sales indices based on data gathered at local deed recording offices across the U.S. The indices are value-weighted and calculated monthly using a three-month moving average.

The U.S. property derivatives market lags behind the development in the U.K. Possible reasons are the lack of comparable indices such as the MSCI-IPD in the U.K. and the larger knowledge gap between real estate traders and derivatives traders in the U.S. (Fabozzi et al., 2012).

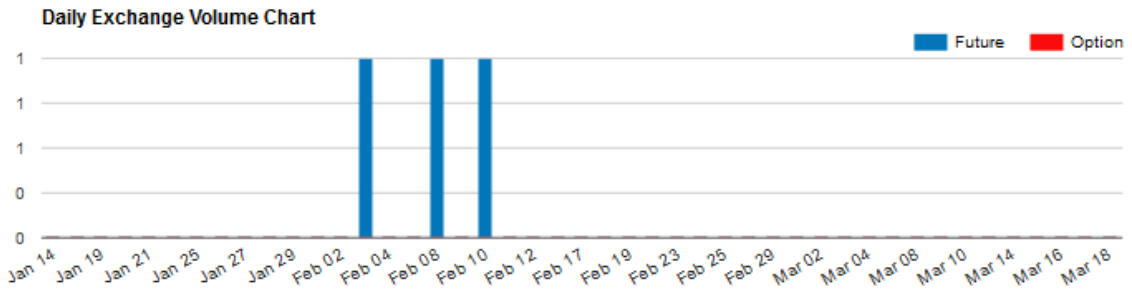


Figure A.1: Daily futures trading volume on the CME in Q1/2016 (Source: CME, 2016)

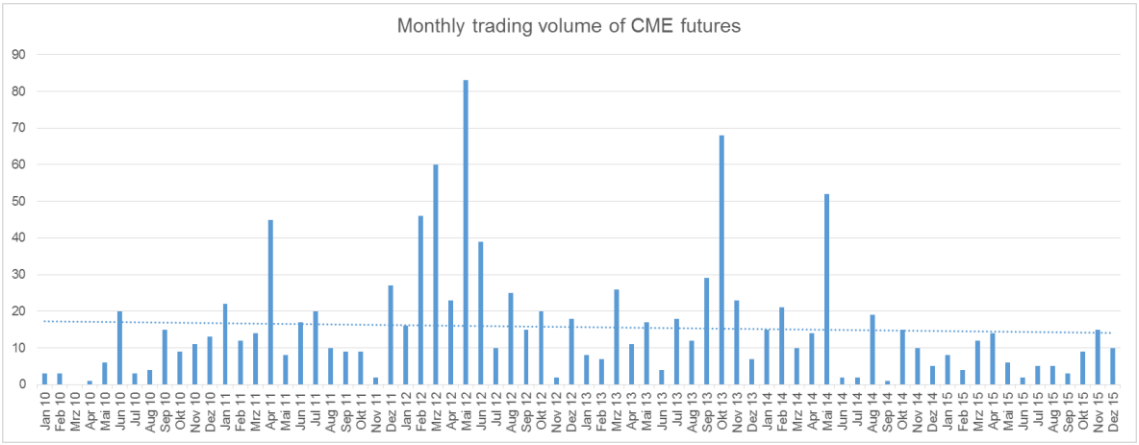


Figure A.2: Monthly trading volume from 2011-2015
(Source: www.homepricefutures.com)

## Appendix B: Schedule 26 to the Finance Act 2004

Schedule 26 to the Finance Act 2004 clarified that all profits arising from its contracts shall be chargeable to tax as income or relieved in case of arising losses. For the companies applying fair value accounting (either under FRS[172] 26 or IAS[173] 39), this would mean that the fair value of the derivative contract "is recognised in a company's profit and loss together with any amounts actually paid or received under the derivative contract" (Johnson and Miller, 2005, p. 18). In this context an important distinction is made as to whether the profits from property derivatives contracts are treated as taxable income or capital gains. Amounts arising from contracts based on an index that tracks the property income component will be taxed or relieved as income (Johnson and Miller, 2005). If the index underlying the contract is based on the capital appreciation movement of properties, then the amounts will be treated as capital gains or allowable losses (Johnson and Miller, 2005). Matters become more complex when contracts are based on the total property return index (Johnson and Miller, 2005). The changes in fair values of derivatives contracts need to be brought into account which can induce additional account volatility. The two-year carry back rule allows setting off the capital losses from a derivative contract against its capital gains within a two-year window (Johnson and Miller, 2005). The limitation of two years may be problematic in case of long-term derivatives contracts.

[172] Financial Reporting Standards.
[173] International Accounting Standards.

## Appendix C: Traded Property Futures Contracts and Open Interest on Eurex

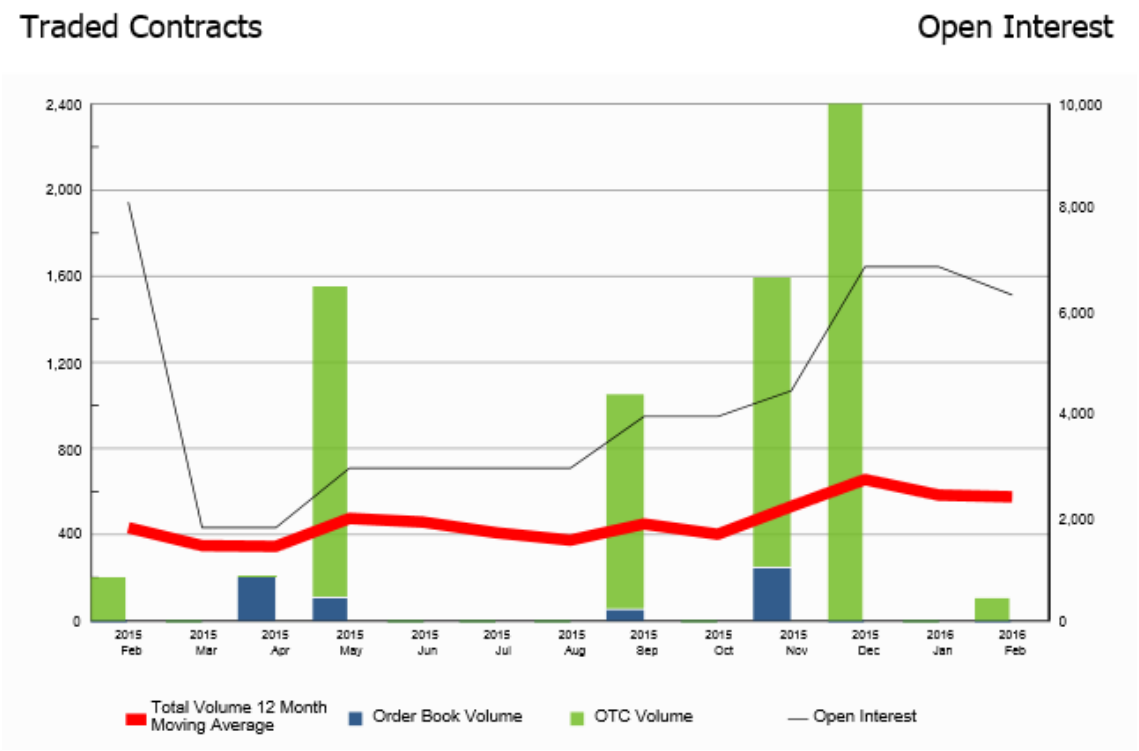


Figure C.1: Volume of traded contracts and open interest of property futures on Eurex (Source: Eurex (2016), p. 117)

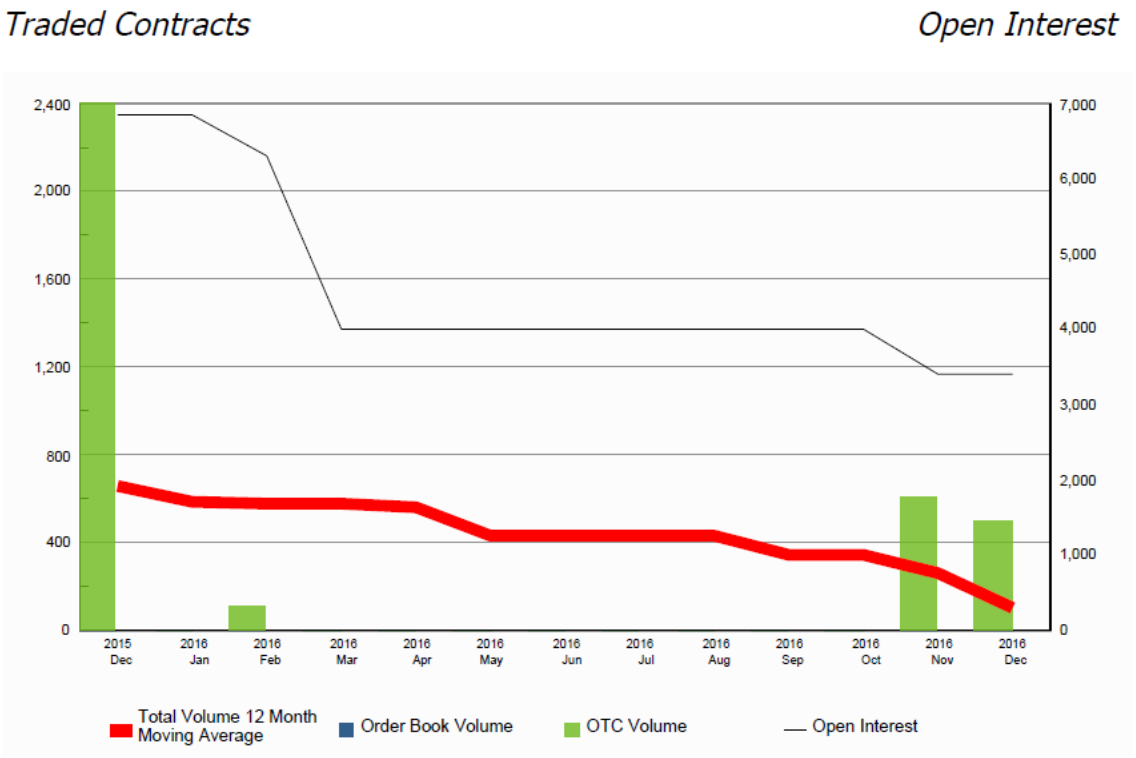


Figure C.2: Volume of traded contracts and open interest of property futures on Eurex in 2016 (Source: Eurex Monthly Statistics, December 2016, p. 108)

## Appendix D: Calculation Method of MSCI-IPD index and NPI

MSCI-IPD uses two sources of data for the calculation of performance measures which are both provided by data contributing clients from their portfolios, namely: valuation data including lease details and accounting data in form of capital expenditure and operating costs.

With this data the capital growth can be calculated for the period of measurement (monthly, quarterly, or annually) and the corresponding income return. MSCI-IPD use the following formula for the calculation of the capital (value) growth:

$$CVG_t = \left( \frac{CV_t - CV_{(t-1)} - CExp_t + CRpt_t}{CV_{(t-1)} + CExp_t} \right) \times 100 \qquad (1)$$

Where:

$CV_t$ is the capital value at the end of month t;

$CExp_t$ is the capital expenditure (includes purchases and developments) in month t;

$CRpt_t$ is the capital receipts (includes sales) in month t;

It is assumed that capital expenditures occur at the beginning of the month and capital receipts and income occur at the end of the month.

The income return is calculated using the following formula:

$$INCR_t = \left( \frac{NI_t}{CV_{(t-1)} + CExp_t} \right) \times 100 \qquad (2)$$

Where:

$NI_t$ is the day-dated rent receivable during month t, net of property management costs, ground rent and other irrecoverable expenditures.

The total return is calculated using chain-linked time-weighted rates of return with the following formula:

$$TR_t = \left(\frac{CV_t - CV_{(t-1)} - CExp_t + CRpt_t + NI_t}{CV_{(t-1)} + CExp_t}\right) \times 100 \quad (3)$$

In other words, this formula can be expressed as:

$$Total\ return = \frac{Change\ in\ capital\ value - capital\ expenditure + net\ income}{Capital\ employed}\ [\%] \quad (4)$$

A slightly different approach is taken by NCREIF to calculate the NPI index. An important point is that valuation practices in the U.S. are not as standardised as they are in the U.K. (Syz, 2008) which may impact the way valuations are conducted. NCREIF provides valuation guidelines and standards but it is not mandatory to follow them. The only requirement in terms of valuations is the frequency, which is at least quarterly to be performed either by an external or internal appraiser.

The NPI index is constructed in such a way that the quarterly returns of individual properties are weighted by their market value. Index values are calculated for income return, capital value, and total returns. As with MSCI-IPD, the total return is the sum of income return and capital value return. The capital value return measures the change in market value from one period to the next. The corresponding Equation (5) takes capital improvements and partial sales into account that occurred during the observation period:

$$CVR = \frac{(EMV - BMV) + PS - CI}{BMV + \frac{1}{2}CI - \frac{1}{2}PS - \frac{1}{3}NOI} \quad (5)$$

Where:
EMV is the ending market value;
BMV is the beginning market value;
PS are partial sales;
CI are capital improvements;
NOI is the net operating income.

Generally, it is assumed that the net operating income (NOI) is received at the end of each month during each quarter and that both capital improvements (CI)

and partial sales (PS) occur at mid-quarter. Hence the factors ½ and ⅓ in the denominator of the formulas above.

The income return (IR) is calculated as follows:

$$IR = \frac{NOI}{BMV + \frac{1}{2}CI - \frac{1}{2}PS - \frac{1}{3}NOI} \quad (6)$$

A general overview on index providers in the U.S. and U.K. is shown in the table below:

| Country | Residential real estate indices | Commercial real estate indices |
|---|---|---|
| U.S. | S&P/Case-Shiller Home Price Indices | NCREIF/NPI* |
| | CoreLogic National Home Price Index | Moody's/RCS CPPI |
| | Federal Housing Finance Agency (FHFA)/HPI | ReXX |
| | U.S. Census Bureau Price Index of New Houses | S&P/GRA commercial property index (delisted)** |
| | RadarLogic/RPX-Index from | Moody's/REAL commercial property index (CPI)** |
| | | Real Capital Analytics (RCA) |
| U.K. | Markit/Halifax/HPI | MSCI/IPD* |
| | Nationwide | |
| | Rightmove | |
| | Department of Communities and Local | |
| | Government | |
| | Land Registry | |
| | LSL/Acadametrics index | |

Table D.1: Major real estate indices in the U.S. and U.K. (Appraisal-based*, Transaction-based**)

Critics (e.g. Ducoulombier, 2007) say that the NPI cannot be considered a representative index of direct real estate because of its low market coverage, the large portion of core prime properties which are not representative for the market as a whole, and the overemphasis on tax-exempt institutions as they provide the data (Ducoulombier, 2007). Unlike IPD's dominance and market coverage in Europe, the NCREIF Property Index represents only about 5 to 7 per cent of the commercial property market according to Syz (2008). Another point to add is that not all properties are seriously or independently reappraised every period which adds an additional lag into the index (Geltner and Fisher, 2007). The abundance of appraisal activities towards the end of the year imparts artificial seasonality to

the index which tends to spike in the fourth quarter (Geltner and Fisher, 2007). In addition, the index returns of the NPI are more predictable than the ones from the IPD index in the U.K. and show a $R^2$ of 63% in the period from 1978-2010 (Rehring and Steininger, 2011).

Due to its shortcomings, the NPI is not well suited to tracking the short-term value-change of commercial real estate (Lecomte and McIntosh, 2006). From this follows that the NPI is not a suitable underlying for short-term derivatives.

Based on personal communication with NCREIF from February 2016, there are currently no banks licensed to use the NCREIF indices as underlying instrument for property derivatives in the U.S. By the same token, there are no standardised property derivative products based on the NPI offered by exchanges.

## Appendix E: Contract Specifications of Property Futures Contracts

| Specifications | S&P/Case-Shiller Home Price Index Contract Specs (Source: www.cmegroup.com, accessed on June 24, 2016) | MSCI-IPD U.K. Index Contract Specs (Source: www.eurexchange.com, accessed on June 24, 2016) |
|---|---|---|
| **Contract Unit** | $250 times the S&P/Case-Shiller Metro Area Home Price Indices (e.g. index level at 200 = $50,000 notional amount) | The contracts have a nominal size of GBP 50,000 and a par value of 100. |
| **Price Quotation** | 1 point = $250.00 | 1 point = GBP 500 |
| **Minimum Price Fluctuation** | 0.2 = $50.00 | The minimum price change is 0,05 per cent, equivalent to a value of GBP 25. |
| **Contract Years** | Settlement in February, May, August, and November for the current and the following year. Settlement in May and November for years two and three in the future. Settlement in November for year four in the future. | Each contract will be based upon the total return of the respective IPD property index for an individual calendar year. The **five nearest successive annual contracts** of the **February** cycle are tradable at any time. |
| **Settlement Method** | Cash settlement | Cash settlement |
| **Daily Settlement Price** | Tier 1: If a trade(s) occurs on Globex between 13:59:00 and 14:00:00 Central Time (CT), the settlement period, the contract settles to the volume-weighted average price (VWAP) of the trade(s) during this period.<br><br>Tier 2: If no trades occur on Globex between 13:59:00 and 14:00:00 CT, then the last trade (or prior settle in the absence of a last trade price) is used to determine whether to settle to the current bid or the current ask.<br><br>If the current bid is higher than the last trade/prior settlement price, then the contract settles to the bid. If the current ask is lower than the last trade/prior settle, then the contract settles to the ask. The contract settles to the last trade/prior settle if it is equal to or between the bid and the ask. | The daily settlement prices for the current maturity year are derived from the volume-weighted average of the prices of all transactions during the minute before 17:30 CET (reference point), provided that more than five trades were transacted within this period. |
| **Final Settlement Procedure** | Final settlement prices are equal to the value of the reference metro area home price index as determined for the three-month period, or the "data period," **ending two calendar months prior to the contract month**. | The final settlement price is established by Eurex on the final settlement day. The final settlement price shall reflect the nominal par value of 100 plus the compound quarterly total returns or minus a loss for the respective index during the calculation period of one calendar year which is subject to being calculated. It is determined in per cent; the decimal places are rounded to the next possible interval of 0.005, or 0.01, or multiples thereof. |

Figure E.1: Contract Specifications of Property Future Contracts

## Appendix F: Summary of Characteristics of Various Property Derivative Instruments

| | Structured notes | Swaps | Forwards | Futures |
|---|---|---|---|---|
| **Principal exchange** | Yes | No | No | Initial margin |
| **ISDA documentation required** | No | Yes | Yes | No |
| **Credit Support Annex (CSA) required** | No | Yes | Yes | No |
| **Trading place** | OTC | OTC | OTC | Exchange |
| **Counterparty risk** | Yes | Yes | Yes | No |

Table F.1: Characteristics of property derivatives (Source: IPF, 2010, RBS, 2010)

## Appendix G: Overview of Conducted Interviews

| No. | Type of Organisation | Position of Interviewee | Duration [min] | Type of Interview | Chronological Order[174] |
|---|---|---|---|---|---|
| 01 | Fintech firm | Managing Director | 52 | Face-to-face | 1 |
| 02 | Stock exchange | Non-Executive Director | 48 | Face-to-face | 2 |
| 03 | Bank | Head of Property Derivatives | 28 | Face-to-face | 6 |
| 04 | Bank | Former Director Rates Sales | 35 | Via telephone | 31 |
| 05 | Bank | Former Managing Director Property Derivatives | 41 | Via telephone | 33 |
| 06 | Bank | Former Senior Director | 59 | Via telephone | 34 |
| 07 | Bank | Former Head of U.K. Insurance and Pensions, Managing Director | 37 | Via telephone | 36 |
| 08 | Bank | Former Senior Trader Property Derivatives | 58 | Via telephone | 38 |
| 09 | Brokerage firm | Directors[175] | 58 | Face-to-face | 3 |
| 10 | Brokerage firm | Executive Director, Indirect Property and Derivatives | 105 | Face-to-face | 17 |
| 11 | Brokerage firm | Former Broker | 36 | Via telephone | 27 |
| 12 | Advisory firm | Senior Investment Consultant | 49 | Face-to-face | 5 |
| 13 | Advisory firm | Head of Group Research | 30[176] | Via telephone | 30 |
| 14 | Investment Management Firm - Direct Property | Fund Strategist Real Estate | 80 | Via telephone | 4 |
| 15 | Investment Management Firm - Direct Property | Researcher | 28 | Face-to-face | 7 |
| 16 | Investment Management Firm - Direct Property | Researcher | 101 | Face-to-face | 10 |
| 17 | Investment Management Firm - Direct Property | Strategic Advisor | 82 | Face-to-face | 11 |
| 18 | Investment Management Firm - Direct Property | Head of U.K. Property Pooled Funds | 54 | Face-to-face | 12 |
| 19 | Investment Management Firm - Direct Property | Property Fund Manager | 55 | Face-to-face | 13 |
| 20 | Investment Management Firm - Direct Property | Head of Global Real Estate | 37 | Face-to-face | 16 |
| 21 | Investment Management Firm - Direct Property | Head of European Real Estate | 45 | Face-to-face | 21 |
| 22 | Investment Management Firm - Direct Property | Property Fund Manager | 29 | Face-to-face | 22 |
| 23 | Investment Management Firm - Direct Property | Fund Analyst | 66 | Face-to-face | 9 |
| 24 | Investment Management Firm - Direct Property | CIO | 33 | Face-to-face | 8 |
| 25 | Investment Management Firm - Direct Property | Property Fund Manager | 36 | Face-to-face | 15 |
| 26 | Investment Management Firm - Direct Property | Director Fund Management | 58 | Via telephone | 24 |
| 27 | Investment Management Firm - Direct Property | Senior Fund Manager | 63 | Via telephone | 35 |
| 28 | Investment Management Firm - Direct Property | Global Investment Strategist - Property | 46 | Via telephone | 39 |
| 29 | Investment Management Firm - Direct Property | Former Head of Research | 64 | Via telephone | 40 |
| 30 | Investment Management Firm - Direct Property | Former Director Property Derivatives | 34 | Via telephone | 41 |
| 31 | Investment Management Firm - Indirect Property | Fund Manager | 31[177] | Face-to-face | 18 |

[174] This is the chronological order in which the interviews were conducted. When an interview number is referred to in the text, it is the chronological number that is indicated.
[175] Conducted as group interview with three participants.
[176] The interviewee did not agree to be recorded.
[177] The interviewee did not agree to be recorded.

| No. | Type of Organisation | Position of Interviewee | Duration [min] | Type of Interview | Chronological Order[174] |
|---|---|---|---|---|---|
| 32 | Investment Management Firm - Indirect Property | Investor Relations/Fund Manager | 118 | Face-to-face | 19 |
| 33 | Investment Management Firm - Indirect Property | Senior Fund Manager[178] | 69 | Via telephone | 26 |
| 34 | Investment Management Firm - Indirect Property | Head of Property Multi-Manager | 42 | Via telephone | 28 |
| 35 | Investment Management Firm - Indirect Property | Funds Development Director | 51 | Via telephone | 29 |
| 36 | Investment Management Firm - Indirect Property | Indirect Property Fund Manager | 34 | Via telephone | 25 |
| 37 | Investment Management Firm - Indirect Property | Head of Real Estate Investment | 46 | Via telephone | 37 |
| 38 | Investment Management Firm - Indirect Property | CFO, Alternatives and Real Assets | 30 | Via telephone | 42 |
| 39 | U.K. REIT | Head of Investment | 37 | Face-to-face | 14 |
| 40 | U.K. REIT | Group Financial Director | 51 | Via telephone | 32 |
| 41 | U.K. REIT | Head of Investor & Corporate Communications | 30 | Via telephone | 43 |
| 42 | Real Estate Private Equity Fund Manager | Chief Investment Officer | 38 | Via telephone | 23 |
| 43 | Property Development and Investment Company | Group Corporate Finance Manager | 60 | Face-to-face | 20 |

Table G.1: Overview of conducted interviews

[178] Group interview with two interviewees.

## Appendix H: Interview Questions Used for the Current Research

| No. | Questions |
|---|---|
| | **Endogenous Factors** |
| **A.** | **Organisational Level** |
| **1.** | **Motivations for Using Property Derivatives and Corresponding Return Expectations** |
| | What would be your motivations for using property derivatives? |
| | What do you think is the core remit of using property derivatives? |
| | What would be your goal or desired outcome when using the instruments? |
| | What are your expectations from using property derivatives? |
| | When you look at property derivatives and decide whether to use them or not, do you consider them an alternative to the physical property investment? |
| | When used as investment: When a property derivative position is used to create index exposure; do you expect the same, lower, or higher returns compared to the physical investment? |
| | Cash drag: Does cash drag play a role in your funds? |
| | Cash drag: Generally speaking and with regard to cash drag; at what rate are received funds invested until their final deployment? |
| | Cash drag: What are the return level expectations relative to the physical real estate when investing in property derivatives to mitigate cash drag? |
| | Cash drag: Does the difference between the property yields and the interest rate / risk-free rate matter? |
| | Hedging: When you consider a hedge, do you expect to cover both income and capital return, or only capital return? |
| | Hedging: What return do you expect from your hedged asset after eliminating market risk with a property derivative? |
| | Hedging: How important is the hedging effectiveness of property derivatives for you? |
| **2.** | **Decision-Making Process to Employ Property Derivatives** |
| | Are you currently trading property derivatives? |
| | Have you done so in the past? |
| | Can you describe the decision making-process that leads or led to this decision? |
| | Who is the decision-making unit? Who decides in the end? With whom rests the power of decision to employ property derivatives? |
| | Provided the fund manager is allowed to employ property derivatives by his mandate, who in the organisation decides then to use them or not to use them? |
| | Is the decision to employ property derivatives made at the discretion of the fund manager? |
| | How involved is the research team in the decision-making process? |
| | Are there external advisors involved as well? |
| | What are the stars that need to be in alignment in order for you to decide to employ property derivatives? What conditions need to be fulfilled? |
| | How quickly can the decision be made in case an attractive opportunity arises? |
| | Are the investors / trustees involved in the decision-making process? |
| | Who educates or persuades the decision-maker? (e.g. trustees) |
| | What internal barriers have to be overcome in order to use property derivatives? |
| | How would you like to be compensated for these risks relative to physical real estate returns (i.e. in basis points)? |
| | When would you consider property derivatives pricing levels attractive? |
| | What role does the level of knowledge play that is within the organisation on the one side and that clients or trustees have on the other? |
| | How would the investment committee or risk committee view the current illiquidity prevailing in the property derivatives market? |

| No. | Questions |
|---|---|
| **3.** | **Administrative and Operational Requirements** |
| | Is your organisation/fund set up to trade property derivatives? |
| | If not: How difficult is it to get set up? |
| | What role does the administrative and operational setup play to trade property derivatives? |
| | Who is supposed to own the process of managing the property derivatives contracts (i.e. entering and exiting a contract, cash management)? (fund manager vs. designated property derivatives person) |
| | Who would be the process owner of the property derivatives trade if you or your organisation were trading property derivatives? |
| | What are the dependent factors of the implementation process? |
| | What is the implementation direction (top-down vs. bottom-up)? |
| | What are the departments that would be involved in this process? |
| **4.** | **Hedging Strategies** |
| | What is your hedging strategy to hedge market risk, i.e. systematic risk? |
| | What constitutes market risk in your opinion? |
| | Is it necessary to hedge real estate market risk? And why? |
| | What are the risk management strategies that you apply? |
| | Are there other strategies used to manage the exposure indirectly? |
| | What level of risk management do your investors or clients expect from you? |
| | Are your investors/clients willing to accept temporary drops in capital values of the fund's properties as long as the investment provides an attractive income? |
| | Are your investors aware of the cyclicality in the real estate market? |
| | How do they manage the risk of their real estate investments? How do they hedge? |
| | How important is the control over timing with regard to investing in and divesting real estate? |
| | Would you be willing to surrender return for reducing or eliminating market risk? |
| | Are investors generally willing to give up the upside potential of the capital return when they can keep the income return and are hedged against a decline in the capital return? |
| | What are your hedging needs when it comes to property investments? |
| | What type of return would you like to hedge (total return, income return, capital return)? |
| | What are the expectations of your clients/investors when it comes to hedging real estate market risk? |
| | Why is it (not) important to you and them to hedge that kind of risk? |
| | Why don't you employ property derivatives to hedge your property portfolio? |
| | How volatile is the income stream that is generated by the properties in your fund? |
| | Do you deem it necessary to hedge that income stream? |
| | How important is the hedging effectiveness? |
| **B.** | **Individual Level** |
| **1.** | **Understanding of the Market and Instruments – Need for Education** |
| | How important do you think a sound understanding of the instrument and the market for the employment of property derivatives is? |
| | At what level is education necessary (e.g. operational, managerial, client level)? |
| | Have you introduced the idea of using property derivatives to your clients/investors? |
| | If not: Why not? |
| | Who should educate investors/clients in your opinion? |
| | Would you say that there is generally openness towards financial innovations among practitioners in the field? |

| No. | Questions |
|---|---|
| **2.** | **Psychological Barriers** |
| | What are the psychological barriers that keep you from employing property derivatives? |
| | What risks do you associate with the use of property derivatives? |
| | If losses: Is the possibility of losing money more concerning than the possibility of realising a profit? |
| | What are the issues related to potential losses? Is there a fear for possible job-related consequences? |
| | What are the reasons for the lack of comfort when dealing with property derivatives? |
| **3.** | **Perception of Fund Managers Towards Property Derivatives** |
| | What is your perception of property derivatives? |
| | Do you expect that the instruments are being offered to you as opposed to you reaching out actively to the market? |
| | If the former: Who should offer the instrument? |
| | Are you currently monitoring the market? |
| | What are the critical success factors for the acceptance of property derivatives by real estate investors? |
| **4.** | **Awareness of Current Instruments and Ways of Market Access** |
| | Are you aware of the products currently available on the market? |
| | How do you or would you access the property derivatives market? |
| | Do you expect to be approached by an intermediary? |
| | If so: By whom? |
| **5.** | **Disproportion Between Effort and Impact** |
| | Do you think there is a disproportion between the effort to get setup, to obtain internal and external approvals, etc., and the impact property derivatives have on the fund performance? |
| | What contract volume would you consider worthwhile? |
| | What impact on the fund performance in basis points [bps] would you consider worthwhile? |
| | What is the minimum contract length that you would consider meaningful and worth the effort? |
| **6.** | **Demonstrating Practical Competence** |
| | How important do you think it is to be able to demonstrate practical competence in dealing with property derivatives? |
| | a) within the organisation to get clearance from investment and risk committees? |
| | b) in relation to clients? |
| | To what extent would practical competence lower the psychological barrier? |
| | **Exogenous Factors** |
| **A.** | **Market-Related Exogenous Factors** |
| **1.** | **Structural Change in the Property Derivatives Market Evolution** |
| | *Facilitating the Market and the Role of Intermediaries* |
| | Why did the banks stop trading property derivatives and what was the cause of that? |
| | Why is not possible for the banks to warehouse risk anymore? |
| | What makes warehousing risk prohibitively expensive? |
| | What exactly are the restrictions preventing the banks from being active in the market? |
| | Did pricing work before the GFC because income was swapped for LIBOR which was higher at that time? |
| **2.** | **Banks' Withdrawal from the Property Derivatives Market** |
| | - separate catalogue of questions - |
| **3.** | **Notion of Illiquidity** |

| No. | Questions |
|---|---|
| | What is your perception of liquidity? |
| | When does illiquidity in the property derivatives market become a problem? |
| | What trading volume would you consider liquid? |
| | What is more problematic; the liquidity on contract entry or exit? |
| | What problems arise when the capital is locked in until maturity? |
| | What justification does volume provide (e.g. ease of deal entry and exit, legitimacy of these instruments through peer activity)? |
| | What would be the holding period if you were invested in property derivatives? |
| **4.** | **Pricing of Property Derivatives** |
| | *Transparency of the market* |
| | How do you access property derivatives pricing data? How do you obtain pricing information? |
| | Do you consider the market transparent? |
| | *Marking to market* |
| | Do you see any issues with marking the instruments to market? |
| | How do you or would you mark the instruments to market? |
| | Does the mark-to-market issue pose a problem for the internal approval processes? |
| | *Index* |
| | What component of the index would you trade; capital return, income return, or total return? |
| | *Pricing* |
| | Do you monitor the property derivatives pricing? |
| | What does the current futures price tell you? |
| | Do you view futures prices as the market's expectation of total return values at the maturity of the underlying MSCI-property derivatives index? |
| | Do you agree that the current value of a property futures contract is the year-to-date total return performance plus the expectation for the remainder of the contract period? |
| | What should an investor receive in terms of returns for taking real estate market risk; capital return, income return, or total return? |
| | How should the liquidity be considered in the derivative price? |
| | How should the lower transaction costs of the property derivative be reflected in its price? |
| | Would you say that current property derivative prices are too high? |
| | *Relative value pricing* |
| | How important is the relative value pricing of property derivatives for you? |
| | Is it a necessary condition that the property derivatives contract generates returns in access of the physical real estate market? |
| | When do you consider property derivatives pricing attractive? |
| | Does ring-fencing play any role? |
| **5.** | **Importance of Market Actors** |
| | What influence does peer activity have on your decision-making process to employ property derivatives? |
| | If everybody in the market was using the instrument, would you as well? |
| | Would the presence of trailblazers encourage you to join the market? |
| **6.** | **Homogeneity of Market Views** |
| | Is there homogeneity in the market views with regard to the property derivatives U.K. All Property level and various sector levels? |
| | Is there bigger difference of opinion with the sub-sectors than there is with the All Property index? |
| **B.** | **Product-Related Exogenous Factors** |

| No. | Questions |
|---|---|
| **1.** | **Importance of Real Estate Indices for the Use of Property Derivatives** |
| | What is the benchmark the fund performance is measured against? |
| | How important is the outperformance of the benchmark? |
| | How satisfied are you with the MSCI-IPD index quality in the U.K. with regard to capturing the performance of the underlying market and its representation by the indices? |
| | And outside the U.K.? |
| | Are you satisfied with the index frequency? |
| | Would you like to have more transparency as to the constituent properties of the MSCI-property indices? |
| | When the index is used as an underlying instrument for futures, would you prefer to have it based on the capital component of the index only? |
| **2.** | **Risk-Return-Profile** |
| | Do you consider the risk-return profile of property derivatives not attractive enough? |
| | What do you consider more problematic; is the associated risk too high or the expected return too low? |
| **3.** | **Negative Connotations Associated with Derivatives** |
| | What connotations do you associate with derivatives in general and property derivatives in particular? |
| | And your fund investors? |
| | What influence does the GFC have in this regard? |
| **4.** | **Ambiguities Concerning the Taxation of Property Derivatives** |
| | Are there any uncertainties as to the fiscal treatment of gains and losses incurred during the contract term of a property futures contract? |
| **5.** | **Availability of Products** |
| | How satisfied are you with currently available property futures on Eurex? |
| | Do you believe there should be a greater variety of products available? |
| | Do the currently available property futures contracts meet your requirements? |
| | The exchange-traded derivatives are based on the MSCI-property derivatives total return index. Would you prefer derivatives written on any of its constituent parts (income or capital)? |
| **6.** | **Conflicting Investment Horizons** |
| | What investment horizon would you require if you were to use property derivatives? |
| **7.** | **Induced Accounting Volatilities** |
| | What is your experience with accounting volatilities induced by the mark-to-market procedure of the property derivative position? |
| | What is your experience with hedge accounting when using property derivatives? |
| | Are you aware of recent changes to the applicable tax law? |
| | How do you mark the instruments to market? |
| **8.** | **Introducing Additional Risk** |
| | What additional risks are introduced when using property derivatives in your opinion? |
| | How would you like to be compensated for these risks relative to physical real estate returns (i.e. in basis points)? |
| **C.** | **Client-Related Exogenous Factors** |
| **1.** | **Investor Expectations of Real Estate as an Asset Class** |
| | What are the prime reasons of your investors for investing in real estate? |
| | What do your investors expect from real estate as an asset class? |
| | Are they more interested in the income return or in both income and capital return? |
| | Do they prefer physical over synthetic real estate? |

| No. | Questions |
|---|---|
| | Are your investors aware of the cyclical nature of real estate? |
| | How long are their holding periods? |
| | Are yields applicable in real estate dependent on the yield levels prevailing in other asset classes? Is there any rule of thumb (e.g. corporate bond rates plus 2-3%)? |
| **2.** | **Investor Expectations of Real Estate Investment Managers** |
| | What do your investors expect from you as a fund manager? |
| **3.** | **Restrictions by Fund Mandate, Fund Prospectus or Investment Management Agreement** |
| | Is the fund mandate, investment management agreement, or fund prospectus restricting the use of property derivatives in any way? |
| | Is there any group of investors that is excluded from using property derivatives due to regulatory restrictions? |
| | Ring-fencing: What role does ring-fencing play when using property derivatives? |
| | When ring-fencing a property derivatives investment: What is the amount that needs to be ring-fenced? Notional amount of the property derivatives trade or notional amount minus margin? |
| | Where do the restrictions to use property derivatives by pension funds come from? |
| **D.** | **Value-System-Related Exogenous Factors** |
| **1.** | **Remit of Property Investment Managers** |
| | What do you think belongs to the remit of a fund manager? |
| | Would you say that using property derivatives belongs to this remit? |
| | Is there a pre-defined role of the property fund manager that prevents him/her from using property derivatives? |
| **2.** | **Metrics of Measuring Investment Performance** |
| | How is the investment management performance of the fund manager being measured? |
| | How and by whom is the current performance measured, i.e. the performance which is then compared with the benchmark? |
| | How common is it to apply absolute return strategies? |

## Appendix I: Checkpoints for Evaluating the Methodological Consistency of a Grounded Theory Study

Source: Corbin and Strauss (2015, pp. 350-351)

1. What was the target sample population? How was the original sample selected?

2. How did sampling proceed? What kinds of data were collected? Were there multiple sources of data and multiple comparative groups?

3. Did data collection alternate with analysis?

4. Were ethical considerations taken into account in both data collection and analysis?

5. Were the concepts driving the data collection arrived at through analysis (based on theoretical sampling), or were concepts derived from the literature and established before the data were collected (not true theoretical sampling)?

6. Was theoretical sampling used, and was there a description of how it proceeded?

7. Did the researcher demonstrate sensitivity to the participants and to the data?

8. Is there evidence or examples of memos?

9. At what point did data collection end or a discussion of saturation end?

10. Is there a description of how coding proceeded along with examples of theoretical sampling, concepts, categories, and statements of relationship? What were some of the events, incidents, or actions (indicators) that pointed to some of these major categories?

11. Is there a core category, and is there a description of how that core category was arrived at?

12. Were there changes in design as the research went along based on findings?

13. Did the researcher(s) encounter any problems while doing the research? Is there any mention of a negative case, and how was that data handled?

14. Are methodological decisions made clear so that the readers can judge their appropriateness for gathering data (theoretical sampling) and doing analysis?

15. Was there feedback in the findings from other professionals and from participants? And were changes made in the theory based on this feedback?

16. Did the researcher keep a research journal or notebook?

## Appendix J: Checkpoints for Evaluating the Quality and Applicability of a Grounded Theory Study

Source: Corbin and Strauss (2015, pp. 351-352)

1. What is the core category, and how do the major categories relate to it? Is there a diagram depicting these relationships?

2. Is the core category sufficiently broad so that it can be used to study other populations and similar situations beyond this setting?

3. Are each of the categories developed in terms of their properties and dimensions so that they show depth, breadth, and variation?

4. Is there descriptive data given under each category that brings the theory to life so that it provides understanding and can be used in a variety of situations?

5. Has context been identified and integrated into the theory? Conditions and consequences should not be listed merely as background information in a separate section but woven into the actual analysis with explanations of how they impact and flow from action-interaction in the data. Describing context enables potential users of a theory to compare (for fit) the situations under which the theory was developed to situations to which they might want to apply it.

6. Has process been incorporated into the theory in the form of changes in action-interaction in relationship to changes in conditions? Is action-interaction matched to different situations, demonstrating how the theory might vary under different conditions and therefore be applied to different situations?

7. How is saturation explained, and when and how was it determined that categories were saturated?

8. Do the findings resonate or fit with the experience of both the professionals for whom the research ended and the participants who took part in the study? Can participants see themselves in the story even if not every detail applies to them? Does it ring true to them? Do professionals and participants react emotionally as well as professionally to the findings?

9. Are there gaps, or missing links, in the theory, leaving the reader confused and with a sense that something is missing?

10. Is there an account of extremes or negative cases?

11. Is variation built into the theory?

12. Are the findings presented in a creative and innovative manner? Does the research say something new or put old ideas together in new ways?

13. Do findings give insight into situations and provide knowledge that can be applied to develop policy, change practice, and add to the knowledge base of a profession?

14. Do the theoretical findings seem significant, and to what extent? It is entirely possible to complete a theory-generating study, or any research investigation, yet not produce findings that are significant.

15. Do the findings have the potential to become part of the discussions and ideas exchanged among relevant social and professional groups?

16. Are the limitations of the study clearly spelled out?

17. Are there suggestions for practice, policy, teaching, and application of the research?

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