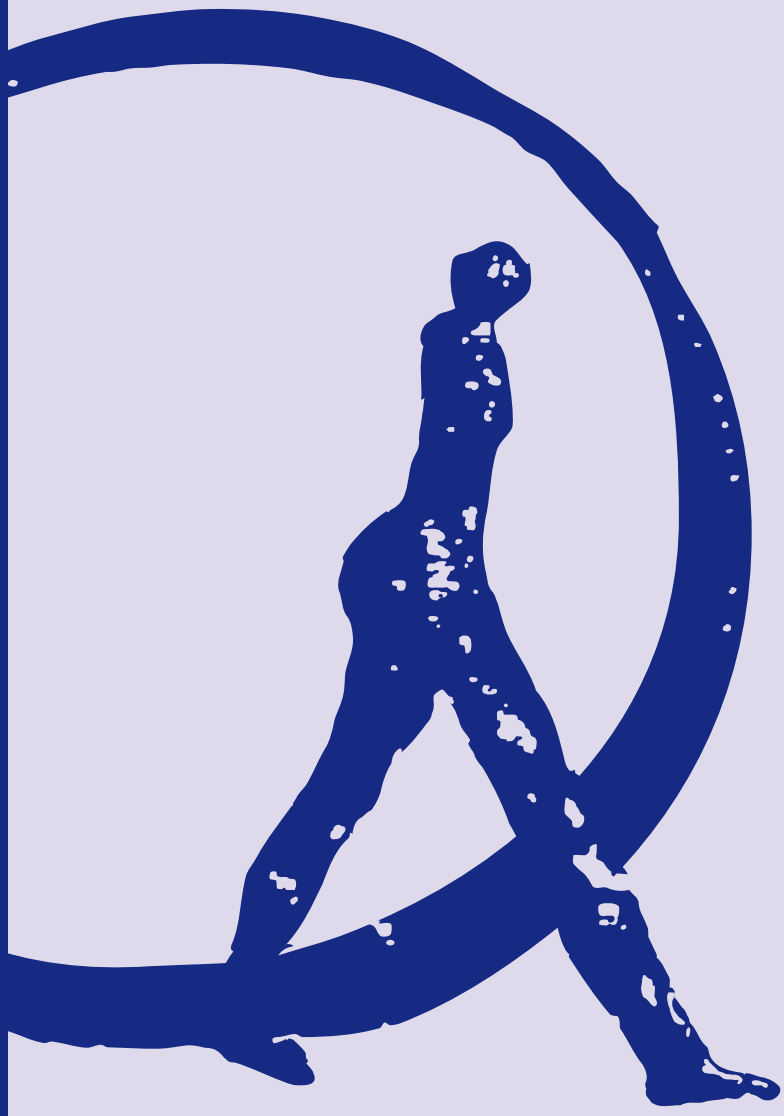
An EDHEC Risk and Asset Management Research Centre Publication

EDHEC European Real Estate Investment and Risk Management Survey

November 2007



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Foreword

The survey it is our pleasure to present here is part of the EDHEC Risk and Asset Management Research Centre's research programme in asset allocation and alternative diversification.

This programme has led to extensive research on the benefits, risks, and integration methods of alternative classes and instruments in asset allocation. After winning plaudits for its study of hedge fund strategies, EDHEC has started to explore other alternative assets.

Real estate, probably the most traditional of alternative classes, is enjoying renewed favour as institutional investors search for diversification benefits and competitive yields. Institutional demand for real estate exposure has brought about improvements in market transparency and the development of new indirect and synthetic investment tools.

With target allocations to real estate increasing, research into real estate as an asset class must enable industry participants to refine traditional approaches and to consider real estate within the bounds of asset management and asset-liability management. It is in this way that research can help real estate take its place in multi-style, multi-class portfolios, contribute to the design of integration methods that optimise its risk/return trade-off, and, finally, enable the class to deliver on its full potential.

The EDHEC European Real Estate Investment and Risk Management Survey, the first phase of this research, takes stock of developments in the real estate investment market, reviews academic evidence on allocation to and management of real estate, and analyses the results of a large-scale, pan-European survey of institutional practices.

Chapters 1 to 3 provide background as well as a framework for an analysis in light of the greatest academic and practical challenges. These chapters contain an overview of real estate as an asset allocation class, a discussion of real estate portfolio management, and an appraisal of property derivatives. In addition to presenting the results of the survey, chapter 4 analyses institutional investors' perceptions of and practices in these three areas.

We would particularly like to thank our partners at Aberdeen Property Investors and Groupe UFG, whose support made this Survey possible. We are also grateful to Frédéric Ducoulombier, the author of the Survey, to Tao Ye, for her help in collecting the data, and to the technical team led by Peter O'Kelly and Laurent Ringelstein.

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About the author

Frédéric Ducoulombier has been a full-time faculty member of EDHEC Business School since 2002. He currently serves as deputy to the school's Director of Research and heads EDHEC Asset Management Education. Over the last ten years, he has held positions in programme design, management, and internationalisation, and has taught finance in France and China. At EDHEC, he has unified the operations of the various MSc courses and now helps implement the school's innovative research policy. He joined the EDHEC Risk and Asset Management Research Centre in late 2004 to launch its executive education operation which now serves hundreds of organisations throughout Europe. As head of the centre's real estate research initiative, he has written in trade publications about real estate indices and derivatives and presented at various industry conferences. He holds an MSc in Management from Iéseg School of Management and a graduate certificate in East Asian Studies from Université de Montréal/McGill University as well as the Chartered Alternative Investment Analyst^{SM} designation.

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This summary of the EDHEC European Real Estate Investment and Risk Management Survey provides an overview of real estate as an asset class, of the management of a real estate portfolio, and of real estate derivatives; it then synthesises the main findings of a pan-European survey of real estate investors.

Markets, practices, and academic results

Real estate as an asset class

From buildings to allocation class

At the heart of the real estate asset class is fixed property, real physical assets inseparable from specific locations, highly heterogeneous, and exchanged at high unit values; they are divisible with difficulty and require the close attention of property managers. It is on account of these features that they are traded on direct-search or brokered decentralised markets where transaction costs are high, liquidity is low, and transparency limited; it is for the same reasons that they generate both high management costs and value-adding opportunities unique to direct ownership; that their specific risk is high and diversifiable with difficulty.

The direct acquisition of property and mortgage lending are the two traditional sides of real estate investment. The securitisation of debt and the creation of collective investment vehicles separate management and ownership. These more recent developments offer investors modes of exposure with reduced lumpiness, greater diversification, and—when there are active secondary markets for these media—improved liquidity. The quadrant model depicts the wealth of possible real estate investments along equity vs. debt and private vs. public axes; all these investments are candidates for inclusion in the real estate asset class.

The specifics of the underlier and its markets and the ability to make a homogeneous group of assets—representative of a sufficiently large investment universe—with its own return features make it possible to view all equity investment media as an individual asset class; mortgage debt and its derivatives, by contrast, are included in the traditional bond class. In this view, held by most investors and academics today, listed property companies are considered integral to the asset class, whereas more traditionally they are excluded. A new minority considers the products from all the quadrants part of the asset class.

Importance of real estate in a multi-class portfolio

The most frequently mentioned advantages of real estate are its low volatility, its high adjusted returns, its superiority as a hedge for inflation risk, its high and stable rent component, and its excellent decorrelation characteristics; only the two latter advantages have been clearly documented by academic research. The usefulness of real estate for hedging inflation risk has been confirmed in the specific context of long-term studies and residential real estate.

The limited availability and the biases of direct investment indices make it difficult to set optimal allocation levels. The use of indices that are smoothed and lagged and/or fail to make allowances for liquidity fluctuations not apparent in prices leads to underestimation of real estate volatility and of its co-moments with other asset classes, and thus to overestimation of its benefits to a diversified portfolio. The mean-variance asset management models that correct for these biases recommend that a balanced portfolio have allocations to real estate of between 15% and 25%; studies using asymmetric and extreme risk measures recommend lower allocations. The first asset-liability management studies to include real estate conclude that lower allocations are in order as a result of the low correlation of the asset class and liabilities; as this situation is linked in part to the biases pointed out above, additional work is necessary.

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Features of the major investment vehicles

The particular features of the major equity investment vehicles are summarised in the table below

	Direct investment	Non-listed funds	Listed real estate
European market (€bn, end 2006)	2,430 (appraisal values)	440 (gross fund assets)	327 (capitalisation)
Control of assets (and need for property management)	Maximum	Delegated	Delegated
Unit investment/minimum	Very high	High to low	Very low
Diversification	Very low	Low to medium	Average to high
Liquidity	Low	Very low (private equity) to high (German OE funds)	Very high
Transparency	Low	Low to adequate	Very high
Transaction costs	Very high	Very high to medium	Low
Complete market	Yes, with geographic variations	No, significant geographic and property-type variations	No, significant geographic and property-type variations
Type of index (supplier)	Appraisals for commercial real estate (IPD), transactions for residential real estate (no European index)	Net asset values (INREV/IPD)	Stock market transactions (EPRA; GPR; IEIF)
Correlation of index and direct real estate (short-term)	100%	Medium to high	Very low
Correlation of index and equity	Very low	Very low to low	High
Main sources of risk	Concentration and liquidity	Concentration and liquidity varying from one instrument to another	Stock market risk

Real estate portfolio management

Sources of value and risk

Strategic and tactical asset allocation linked to forecasting abilities and done within the limits of the investor's objectives and constraints, asset selection, and the management of directly held properties are the three spheres of activity in a real estate portfolio where value can be created. Conventional real estate management focuses on asset selection and property management, whereas modern management works in all three spheres. Allocation strategies imply the creation of representative, well diversified portfolios and lead to rebalancing transactions. Because of the problems with diversifying direct portfolios and because of the costs and delays of physical transactions, it is difficult to use top-down strategies, and the rational investor may well prefer a bottom-up approach that emphasises conventional sources of value and respects an overall risk or allocation constraint.

The performance of a real estate investment is linked to factors specific to the property and to the terms under which it is leased as well as to systematic factors. The sources of systematic risk are real growth, employment, interest rates, and unexpected inflation. These macroeconomic factors affect returns on property with a swiftness and intensity that vary depending on the type of property (office, retail, industrial, residential) and on continental, domestic, regional, and local conditions.

Modes and limits of diversification

Domestic portfolio diversification by property type results in a reduction of risk clearly higher than that achieved by geographic diversification even when economic rather than political regions are used. International diversification leads to significant risk reduction, all the more so when the syncopation of domestic real estate or economic cycles is exploited. In addition, once international

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diversification has been achieved, the marginal benefits of diversification by property type are largely insignificant. The efficiency of international diversification is lessened when the tenants of properties in different domestic markets belong to the same global industry or when institutional money flows to real estate in only a few markets. In practice, international diversification is subject to currency risk, as the volatility of exchange rates is, on average, significantly higher than that of real estate yields. The other obstacles to international diversification are the need for local expertise, political risk and restrictions on foreign investment, fiscal problems, and the lack of depth and the illiquidity of some markets, emerging markets, in particular—obstacles that can also be viewed as opportunities.

Diversification of specific risk appears impossible through direct investment: if normal return distributions are assumed, an equally weighted portfolio of 30 to 40 properties may on average be 95% diversified, but the reality of returns and property indivisibility would require investment in several hundred properties for the same average result, and an even higher number would be necessary to limit the risk of portfolios deviating from this average. This finding supports a vision of direct investment centred on the selection and management of a portfolio of relatively few properties or, for strategies involving diversification, heavy reliance on intermediation.

Difficulty of dynamic management in non-listed real estate

Allocation changes in a portfolio of direct real estate holdings are difficult and costly. Changes in exposure through non-listed funds are hindered by the very low levels of liquidity of many vehicles and by the limited availability of domestic funds that specialise in single property types. The dynamic management of a portfolio of listed real estate poses no problems, but options are limited by levels of market development that vary from one European country to another. Effecting changes in a portfolio of non-listed real estate with the help of a synthetic approach that uses listed property companies—an approach made undeniably tempting by high liquidity and low costs—is infeasible on account of the limited short-term substitutability of these two modes of exposure.

Performance analysis and assessment

For direct real estate investments, the benefits of portfolio performance analysis are limited by the impossibility of index-based management and by the difficulty of making allocation changes; performance can, however, be analysed at the property level. Indirect investments, either listed or frequently priced, lend themselves more easily to performance and style analyses as long as appropriate indices are available. The use of the Sharpe and Sortino ratios presupposes corrections for the biases linked to the frequency and the nature of the data.

Assessment, analysis, and management of risk

Real estate returns are subject to auto-correlation and non-normality, a possibility that justifies, for measures of performance and for allocation models, the use of tests, possible correctives, and gauges of asymmetric and extreme risk. All the same, when it comes to non-listed real estate, the limited availability and the low frequency of data make it difficult to put these approaches into practice.

Linking measures and sources of risk at both asset and portfolio level could lead not only to better allocation decisions but also to initiatives not requiring allocation changes. In addition, the usual techniques can be used to manage the exposure of a real estate portfolio to exchange rate risk, interest rate risk, and inflation risk.

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Real estate derivatives

Real estate derivatives markets

In 2004, an over-the-counter market for swaps on IPD UK commercial real estate indices—now remarkably active—was created; it provided the inspiration for a comparable market in the United States and is now being exported to continental Europe. An over-the-counter derivatives and structured products market has sprung up around the UK Halifax house price index, but at the Chicago Mercantile Exchange derivatives contracts on Case-Shiller home price indices are still struggling to find takers. More recently, the Chicago Board of Trade and Liffe have launched derivatives on indices of listed American and European property companies.

Main products and uses

For the moment, the real estate derivatives market is largely a market for total return swaps on direct real estate indices founded on appraisal data—on the IPD UK indices, in particular. The most common of these is a medium-term swap of the return on the annual all-property index for the three-month inter-bank rate plus (or minus) a premium; a few swaps of sector or sub-sector for all-property have been recorded.

In terms of liquidity, cost, granularity, swiftness, and flexibility, real estate derivatives allow exposure to market risk to be established or changed with potentially greater efficiency than in the underlying market; they are thus particularly advantageous for direct real estate. Real estate derivatives can be used for investment and diversification, to take advantage of price differentials between markets and segments, to bet on falling markets, for leverage, and, possibly, for hedging and synthetic portfolio management.

Limits of direct real estate index derivatives

The efficiency of real estate index derivatives as a hedge and for synthetic management requires high correlation of the portfolio the manager is seeking to protect or rebalance and the index. In direct real estate, such a situation is an exception, as the reference indices, unlike portfolios, are highly diversified; the efficiency of these techniques will thus be less than ideal.

Because it is difficult to replicate appraisals-based indices, it is likewise difficult to hedge the derivatives they are the underliers for; as a result, market liquidity is limited and doubt is cast on derivatives prices, as pricing by arbitrage, in the stricter sense, is not possible. Further work on synthetic and cash hedging methods is necessary. Indices based on the net asset values of real estate funds of funds are a partial solution to the hedging problem, as there is an investable underlier. Derivatives based on indices of listed property companies avoid this problem, given the investability of the underlier and the possibility of short-selling.

Findings of the survey

Between November 2006 and May 2007 three types of European institutional investor were surveyed: end investors (pension funds and insurance companies), diversified asset managers, and real estate specialists (managers of real estate investments and property companies). The survey produced responses from 143 investors in nineteen countries, with a total of more than €3 trillion of assets under management and more than €400 billion in real estate assets. 86% of our respondents have investments in real estate and an average experience of the class of 24.5 years.

Real estate as an asset class

Real estate is perceived as an asset class of its own that encompasses direct as well as indirect investment

Nearly 100% of our respondents acknowledge that real estate is an asset class of its own. By and large, investors include in this class vehicles for indirect real estate equity investment but have mixed views of real estate debt. The proponents

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of a restrictive view of real estate investment are in the minority: 4.2% of those who responded to our survey equate the real estate asset class to directly acquired properties and 14.7% believe that non-listed investments alone (through direct acquisition or funds) count as real estate. 72% of respondents acknowledge simultaneously the three modes of exposure to equity investments: direct acquisition of property, purchase of a share in an non-listed fund, and investment in listed property companies. Structured real estate products, investable indices, and real estate derivatives are given a favourable reception, as 67.8% of respondents accept these innovations as part of the asset class. Overall, 38.5% of respondents view real estate debt as belonging to the class, but this average is misleading: 63.2% of real estate specialists are of this opinion, as opposed to 29.5% of other investors.

Real estate investment policy

Objectives: diversification, performance, hedging

For non-specialist investors, the three main reasons for allocation to real estate are for overall portfolio diversification (27.2%), attractive risk-adjusted performance (20.5%), and as a hedge for inflation (11.3%). Overall, the various reasons linked to diversification are predominant; the search for alpha is secondary. The excellent performance of real estate over the last few years may account for this situation; in less favourable circumstances, investors may no longer be satisfied with market returns (beta) and may instead take a more discriminating approach (alpha).

Strategic allocation: 10%

74.5% of respondents (excluding real estate specialists) view their investments in real estate as investments in a class of its own, while 23.5% invest opportunistically; the latter are generally smaller investors. The average target allocation is 9.9% and the average range 5.7% to 13.5%.

Conventional pecking order among vehicles for equity exposure, marginal role for debt, and modest allocation to new products

The study of the vehicles used by investors for their allocation to real estate shows the limited role of pure debt products (3%), the respect for conventions of long standing among the vehicles for exposure to equity investment (direct investment: 50%; non-listed funds: 24%; listed real estate: 17%), and the still minimal importance of recent offers for structured products (2%), index-linked products (3%), and derivatives (1%).

The equal shares of direct and intermediated investment mask notable differences, as real estate specialists make direct investments with 75% of their funds—that is, twice as much as other investors do. Diversified asset managers put listed real estate ahead of non-listed funds and are more open to new vehicles for exposure.

The study reveals a positive correlation of portfolio size and direct real estate allocation that highlights the problems of directly invested real estate portfolios and identifies non-listed funds as the closest proxy for direct investment.

Real estate portfolio management

Performance measurement: an absolute return orientation prevails, but relative return measures are often used

80.6% of specialists and 52.1% of other investors report that they first set nominal or real absolute return objectives. More than half of pension funds (56%) resorted primarily to relative return measures—the only category of investor in our survey in which a majority did so. However, 46.7% of the investors who take a mainly absolute approach to performance measurement also use relative return measures. Overall, 68.5% of survey respondents use relative return benchmarks as a primary or secondary gauge of the performance of their real estate investments, a finding that suggests

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that allocation to index-based vehicles could increase significantly about current levels.

Detailed analysis of responses shows the appropriateness of benchmark choices: direct indices are used to track the performance of direct investments, property company indices are used to track the performance of investment in property companies, geographic indices are used to track the performance of investment along geographic lines, and so on. The IPD and NCREIF direct property indices enjoy monopolies in the regions they cover. The EPRA family of indices is by far the most popular for the assessment of investments in listed real estate—its only serious challengers are the indices supplied by GPR.

Sources of risk and performance: primacy of specific risk, importance of sector and geographic risks

Investors view idiosyncratic risks as the main factors behind the performance of real estate investments: for specialists as well as for non-specialists, the factor most frequently mentioned first, and the most frequently mentioned of the three main risk factors, is that which refers explicitly to the specific features of the property (location, use, size, age, architecture, and so on). For real estate specialists, the other key factor that is made apparent is also specific—lease terms and tenant creditworthiness. These responses reveal a conventional approach to real estate investment, in the context of which specialists largely view the leverage for added value at the property level. Non-specialists identify sector and geographic exposures as significant dimensions of risk.

Risk management: diversification, both by property type and by geography, is the sole appropriate approach; a pan-European index would be invaluable

Diversification emerges as the sole suitable approach for real estate specialists and the most useful for other investors. Of the other possibilities, only limits on allocation to real estate find favour among non-specialists; principal-protected structured real estate products are deemed not very useful and derivatives get a wary welcome. Real estate specialists, who are unable to cap the share of real estate in their portfolios, consider derivatives and structured products even less useful.

Investors identify diversification by property type and diversification by geography as the two main approaches to diversification. For specialists, a third approach is grounded on financial analysis; style considerations (growth vs. value, core vs. value added or opportunistic) are important as well. For other investors, the third approach to diversification is by instrument or by manager, an approach that reveals the particular concerns of those investing indirectly in real estate.

65.6% of investors view an investable European real estate index or a derivative of that index as the best means to diversify the real estate portfolio of an institutional investor with a strong home bias.

Property derivatives

81% of the investors have no immediate plans to use property derivatives; their investment policies, a lack of training, and the unsuitability of the products account for this figure

81% of our respondents have no immediate plans to use real estate derivatives, 5% currently use them, and 16% plan to do so in the short term. Real estate specialists are less interested in derivatives, but their interest increases as the size of their portfolios increases. 50% of real estate specialists consider existing products unsuited to their needs. The other reasons for the failure of specialists to resort to derivatives are the investment rules in force in the respondent's organisation (for 42.9% of those responding) and, to a lesser degree, a lack of familiarity with the products (32.1%). For pension funds and insurers, the lack of familiarity with real estate derivatives is the primary obstacle to the

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use of these products (55.3% of 38 respondents), followed by their unsuitability (34.2%) and by regulatory restrictions (31.6%). For diversified asset managers, internal investment policies are the main obstacle (42.9%), ahead of a lack of familiarity with the products (35.7%) and their unsuitability (28.6%).

Key success factors for property derivatives: index quality, contract liquidity

The transparency of the index underlying the contracts is the primary requirement. Investors also deem its representativity very important—somewhat more so than its breadth. The liquidity/investability of the index is a noteworthy criterion as well, particularly among non-specialists. The main investor demand of the market—far ahead of demand for effective hedges, for cost-reduction capacities, and for a central counterparty to reduce risk—is for contract liquidity.

Investors are unanimous in their rejection of indices based on the opinions of real estate agents and report an overall preference for constant-quality transactions-based indices.

The ideal property derivative: a medium-term, highly liquid forward contract on the total return of a country or international commercial real estate index of all property or of a single property type

Overall, investors prefer futures contracts, but it is swaps that account for nearly all of current market volumes. They are content with total return derivatives and there is little demand for disaggregating rents and capital values.

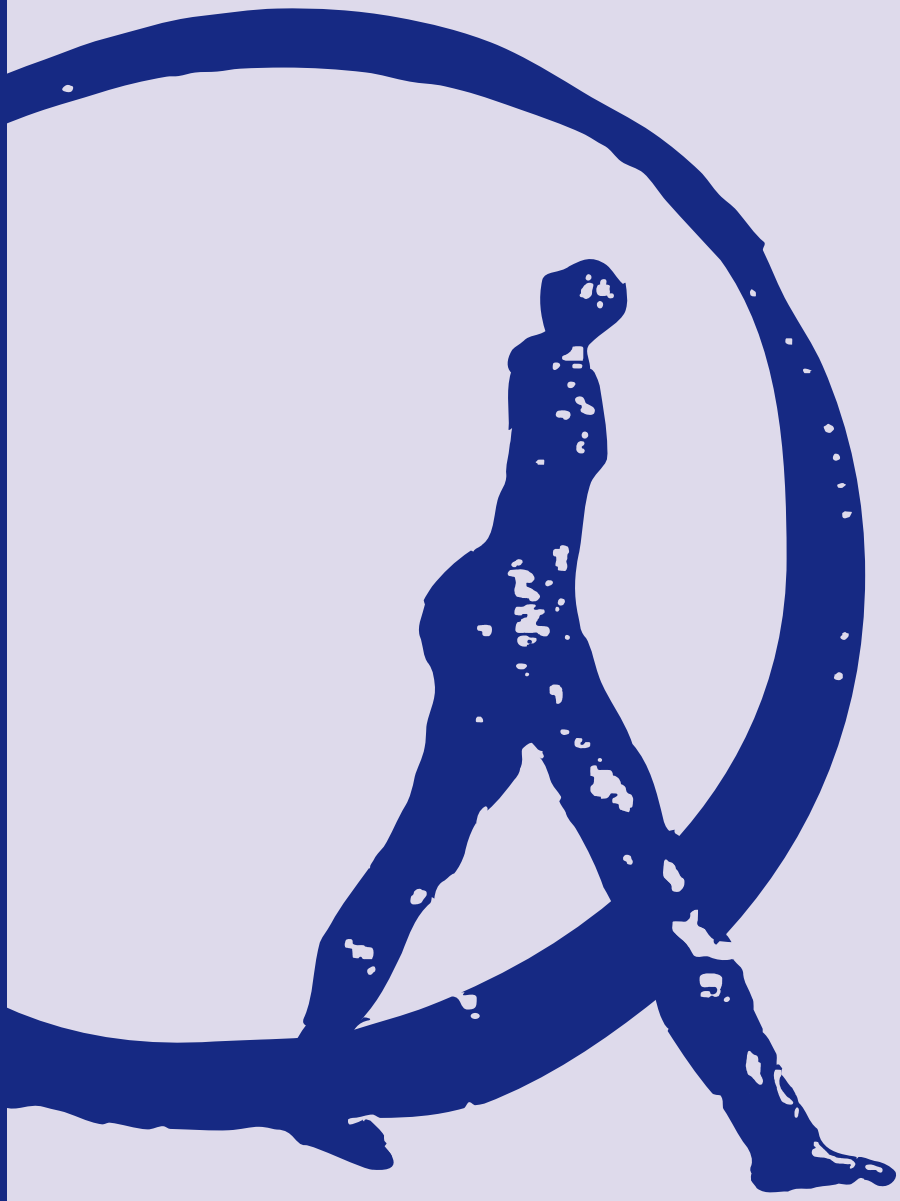
Real estate specialists have a neutral view of all-property index derivatives as long as residential properties are excluded, consider sector and sub-sector index derivatives somewhat useful, and have no interest whatsoever in derivatives linked to housing price indices. The pension funds, insurance companies, and diversified asset managers with significant real estate investments focus on property-type indices of commercial real estate and are also interested in all-property indices; smaller diversified asset managers, by contrast, are drawn first to derivatives of all-property indices, then to property-types.

The bulk of demand is for derivatives for investment at the country level, but there is also a significant interest in continental derivatives; at best, investors are indifferent to the idea of a global real estate derivative.

All investors report high liquidity requirements with respect to derivatives contracts: the three most frequently mentioned periodicities are monthly, weekly, and daily. Diversified asset managers may report the highest liquidity requirements, but—for their modes and horizons of investment—other investors have surprisingly high requirements.

The one-year maturity garners the most votes from all three types of investors. For real estate specialists, the next two most frequently mentioned are the five-year maturity and the three-year maturity. For pension funds and insurance companies, it is the two- and three-year maturities. Diversified asset managers have a short-term outlook, as their maturities of choice extend to at most one year.

1. Real Estate as an Asset Class



1. Real Estate as an Asset Class

1.1. From building to asset class

1.1.1. The characteristics of the underlying

Land and buildings are physical assets that are directly involved in production, whereas the financial assets linked to real estate confer ownership rights (contingent for debt) to the real assets as well as to the income and benefits they produce.

The main distinctive features of the real estate underlying are its high unit value, its indivisibility, its great heterogeneity, its fixed nature, and the considerable amount of day-to-day management it requires.

High unit value and indivisibility

In late 2006, the average value of a property in the pan-European commercial real estate index published by Investment Property Databank was €16 million. Average values were as much as five times higher (appendix 1) for some countries than for others and around twice as high for office or retail properties as for industrial or residential properties.

Carving up buildings is not easy, and commercial buildings usually have single owners. It is possible, of course—and not uncommon—for institutional investors to work out club deals or create joint-ventures to acquire particular buildings, but experiments with the securitisation of property have, in Europe at any rate, resulted in failure.

By preventing the direct participation of many investors and making the market less granular, these characteristics reduce market liquidity.

Heterogeneity and real nature of property

Each building is unique as a result of its location, its architecture, its structure, its size, its age, its condition, the use to which it is currently being put, and so on. In addition, a single building can be rented under different conditions (length of lease, indexation policies, and so on) and to very different tenants (in terms of their number, their diversity, their creditworthiness).

Because of the important role property development and management play in the economy and in public welfare, they are closely watched over by all levels of government. National, regional, and municipal regulations on the construction and use of buildings reinforce their location-specific nature. In a context of growing international tax competition, the fixed nature of property is a drawback with respect to more mobile forms of capital, and specific taxes or duties on real estate transactions—in addition to those on rental income and on capital gains—remain high.

This heterogeneity and this location-specific character mean that buildings are traded fitfully on decentralised direct-search or brokered markets. The price of a real estate transaction is the result of a private negotiation between the seller of a particular property in a particular location and a buyer; it is not an equilibrium price determined through the centralised-market participation of multiple buyers and sellers in the continuous-time auction of a fungible asset.

High information costs (search, appraisal, inspection) and other high transaction costs are associated with market structures of this sort. The private and asymmetric nature of information in the real estate markets, on the other hand, usually leads to the assumption that the likelihood of abnormal returns is greater.

Property management required

The owner of a building has substantial management responsibilities with respect to both tenants and government authorities. These responsibilities require a degree of fieldwork that depends on the type of building, the passive holding of which is impossible. They demand diverse skills and generate substantial costs. They can be sourced to so-called asset managers or property managers. The

1. Real Estate as an Asset Class

institutional investors most active in real estate may take on these responsibilities themselves by creating specialised affiliates, but the local nature of buildings reduces economies of scale or encourages a potentially dangerous geographic concentration of investment.

Direct control of property may also be a source of value creation: the investor can renovate or reposition the building, and manage the portfolio of leases in such a way as to maximise rental income—these value-adding strategies undertaken at property level may be timed to accompany market-wide changes for maximum impact.

As a result of the greater heterogeneity of buildings, specific risk accounts for a larger share of total risk for real estate than it does for conventional assets. Low granularity and heterogeneity lead to illiquidity and to diversification challenges. For these reasons, direct real estate investment has traditionally been long-term, active, and focused on individual properties or—for want of sufficient human and monetary resources—rejected outright. The validity of this proposition has been called into question by the emergence of vehicles for indirect investment in real estate.

1.1.2. Classification of vehicles for real estate exposure

Given the high unit values of properties and the interest tax shelter, investors and owner-occupiers have traditionally borrowed from financial institutions to finance a significant share of the purchase price. With some exceptions, the loan is a mortgage: the property acquired with the aid of the loan is used as collateral against borrower default, and the lender can foreclose. This sort of collateral allows high levels of debt and, at the same time, ensures relatively low interest rates.

In the past, these mortgage loans remained on the books of the financial intermediaries that granted them until they were paid off; on rare occasions they could be transferred in their entirety to other financial institutions. Like other loans, real estate debt was used in securitisation deals first in the US, then in Europe, and now there are markets for securities—backed by mortgage loans—that allow investors to acquire exposure to real estate debt without acting as lenders.

The need for equity-capital financing and risk-sharing has also led investors to seek partners—some more active than others—or to create vehicles for collective investment schemes. Raising large amounts of funds makes it possible to build a portfolio of properties and reduce risk through diversification.

The separation of management and ownership enables investors who have neither the resources nor the expertise to acquire and manage real estate portfolios directly to participate in the market. Joint ventures and collective investment schemes allow greater investor participation and reduce market granularity; they do not necessarily lead to greater liquidity.

Public markets are additional long-term sources of capital for real estate funds and property companies. Low denomination instruments for indirect investment in real estate, for which there is an active secondary market, offer superior liquidity and may appeal to both institutional and retail investors.

Exhibit 1: **The quadrant model of real estate investment**

	Privately placed	Publicly traded
Equity	• Direct investment • Private property companies • Private collective instruments	• Public property companies • Publicly traded collective schemes
Debt	• Direct lending • Private collective investments in mortgage debt	• Mortgage-backed securities

1. Real Estate as an Asset Class

Real estate investment was conventionally limited to private market equity and debt investments. The development of publicly traded real estate securities has brought about an expansion of these modes and a quadrant approach to real estate investment has emerged with one private/public axis and one debt/equity axis (exhibit 1).

1.1.3. The real estate asset class: its existence and its boundaries

In defence of real estate as an asset class

The existence of a real estate asset class as such has direct consequences on asset allocation policies, but there is no standard definition for what constitutes an asset class. Among the criteria used to determine whether a group of investments is an asset class are (box 1) fundamental classification criteria, criteria linked to investment restrictions, as well as those used in asset allocation and the modelling of asset allocation.

Observers such as DeLisle (1995, 2002) or Chen and Mills (2004) use these criteria to justify putting both direct and indirect real estate equity investment into a class of its own. Exhibit 2 summarises the arguments put forward by Chen and Mills.

Thrashing out the boundaries of the real estate asset class

Traditionally, non-listed equity investments alone—the northwest quadrant—were considered genuine investments in real estate. Listed property companies were considered a sector of the stock market and debt linked to real estate was merely another fixed-income product.

Now, convention has it that equity investments, whether listed or not—in other words, the two northern quadrants—are to be placed together in the real estate asset class. Differences in the nature, composition, and calculation of indices are

Box 1: Main criteria for the constitution of asset classes

- distinctive features with respect to the nature of and markets for the primary underlying assets
- intra-group conceptual similarity
- subject to the same laws and regulations
- substantial size of investment universe and sufficient number of representative investment opportunities
- distinctive and relatively stable risk and return profiles
- distinctive within group correlations
- dependence upon common identifiable economic factors that can be quantified and used for forecasting
- availability of information on the characteristics and prices of investments
- possibility of passive investment at published prices and for sufficient amounts

Exhibit 2: **The Chen and Mills argument for real estate equity as an asset class (2004)**

Sufficient size	• Real estate comprises 10% to 20% of the total capitalisation of stocks, bonds and real estate in developed countries. • The market is deep enough to support a 10% or greater real estate allocation in an efficient mixed-asset portfolio.
Competitive returns compared to stocks and bonds	• Real estate has historically provided 4% to 6% average annual real rates of return. • The low volatility of real estate returns leads to competitive risk-adjusted performance over time.
Unique return characteristics	• Its low correlation to other major asset classes provides diversification benefits to a mixed-asset portfolio. It exhibits inflation hedging capabilities over time. • Current income generally comprises the largest component of total returns.

1. Real Estate as an Asset Class

largely responsible for the significant differences in performance, as has been shown by many market observers in the wake of the trailblazing work of Pagliari, Scherer, and Monopoli (2003).[1] In addition, as has been shown by Booth and Marcato (2004a, 2004b), the correlation of listed and non-listed investment vehicles is greater in the long term.

Other authors use a composite index of the four quadrants to study the benefits of real estate in a diversified portfolio.[2] Although the quadrant model is increasingly favoured when it comes to illustrating the wealth of products linked to real estate, the use of composite indices for strategic allocation remains uncommon. Our fear is that, as a result of its preponderance, real estate debt—whose behaviour is much like that of other fixed-income products[3]—will dilute the qualities specific to real estate equity and distort multi-class allocation.

1.2. The main real estate investments

1.2.1. Equity investment

Direct investment

Direct equity investment in property has historically been the dominant form of institutional investment in real estate. It allows the greatest control over asset selection, over the financial and fiscal organisation of the acquisition, over the management of the property, and over its transfer.

Acquisition of a property or acquisition of a company

Investment in the underlying physical asset can take the form of a direct acquisition of the property or of an acquisition (at 100% or as part of a joint-venture) of a company in possession of the underlying.

Transactions in the physical real estate market are subject to numerous taxes and fees. These costs can be lower when the purchase is made by acquiring a company.[4] Acquisition through a company can allow investors who are not authorised to use debt to benefit from leverage.

To limit leakage linked to double taxation or to the payment of taxes, which may never be recovered, by investors not subject to taxation, it is important to study the fiscal impact of the chosen vehicle.

Obstacles

Direct investment is a slow process that requires multiple sorts of expertise (commercial, technical, legal, fiscal). Direct acquisition or acquisition through a company requires identification of the property, appraisal of the property, negotiation with the seller, the signature of preliminary contracts full of conditions precedent, a complete audit[5] of the properties as well as of the contracts for the fulfilment of conditions precedent, the closing of the sale. If the acquisition is debt-financed, loans and collateral must also be considered, and lender may become a third party to the contract.

Property categories

In spite of their heterogeneity, direct investments are usually categorised by property type or sector and by geographical region. Property types differ from country to country, but the categories at the core of traditional institutional investments are clear: office, industrial, retail, and—in most countries—residential.

Nonetheless, appendix 2 shows that there are significant variations from country to country in the supply of properties by sector. Differences in the economic structure and the maturity of the markets for real estate investment, as well as differences in the proportion of owner-occupiers—for both residential and commercial properties—account for these variations.

As a result of features that are, in principle, substantially different, sub-sectors may also be created. In the retail category, it may be useful, for example, to distinguish between small shops and larger shopping centres.

1 - For example, Feldman (2003) or Riddiough, Moriarty and Yeatman (2005).
2 - Hudson-Wilson, Fabozzi, and Gordon (2003), Hudson-Wilson, Gordon, Fabozzi, Anson, and Giliberto (2005).
3 - With the exception of hybrid products such as convertible bonds, mezzanine debt, or the equity tranches of securities backed by mortgage loans, all of which are grouped with stocks by informed investors.
4 - If, for example, taxes on share transfers are lower and no exception applies to real estate firms or if corporate debt reduces the tax base.
5 - The audit will examine the sources of risk in the proposed acquisition and should analyse multiple dimensions (leases, service and maintenance contracts, potential litigation, title deeds, encumbrances, technical inspection of buildings, and so on). If a company is acquired, an audit of the company structure will be added to the audit of the properties.

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In addition to the core sectors of real estate investment, there are the so-called alternative sectors: timberland, farmland, hospitals and health facilities, nursing homes, student dormitories, parking facilities, and infrastructure.

Real estate styles

There are at least three styles for real estate along the risk-return axis: core, value-added, and opportunistic. The style is largely a result of the risk (linked to the amount of leverage) and of the relative significance of the rental income and the potential capital gain. In the United States, the National Council of Real Estate Investment Fiduciaries (NCREIF) has adopted a classification for these styles (box 2).

Size and liquidity of the European market

In late 2006, RREEF (2007) put the total value of European real estate at $9.2 trillion, of which $6.1 trillion is potentially available for institutional-quality investment (38% of all such real estate in the world) and $3.2 trillion (33% of global supply) is in fact available; that is, not held by owner-occupiers. 90% of the potentially investable supply is in Western Europe, five countries of which are among the ten largest institutional-quality real estate markets in the world: Germany (3), the United Kingdom (4), France (5), Italy (6), and Spain (9). For invested stock, the major markets are the United Kingdom, Germany, and France, followed by Switzerland, the Netherlands, Sweden, and Italy (appendix 3).[6]

According to Jones Lang LaSalle (2007), direct investment into real estate in Europe reached the record sum of $242 billion in 2006. When the value of the supply estimated above is divided by this transaction volume, an average tenure of thirteen years is implied, a result that shows very feeble liquidity of the market in spite of a particularly dynamic economic context.

Box 2: Real estate styles according to the NCREIF (2003)

• CORE ASSETS

"Assets that achieve relatively high percentage of return from income and that are expected to exhibit low volatility." In addition, they should belong to one of the property types considered "core" for institutional investment (for the United States, office, retail, industrial (and logistics), and multi-family dwellings, and increasingly hotels).

• VALUE-ADDED ASSETS

"Assets that exhibit one of more of the following attributes—achieve a significant portion of return from appreciation, exhibit moderate volatility and/or are not currently considered core property types. However, if the overall risk level is excessive, the asset should be classified as Opportunistic."

• OPPORTUNISTIC ASSETS

"An asset that is expected to derive most of the return from appreciation or which may exhibit significant volatility in returns. This may be due to a variety of characteristics such as exposure to development, significant leasing risk, or high leverage, but may also result from a combination of moderate risk factors that in total create a more volatile return profile."

Analysis of the distinctive feature of these three styles sheds light on the sources of risk identified by the NCREIF: the sector (core or alternative), the point on the life cycle (operating property, property being marketed prior to completion or development and renovation), the occupancy rate, the rollover concentration, the importance of near-term rollover, the leverage, the quality of the properties and markets, and the control provided by the investment structure.

6 - The size of the market for real estate investment grows as properties appreciate, as owner-occuped properties are outsourced through sale and leaseback, and, less significantly, through property development.

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Indices

The volume of transactions in the markets for residential real estate has historically allowed the computation of transactions-based indices by the participants in the various phases of the acquisitions process. The low number of transactions and the lack of qualitative data on the properties justify the use of appraisals—much more frequent than transactions—in the market for commercial real estate.

The private nature of real estate markets, as well as their decentralisation, hinders information-gathering, and the emergence of index providers is a very recent phenomenon in most countries. In Europe, IPD has a near-monopoly on this business.

Appraisal-based indices are computed using the totals of estimated market values, rents, and capital expenses supplied at regular intervals by a base of contributors. The composition of the index changes with any changes in participating contributors and with any sale or acquisition they make. Computations are generally value-weighted. The indices reveal overall performance trends. In general, they provide figures for total return, rental income, and estimated return on capital (net of investment). These indices are computed for the entire set of assets—that is, all-property and for the main property-types. They can then be broken down into sub-sectors, regions, and so on.

In Europe, IPD offers annual indices for all the countries it covers but Ireland, quarterly indices for Ireland and the United Kingdom, and monthly indices for the United Kingdom; quarterly estimates are available for Norway, the Netherlands, and Sweden. There should soon be a half-yearly estimated index for France. The extensive reach of IPD's databases makes its indices the benchmark for tracking the performance of direct institutional investment in real estate.

Several methods exist for the construction of price indices for residential property based on samples of transactions involving heterogeneous properties, samples whose composition does not necessarily reflect that of the market (sample bias) and changes over each observation period. The most common method—using so-called hedonic regression—systematically corrects for quality changes by taking into account information on the attributes of these properties.

Non-listed collective investment vehicles

Advantages and disadvantages

Indirect modes of real estate investment allow investment at unit prices lower than those demanded by the physical market, access to portfolios of properties for which direct investment may be unavailable or infeasible, and a semi-passive management approach—once the vehicle is chosen, investment and management are the responsibility of outside specialists whose interests can be aligned with those of the investors.

The advantages characteristic of non-listed private vehicles are light regulation, access to financial leverage, flexibility (which decreases as the number of investors grows), and, for some, fiscal transparency. In addition, they are appraised in the same way as the underlying buildings and some can be traded at prices approaching thenet asset value (NAV); as a result, they are largely protected from stock market fluctuations.

The primary disadvantages of these vehicles are their limited liquidity, the smallness of their portfolios, and their low level of transparency.[7] In secondary markets, fractional interests may command rational discounts to NAV. Delegating investment decisions involves a total or partial loss of control over strategy implementation. The private nature of most vehicles means substantial research, information, and transaction costs for the investor, costs which must be added to those borne by the vehicle as part of its investment in the underlying physical market.

7 - German open funds, public but non-listed, are, in this respect, entirely different.

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In addition, choosing a non-listed investment vehicle does not necessarily exempt the investor from performing an initial audit of the portfolio of buildings (when it has already been assembled), an audit of the counterparty, or regular monitoring of compliance with contractual requirements.

Great diversity

The non-listed investment vehicles[8] landscape in Europe is highly diverse, as each country has several forms of business organisation. A 2001 IPF report suggests a classification—in which there are four common forms—by legal form of organisation: corporations, partnerships, trusts, and contractual agreements (appendix 4).

According to OPC (2004), partnerships are clearly the most common form, followed by contractual agreements, corporations, and trusts. When it comes to gross assets, the order (after exclusion of German funds, which are mainly owned by individual investors) remains the same.

These vehicles may be open-end or closed. An open-end fund allows both new subscriptions and withdrawals, transactions that lead to fluctuations in the amount of capital managed and thus to the need to invest new funds or to liquidate assets to cope with redemptions. Closed-end funds do not offer this degree of liquidity: their capital fluctuates only during new subscription periods. Typically, open-end funds have no set lifespan, greater amounts of assets under management, and investments in less risky assets than do closed funds. Closed-end funds usually have a life cycle—determined at the outset but subject to possible extensions—of a few years.

Size and characteristics of the market

According to figures from the European Association for Investors in Non-listed Real Estate Vehicles (INREV), the non-listed real estate fund market has more than tripled over the last ten years. In late 2006, the association's database included 446 European vehicles managing a total of €224 billion of assets, in addition to 32 open-end German funds with €105 billion of assets under management.[9]

This growth is linked to an increase in the number of conventional or "core" funds—as well as to an increase in the amounts managed by these funds—and to the emergence and development of value-added and opportunistic funds.[10] "Core" funds manage approximately two-thirds of assets, value-added funds approximately one-fifth, and opportunistic funds approximately one-tenth. There has been fast growth in pan-European products in recent years, and 2006 saw the emergence of funds of funds.

The average size of the funds is small: less than €700 million—or €500 million not including German open-end funds, which, with an average size of more than €3 billion, are among the largest European investors; the average varies considerably from country to country (appendix 5).

Most vehicles are closed-end, with an initial lifespan of between seven and ten years (Brounen, Op't Veld, and Raitio (2007)); if German open-end funds are excluded, some 60% of assets are parked in limited-life vehicles (otherwise, the figure is 40%). By volume, the bulk of the "core" funds (and all open-end German funds, 92% of which are "core") has no maturity; riskier strategies, by contrast, do.

Most funds invest in several property types (71% with German open-end funds, 59% without) or are specialists in the retail (12% or, excluding German open-end funds, 18%), office (9% or 11%), residential (3% or 5%), and industrial and logistics sectors (3% or 4%). Specialist funds are essentially multinational and the United Kingdom alone can boast of depth in domestic sector funds.

8 - For regulatory reasons, some of these vehicles—corporations and contractual funds—may be subject to technical trading on the stock market.
9 - Based on the overall figures provided by OPC (2005), we estimate that the INREV database covers approximately three quarters of the market. Brounen, Op't Veld, and Raitio (2007) note that France is underrepresented, whereas the United Kingdom, Germany, and the Netherlands are overrepresented. The priority of the database is funds for institutional investors, but it also includes those aimed at retail clients.
10 - INREV has attempted to produce standardised style definitions. These definitions have added a degree of transparency to certain fund attributes, but they remain vague and are as yet of only relative usefulness when it comes to asset allocation and risk management.

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Country funds (the United Kingdom, in particular, but the Netherlands as well) predominate (more than €150 billion), followed by funds for all of Europe (more than €100 billion), Western Europe (less than €25 billion), the Euro-zone and the UK, the Euro-zone by itself, Central and Eastern Europe, Southern Europe, and the Nordic countries.

The notion of investment style—reflecting the diversity of styles used by institutional investors—has taken hold in real estate. Several style palettes are used to describe investment vehicles; as with buildings themselves, the opposing poles along the risk-return axis are the "core" and "opportunistic" styles.

Indices

In Europe, as elsewhere, there is little information on the performance of non-listed real estate funds aimed at institutional investors. IPD markets information in the context of its portfolio analysis service. INREV has partnered with IPD to provide an index of non-listed pan-European vehicles. It brings together retail and institutional vehicles and in late 2006 it was based on 206 funds with net assets of €153 billion. The INREV index is broken down into sub-indices by amount of leverage and life-cycle phase (investment, maturity, liquidation). In the UK, the HSBC/AREF/IPD indices track the performance of PUTs (property unit trusts open to the public or only to institutional investors), their insurance-company equivalents, managed pension funds, and, lately, limited partnerships. Performance is a direct reflection of return on NAV. In Germany, an index of core funds can be computed daily using the NAV of public open-end funds. In France, the institute for real estate and land investment (IEIF) uses NAV to produce an annual index of *sociétés civiles de placement immobilier* (SCPI), mostly closed-end publicly traded but non-listed vehicles held at more than 70% by individual investors.

Correlation with direct markets

Baum and Struempell (2006) report the results of a 2005 OPC study on the correlation of non-listed vehicles and the direct markets in Germany, the Netherlands, and the UK. Exhibit 3 shows high levels of correlation. Likewise, for France, the correlation of the IPD index and IEIF SCPI index stands at 82% for the period from 1986 to 2006.

Despite differences on the asset side (liquid assets held by open funds, riskier assets by value-added and opportunistic funds) and on the liability side (leverage), non-listed vehicles retain in part the statistical characteristics of direct real estate. Some offer, in addition, liquidity superior to that of the underlying, although there remain questions about their ability to cope with the redemptions that often accompany falling markets, as the recent open-funds crisis in Germany has shown (appendix 6).

Exhibit 3: **Statistical characteristics of indices of non-listed funds compared to those of direct real estate indices**

	United Kingdom Base HSBC/APUT 1990-2004 (Trusts/managed funds)	United Kingdom PVD index (IPD) 1999-2003 (Limited Partnerships)	Germany 1998-2003	Netherlands 1999-2003
Correlation to local direct real estate index (IPD)	0.98	0.73	0.99	0.99
Sharpe ratio [direct index]	1.09 [1.08]	2.89 [3.78]	3.90 [3.86]	2.85 [2.92]
Tracking Error	1.68%	2.65%	0.48%	0.42%
Comments		Limited sample J-curve effect contributing to volatility Leverage	Limited sample Open-end funds dominate the two indices	Limited sample

Source: OPC (2005) quoted by Baum and Struempell (2006)

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Listed real estate

Advantages and disadvantages

A listing on a stock exchange allows the investor to benefit from liquidity (whose degree depends on the market float of and on the volume of trading in the vehicle) without requiring that the vehicle manager perform maturity intermediation, which necessitates particular skills and may dilute the real estate characteristics of the returns offered by the vehicle. The largest stocks are also the object of securities lending and borrowing and are thus open to short selling.

The liquidity of listed property companies is far greater than that of non-listed vehicles or of buildings and their transaction costs, those of mid-caps, are significantly lower. In addition, investment in a property company gives the investor access to a relatively diverse portfolio of usually excellent quality, with leveraged returns. Management is delegated to professionals and is tracked by the community of analysts.

All the same, liquidity comes at a cost to the investor. On the stock market, the value of the vehicle will reflect microeconomic expectations as well as views on attributes common to the listed real estate sector or to the market as a whole.[11] Continuous trading on markets under the sway of expectations naturally results in levels of volatility higher than those in the markets for the underlying assets, to the extent that volatility in these markets reflects conservative, infrequent appraisals that attach relatively little importance to expectations. Finally, public offerings and listings lead to substantial costs and in the absence of investor oversight the separation of ownership and management can worsen agency problems.

In early 2007, the listed property company markets were still very narrow in some European countries (Germany, in particular); total capitalisation, liquidity, and specialisation will have to increase before they become true institutional markets.

Correlation with non-listed real estate

Since expectations considerably influence the prices of listed shares, while the appraisals used to compute the NAVs of non-listed vehicles are (somewhat) backward looking, a low contemporaneous correlation between the indicators of these markets is to be expected. Reworking indices to reduce the smoothing caused by stale appraisal values or—alternatively—the use of transactions-based indices should result in an upward adjustment to contemporaneous correlation.

By failing to take into account differences in risk, other indicator problems will also cause optical illusions: the comparison of the share price of indebted companies and the value of debt-free buildings, the comparison of composite indices with different property-type mixes, and so on.

It is nonetheless clear that there are real divergences to be exploited in the short term, to the extent that transactions can be executed on the two markets at levels approaching those of the indicators[12] and that these markets diverge along such axes as liquidity, transparency, governance, and oversight.

Size and characteristics of the market

In 2005, Europe had a listed real estate sector that was underdeveloped compared to that of North America and Asia, but in 2006 its relative size more than doubled (exhibit 4).[13]

In late 2006, the total capitalisation of European property companies amounted to €327 billion, 23.2% of global capitalisation (EPRA (2007)). In Europe, the UK is by far the largest market in terms of total capitalisation (28%), followed by France (19%), Spain (15%), the Netherlands (8%), Austria (6%), Germany (6%), and Sweden (5%).[14] The largest listed markets relative to the size of the domestic underlying real estate markets are Austria (20%), Spain (13%), Sweden (12%), the Netherlands (12%), the United Kingdom (10%), Luxembourg (9%), France (8%), and Poland (8%).

11 - Listed property companies are thus advance indicators of developments in the physical market that appraisals pick up on late. As indicators, however, they are subject to the usual ebb and flow of the stock markets—the signal-to-noise ratio depends both on the maturity of the listed property company sector as a specific section of the equity market and on the economic situation.

12 - Whatever the biases of appraisal may be, products traded with reference to NAV allow the investor to benefit from them; likewise, the yield on a listed investment is determined directly by its sale and purchase price on the exchange and by distributions.

13 - Generalisation of the real estate investment trust status and the advantages associated with the transfer of assets to these companies make it likely that owner-occupiers will increasingly resort to outsourcing their real estate holdings and that the share of investments held by these listed companies will grow. In fact, for property companies 2006 was a record year for listings and increases in equity capital, and it saw a marked revaluation of property company stock prices (reduction or reversal of the discount on NAV). New accounting standards, which require the presentation of the real value of buildings in the balance sheet and are thus responsible for volatility in the books, may also contribute to this trend.

14 - The criteria used to determine the eligibility and weighting of the components of the indices bolster the lead of the UK and send Spain tumbling down the charts.

15 - These numbers were obtained from information in the EPRA/NAREIT ranking published in Europe Real Estate Yearbook 2007.

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Exhibit 4: **Listed real estate in the major regions of the world**

Region	Share of commercial real estate 2006 (2005)	Share of the stock market 2006 (2005)
Asia-Pacific	14.57% (9.25%)	4.46% (3.35%)
Latin America	0.27% (0.33%)	0.12% (0.17%)
North America	8.97% (9.67%)	2.90% (3.27%)
Europe	6.30% (2.83%)	2.73% (1.54%)
WORLD	8.80% (6.59%)	3.16% (2.70%)

Source: Figures based on information from EPRA reports and from the FTSE EPRA/NAREIT Global Real Estate Index—Monthly Bulletin 30/12/2005; 29/12/2006, and 30/04/2007.

Countries with larger economies are under represented, while others with much smaller economies are overrepresented, a circumstance that owes much to differences in the share of owner-occupiers in the physical real estate market, to the relative importance of direct and indirect investment, to the existence of non-listed competing indirect media, and to tax regimes.

In early 2007, the average (median) assets controlled by the 100 largest European property companies amounted to €3.3 billion (€1.6 billion) and capitalisation stood at €2.2 billion (€1.3 billion). While over 90% of listed property companies in the US are sector specialists, the majority of European companies are diversified. Of the largest European property companies, forty-two were specialists with over 75% of total investment in a single sector (office or retail for three quarters of them) and twenty-three of these sector specialists were also country specialists. So it is not easy for an investor to use property companies to implement precise strategies by property type; even more difficult is doing so both by property type and by country.[15]

Real Estate Investment Trusts (REITs)

REITs, created in 1960, are a modern structure for investing in real estate and, with their favourable tax status, they contributed greatly to the expansion of listed real estate in the United States (appendix 7) before spreading to the rest of the world at the beginning of the millennium. In late 2006, seven European countries had a national brand of REITs: the Netherlands, Belgium, France, Greece, Bulgaria, Turkey, and the United Kingdom (launched on 1 January 2007). In the first six months of 2007 they were joined by Germany and Italy.

Several reasons have been mentioned for the use of this vehicle throughout Europe: to fall into line with the competition and to combat offshore financial centres, to strengthen the long-term financing of property corporations, to diversify investment choices for institutional investors, to foster transparent and liquid real estate investments, to spur economic progress through the outsourcing of real estate holdings, to improve the information efficiency of the real estate market, to prevent a crisis in the underlying market linked to mass liquidations of closed-end funds upon maturity, to create an underlying for a derivatives market, and even for a one-time injection of tax revenues as a result of taxes levied as companies and assets migrate toward the REIT status.

Among the twenty or so countries throughout the world with such arrangements in place, there is a great variety of authorised activities and of capital structures or of governance and taxation—as real estate is a key sector, the characteristics of these arrangements are continuously amended under pressure from interest groups and in the name of international competitiveness. The chances of a uniform status throughout the European Union are still very remote.

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Broadly, REITs offer fiscal transparency for real estate earnings, deduction of dividend payments from corporate income tax, or elimination of corporate income tax—however, obligations must be met with respect to:

- the nature of the assets and of the activities authorised so that long-term investment predominates—property development activities are limited or restricted to subsidiaries subject to taxation.
- the nature of profits, a large proportion of which must come from rent, capital gains on real estate disposals, and other similar sources.
- the distribution of almost all of their income.
- governance, capital distribution, and negotiability of shares.

Appendix 8 lists the main features of REIT regimes in Europe.

The fiscal transparency of REITs makes listed real estate more attractive to institutional investors, but for international investment in particular there are still problems linked to the withholding of taxes at source and to limits on holdings.[16]

Real estate funds and ETFs

The dynamism of the physical market for real estate and of alternative investment has led asset management firms to launch specialised funds: the development of the listed real estate sector allows them to use their expertise to offer the greater public new tools for diversification in both active and passive asset management. A count done by AME Capital and quoted in Emerging Trends in Real Estate—Europe 2007 shows that there are now more than 100 global funds specialised in listed real estate, of which some fifty focus exclusively on Europe. These funds had a total of $39bn of assets under management.

Indices

Institutional investors can count on two major families of indices covering Europe: one linked to the FTSE EPRA/NAREIT alliance and the other to Global Property Research; there are index funds, ETFs, and derivatives for some of the indices in these families. In 2007, IEIF and Euronext created an index of European REITs in the hopes that it would become the benchmark for ETFs, certificates, and other derivatives. The S&P/Citigroup and the Dow Jones Wilshire indices for global listed real estate are not available for Europe alone.

Because of their selection criteria based on listing, capitalisation, and liquidity, international property indices cannot be considered representative of institutional investment in real estate. And because listed real estate markets in some countries are at more advanced stages of development than in others, these indices are not representative in terms of geography.[17] In addition, even in the most developed markets, domestic indices are still prone to insufficient economic diversification.[18]

Correlation with the stock market and direct real estate

The correlation of daily returns of property indices and broad stock market indices is significant. Indeed, from 2003 to late August 2007, the correlation of the Euronext IEIF REIT Europe index and the Dow Jones Euro Stoxx 50 (large caps) is around 40% and its correlation with the Dow Jones Euro Stoxx Small is around 60%. This correlation has fallen over time[19] but, as exhibit 5 shows, prices for listed real estate remain much more closely correlated to the stock market than do sale prices for buildings. This observation is commonly relied on in arguments for the superiority of direct real estate when it comes to the diversification of a multi-class portfolio. The correlation of direct real estate indices and property corporation indices is usually low and unstable.[20]

16 - In many cases, investment through a non-listed vehicle offers competitive tax advantages; for sophisticated institutional investors, the appeal of REITs for tax purposes may not be so great.

17 - In late 2006, and with respect to IPD's country estimates for real estate available for investment, Spain was underrepresented by a factor of 12.5 and Austria was overrepresented by a factor of 4.4 in the FTSE EPRA/NAREIT Europe index. In addition, Denmark (7.3), Germany (4.1), Norway (2.9), Switzerland (2.5), Italy (2), and Finland (1.9) are plainly underrepresented, whereas the UK (1.3) and the Netherlands (2.2) are plainly overrepresented.

18 - In late August 2007, the leading French property company accounted for nearly 30% of the market value of the index and the five largest companies for more than 70%. This problem is quickly being resolved at the European level, the largest capitalisation in the IEIF Europe index nonetheless accounted for nearly 9% of the market value of the index and the weight of the top five was still greater than 30%.

19 - This fall is generally ascribed to the maturation of the market, but it is also linked to "regulatory shocks" that have affected listed real estate. Plans for favorable tax designations, for example, led to one-time reevaluations of the sector.

20 - For example, the rolling correlation over ten (five) years of the IEIF Foncières index and the IPD Bureaux France index is on average 11% (-31%) between 2000 and 2006, with extremes -12% and +34% (-75% and +83%).

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Exhibit 5: **Correlation of stock market indices and indices for listed and non-listed real estate in France (1990-2006)**

Historical Correlation (10-year rolling correlation) Annual data	IPD Offices France	IEIF Property Companies (real estate investment only)	IEIF Real Estate France (includes investment, development and associated services)
SBF250	0.10 (0.06)	0.38 (0.36)	0.48 (0.50)
CAC40	0.11 (0.06)	0.30 (0.32)	0.40 (0.46)

1.2.2. Debt investment

Mortgage loans

In the mortgage a company extends a long-term loan to a borrower whose collateral is the property that is the object of the loan. It is one of the traditional forms of institutional investment in real estate, but it is rarely labelled as such.

Two indicators are used by so-called originators to monitor the risks of default: the loan-to-value ratio and the debt coverage ratio—the critical levels of these ratios change with business cycle changes and with competition. The benchmark value used for the loan is determined by a prudent appraisal of the future saleability of the property—speculative sources of value should not be taken into account.

The nature of the originator depends on local laws and usages; in some countries, it is a credit institution such as a bank, a savings and loan institution, or a non-depository institution specialised in real estate loans, while in other countries—the UK and the Netherlands, for example—insurance companies are major lenders, in some cases—as in the US—pension funds are active in this market.

The transfer of a loan, a non-standardised contract between two parties in a commercial relationship, is not easy. Traditionally, the lender keeps the loan on its books until it is paid off in full. However, securitisation allows lenders to transfer all or part of the risk of a loan or group of loans to a third party and thus to free capital for the origination business, which can be looked on as a distinctive area of expertise. Securitised instruments can be traded on private or public markets.

Securitised debt

Mortgage-backed securities are securitisation instruments that represent an interest in, or are backed by and payable on, the cash flows generated by a pool of real estate assets. These assets are typically held by "bankruptcy-remote" special purpose vehicles or entities (SPV/SPE), entities with a separate legal existence whose investors are protected if the parent company goes bankrupt. These securities, listed in box 3, allow investors to gain access passively to large-ticket markets and to do so with greater liquidity and diversification.

Following the example of the RMBS market, which expanded greatly in the 1980s, the CMBS market experienced strong growth in the US starting in the early 1990s. Its takeoff in Europe took place in 1999. At first, the market was essentially for the securitisation of single-borrower large-loan transactions, but it has since become more diverse. Most issues are rated AAA, but the proportion of non-investment grade tranches, which offer higher expected returns at the cost of greater risk, has increased; growing demand from insurance companies, hedge funds, and banks was narrowing the return spread until crisis in the markets for subprime residential mortgages spread to the debt markets as a whole.

In Europe there are numerous so-called conduit programmes that lend with a view to immediate securitisation—competition with conventional lenders has led to lower profit margins and greater volume.

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Box 3: Types of mortgage-backed securities

Brueggeman and Fisher (2005) identify four kinds of mortgage-backed securities (MBS). These securities can be backed by residential mortgages (RMBS) or by commercial mortgages (CMBS).

- **Mortgage-backed bonds (MBBs)** are a general obligation of the issuing entity and payments are collateralised by a pool of mortgages of which the issuer retains ownership. The market value of the mortgages must be maintained to keep default risk to stipulated levels.
- **Mortgage pass-through securities (MPTs):** issued by mortgage originators; holders have ownership interests in mortgage pools and receive principal and interest from the pool. These securities are commonly used for the securitisation of residential mortgages.
- **Mortgage pay-through bonds (MPTs)** can be viewed as a combination of the instruments above: cash flows from mortgage pools are passed through to investors, but the issuer retains ownership of these pools.
- **Collateral Mortgage Obligations (CMOs)** are organised along the same lines but issued in multiple tranches. Amortisation and prepayments pass through to the holders of different tranches in a pre-defined order of priority. The difference between the amount of debt issued against the pool—liabilities—and the assets pledged as security constitutes the equity of the issuer. Multiple tranches allow the issuer to offer investors multiple return profiles (maturity period, nature, volatility); some provide greater predictability with respect to cash flows than do the two preceding instruments. Investors in the highest-quality tranches are paid first, followed by those in intermediate or mezzanine tranches, with residual flows reaching the most speculative tranches. Tranches are generally rated either investment grade or intermediate grade; tranches beneath intermediate grade are lowest in the order of priority and are usually unrated.

Multiple tranches appeal to more investor groups, and as a result the value of the instrument is generally greater than that of the pool of mortgages, thus allowing lenders using securitisation to award loans on more aggressive terms.

Commercial mortgage-backed securities have maturities shorter than those for residential mortgages, but pools of commercial mortgages are amortised at term, which extends their duration. For CMBS this CMO model is dominant.

Just before the crisis in the subprime American housing markets spread to credit markets as a whole, risk premia on European CMBS had fallen to historical lows.[21]

According to HVB (2007), €280.5 billion of RMBS and €68.4 billion of CMBS were issued in Europe in 2006. RMBS are the largest single component of the European securitisation market, but their share is shrinking as a result of the dynamism of CMBS and CDOs[22] (some of which are founded on the subordinate tranches in CMBS or on bundles of lower quality mortgage loans). The UK has the most developed market by far, but the Continent is the leading issuer.

21 - Before the summer 2007 crisis, risk premia on AAA-rated securities were at 14 basis points and as low as 90 basis points for BBB-rated securities. By the beginning of autumn, the flight to quality had sent all risk premia on CMBS upward and the gap between senior and junior tranches widened considerably: premia were then at 28 basis points on AAA-rated tranches and from 120 to 170 basis points on BBB-rated tranches. At the same time, new issues dried up and landmark operations were postponed—HSBC's €1.2 billion securitisation of a loan awarded to Metrovesca for the acquisition of the bank's headquarters on Canary Wharf and a Lehman Brothers CMBS of approximately €1.5 billion backed by the Cœur Défense building.

22 - Collateralised Debt Obligations are vehicles for the securitisation of portfolios of bonds or debt. Asset-Backed Securities CDOs hold portfolios of these assets and the yield to the holder comes from the income flows generated by these assets. Since 1999 some of these securities have specialised in commercial real estate debt (Commercial Real Estate CDOs)—in their portfolios there are usually subordinate tranches of CMBS and property company bonds with similar ratings. Nearly two-thirds of investors in CDOs are financial institutions and asset managers—insurance companies and hedge funds are also active in this market.

1. Real Estate as an Asset Class

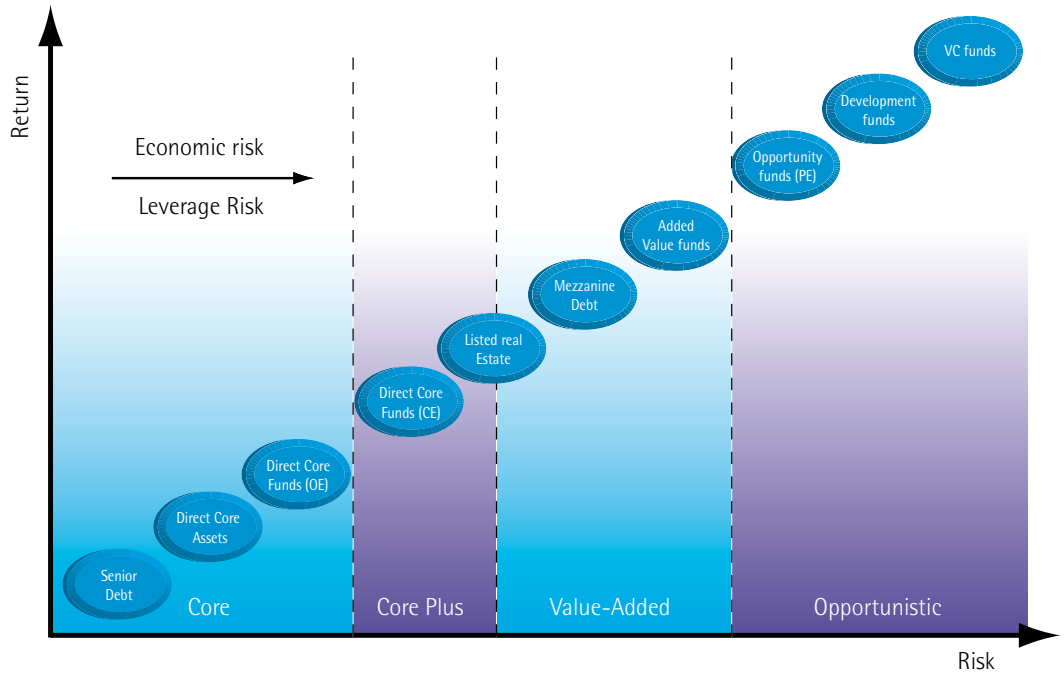
1.2.3. Real estate vehicles compared

Exhibit 6: **Alpha and beta exposure, risks, advantages and drawbacks of various modes of real estate exposure**

Mode	Beta	Alpha	Main risks	Advantages and disadvantages
Direct acquisition of building	Beta of asset	Alpha of asset	Specific risk of asset	⇑ Opportunities awarded by direct control ⇑ Tailor-made investment strategy ⇓ High specific risk ⇓ Expertise required for property management ⇓ High minimum investment ⇓ Low liquidity ⇓ High direct and indirect transaction costs ⇓ Long lead times
Listed property companies	Beta of share	Alpha of the property company	Specific risk of the company, specific risk of its portfolio; equity market risk	⇑ Transparency of a listed investment ⇑ Simplicity of investment in shares ⇑ Liquidity (of mid caps) ⇑ Low minimum investment ⇒ Diversification of property portfolio ⇓ Equity market risk ⇓ Specific company risk ⇓ Limited supply: unequally developed markets across Europe, limited number of sector specialists at the country level ⇓ Securities taxation ⇓ Costs of being listed
Index of listed property companies	Beta of listed real estate sector	None	Systematic risk of equity market; listed real estate sector risk; systematic real estate risk	⇑ High diversification ⇑ Partial exposure to real estate risk (in the long term) ⇓ High exposure to equity market risk ⇓ Securities taxation
Non-listed collective investment vehicle	Beta of vehicle	Alpha produced by manager	Risks specific to the vehicle and its portfolio; some systematic real estate risk	⇒ Diversification (extent limited by the size of the vehicle) ⇒ Delegated active management ⇒ Variable liquidity (sometimes lower than that of direct investment, possibly good for open-end vehicles) ⇒ Medium to low minimum size of investment ⇒ Variable transparency ⇒ Leverage ⇓ High costs ⇓ Limited supply: unequally developed market across countries and sectors, few sector specialists at the country level ⇓ Specific risk (vehicle, portfolio, asset manager)
Direct real estate index	Beta of market or sector	None	Systematic risk (at market or sector level)	⇑ Pure exposure to market or property type risk ⇒ Some liquidity through nascent derivatives markets ⇓ Transparency ⇒ Variable index quality
Mortgage loan	Beta of loan	Alpha of loan	Interest rate risk; possible prepayment risk; and specific borrower default risk	⇑ Opportunities awarded by direct control ⇓ Expertise required for lending activity ⇓ Specific borrower and collateral risk ⇓ High minimum investment ⇓ Indirect exposure to real estate ⇓ Low liquidity
Mortgage-backed security	Beta of security	Alpha of security	Interest rate risk; possible prepayment risk; and credit risk specific to portfolio	⇑ Diversification ⇒ Medium size of minimum investment ⇒ Liquidity ⇓ Indirect exposure to real estate

1. Real Estate as an Asset Class

Exhibit 7: **Modes of real estate exposure on a risk-return spectrum, drawing on Rottke (2005)**



1.3. Allocation to real estate in a multi-class portfolio

"A man should divide his capital into three parts, and invest one-third in land, employ one-third in merchandise, and reserve one-third in ready money" Baba Metzia, fol. 42, col. 1.

As the Talmud shows, real property has been a natural part of asset allocation since time immemorial. Long present in the books of European institutional investors, real estate began to gain acceptance in the US in the inflationary 1970s; in the wake of the early 2000s stock-market crash and facing low yields on the fixed-income markets, investors worldwide have turned en masse towards real estate as a source of alternative beta (risk premia) and alpha (abnormal performance) and are now seeking to increase their allocations to this asset class.

1.3.1. Ideal allocation model

Here we describe an approach to ideal allocation that first takes into account the investor's liabilities and determines the strategic allocation to real estate accordingly; it then manages the allocation optimally from an asset-management point of view. This approach sheds light on the presentation in academic studies of the role of real estate in mixed-asset portfolios and it provides a basis for comparison to the practices described in chapters 2 and 4.

Real estate in asset liability management

While real estate has unique and appealing characteristics for asset allocation, some of its particularities make working it into an Asset Liability Management (ALM) framework a challenge.

Any allocation exercise first requires precise demarcation of the asset class—while most investors now approach real estate as an asset class, there is as yet no consensus on what instruments belong to it: at one end of the spectrum there is the risk of focusing too closely on the idiosyncrasies of each property and failing to recognise the potential of real estate as a class; at the other, there is the danger of using an all-encompassing quadrant model that dilutes the unique characteristics of

1. Real Estate as an Asset Class

real estate equity assets and turns the portfolio into a composite of public and private, debt, and equity investments. Nor has the notion that listed property securities are real estate won unanimous backing. But squabbles over the bounds of real estate should not obscure the fact that real estate is no less of an ALM class than are bonds and equities. And, as with the bonds and equities, diversity within the real estate class lends itself to analyses based on sectors and styles- and should be of great relevance at the asset management (AM) stage. Once the bounds of real estate have been more clearly defined, it is necessary to come up with a model of long-term returns for the class and to calibrate it. Complex multivariate approaches may be required to optimise AM, but stochastic models for ALM demand parsimony and stability.

Extracting model parameters is, of course, never easy, but real estate data pose specific challenges, as they are both scarce and noisy. Two decades of academic research have documented the issues associated with the structure of the private and public property markets, as well as the biases of the various index construction methodologies. Remedial procedures have been developed and data challenges are no longer major impediments to the stochastic modelling of long-term real estate returns required for ALM.

After the stochastic models for assets and liabilities have been defined and calibrated, the strategic allocation to real estate and other classes is the output of the optimisation that corresponds to the investor's overall objective—for example, to minimise shortfall risk, or to optimise surplus for a pension fund.

Because of the cyclical nature of real estate markets and the lack of normality of property returns, dynamic asset allocation strategies for ALM and ALM tools incorporating the impact of parameter and model risk are recommended.

Real estate probably deserves a role in liability-driven investment (LDI). With its (disputed) inflation-hedging characteristics and its links to demographic factors, real estate may have a natural place in liability-matching portfolios used to immunise defined benefit pension schemes against inflation or longevity risks. Nor would real estate—with its attractive risk/return characteristics and relatively low correlation to other asset classes—be out of place in performance portfolios.

Real estate in asset management

Once the ALM exercise has produced a strategic allocation to real estate, asset management practices attempt to optimise its contribution to the portfolio. At the heart of AM is portfolio-construction, a process that aims for asset allocation for maximum diversification benefits. Both real estate holdings themselves and overall portfolios can be optimally diversified.

Real estate portfolio diversification

In the real estate portfolio, diversification includes the elimination of unwanted asset/property specific risk—a task made difficult by the heterogeneity, large minimum commitments, non-divisibility, and high transaction costs of property investments. But it is crucial, as real estate risk is overwhelmingly idiosyncratic.

A scientific approach to diversification presupposes the ability to identify and quantify the miscellaneous sources of risk affecting real estate assets across vehicles, sectors, and regions. Risk factors, risk premia, and betas must be specified for AM models to become operative.

For the formulation and implementation of investment strategy, heterogeneous real estate assets have historically been bundled into ad hoc groupings based on location and property sector. More recently, there have been classifications by economic rather than geographic region and by investment style. These classifications must

1. Real Estate as an Asset Class

be examined to determine to what extent they correspond to different fundamentals and can be used as a basis for diversification. Once investment-relevant classifications have been established based on risk factors, diversification can be optimised within real estate holdings as well as at the global portfolio level.

Real estate in a multi-class multi-style portfolio

In a multi-class multi-style framework, there are two options: (1) construct optimal portfolios for each class and then optimally combine them; (2) conduct one-step portfolio-wide optimisation based on the relevant styles identified across all classes.

When AM follows ALM, the multi-class portfolio of the first approach combines the optimised class portfolios according to ALM-generated optimal weightings, while the alternative one-step multi-style optimisation procedure is carried out subject to the same weighting constraints. While the first approach may be theoretically suboptimal, it facilitates both active management by in-house or outsourced class specialists and passive approaches using class benchmarks.

Data issues

Unlike ALM, AM exercises are less affected by the lack of availability of long time-series, but the quality and frequency of data are of primary importance, as estimates of return, beta moments, and co-moments are crucial to the success of the model.

As private real estate is illiquid and as it has been made clear that returns in the property markets are skewed and leptokurtic, standard mean-variance analysis should not be used. Tools developed to deal with the illiquidity and non-normality of other assets such as hedge funds are needed to optimise the risk/return characteristics of real estate investment programmes and mixed portfolios.

When managing portfolios that include real estate, one must deal with 'classic' but exacerbated sample problems, as well as tackle specific data challenges. Resampling and Bayesian approaches should be used to improve estimates from small size and dubious quality samples. Tools should be refined to include dimensions of real estate risk whether reflected in prices or not. One aspect of liquidity risk specific to real estate and not reflected in prices (or appraisals) is that in bear markets transaction volumes dwindle and time on the market lengthens.

1.3.2. Arguments for real estate investment

Box 4 summarises traditional and modern arguments for the inclusion of real estate in institutional portfolios.

Box 4: Arguments for the inclusion or real estate in institutional portfolios

Traditional arguments

- attractive total returns
- low volatility[23]
- high risk-adjusted returns
- potential hedge against inflation or deflation
- large and stable rent component
- excellent diversifier for mixed-asset portfolios

Modern arguments

- significant component of investment universe (market portfolio approach)
- inefficiency of the real estate market: potential for alpha through selection and tactical allocation
- broader field of application for the tools of modern finance

1.3.3. Empirical studies

Few conclusions but recommendations for significant allocation to real estate

The only traditional arguments for real estate to have been solidly backed by the literature are the low correlation of real estate and other asset classes and its large rent component. Many studies, largely of the asset management type,

23 - Index construction methods may contribute to the underestimation of real estate volatility, but the microstructure of the market, the stability of revenue streams, and the capital intensiveness of the sector may also be responsible for relatively low volatility.

1. Real Estate as an Asset Class

may justify significant allocation to real estate in a multi-class portfolio, but the optimal allocation recommended varies greatly from one study to another. In addition, opinions differ as to whether real estate is superior to stocks as a hedge for inflation; the effectiveness of real estate in this role depends heavily on the type of inflation studied (total, expected, unexpected), on the property type, on the country, on the observation horizon, and on the period studied.

Several reasons have been put forward for the clear gap between the large allocations recommended by studies and the very small role played by real estate in institutional portfolios; these reasons are summarised in exhibit 8.

Exhibit 8: **Possible reasons for gap between real and theoretical real estate allocations**

Data problems • Smoothing and lags • Low frequency of data • Excessively short data series • Use of a time-weighted rate of return rather than a value-weighted rate of return, the latter being closer to actual returns • Sample includes an unrepresentative period	**Real estate characteristics** • Illiquidity (use of appraisal-based or transaction-based indices with no control for variable liquidity resulting in artificial lowering of real estate risk) • Management and transaction costs (higher than those in other classes but not included in analysis) • Heterogeneity of properties (conclusions drawn on non-investable and hard to replicate indices) • Information asymmetry • Stock insufficient to act on recommendations
Method • High statistical uncertainty of parameter estimates resulting in limited reliability of results (fuzzy efficient frontier) • Ex post approach (assumes stability) • Simplistic multi-class portfolio (alternative classes not taken into account) • Single-period approach • Short-term approach • Use of total return whereas breakdown into rent and capital returns would be more relevant • Failure to take into account liabilities • Failure to take into account restrictions with respect to international investment	**Model** • Refutation of hypotheses of normality (alternative approaches: conditional models, use of asymmetric indicators of risk and partial co-moments)

The first shortcoming: the use of smoothed and lagging indices

The earliest studies of real estate in institutional portfolios were strict applications of the capital asset pricing model and their aim was to evaluate the benefit of adding real estate holdings to a conventional mixed portfolio of stocks and bonds. Standard indices were used; for real estate, then, they were appraisal-based indices.

Appraisals, however, are not without their problems; first, they are costly and time-consuming and may be done infrequently—contributors may revalue their properties at wide intervals or when they feel that value has been altered significantly. When the intervals between such updates are greater than the intervals between reporting periods, the database contains stale appraisals. The presence of stale appraisals will result in lagged and auto-correlated index returns and artificially lowered index volatility and correlations with other assets—in other words, smoothing.

If many contributors choose to adjust their valuations marginally or to leave them unchanged for several reporting periods before doing an in-depth appraisal, and if these thorough reappraisals are clustered in the same periods, there might then be discernible "seasonality" in the index, on top of the smoothing and lagging. This "seasonal" bias would artificially increase volatility in the affected periods and lower multi-period compounded returns. The NCREIF Property Index series, for example, is subject to severe fourth-quarter seasonality.[24]

24 - From 1978 to 2006 the average fourth-quarter yield is 2.7% and the volatility 2.6%, as opposed to ranges from 2.3% to 2.4% and from 1.2% to 1.4% for the other quarters. The fourth-quarter variance is statistically different from the variance of the other quarters, which suggests that appraisals are clustered at year end.

1. Real Estate as an Asset Class

Second, any appraiser has to work with the information that is available–in direct real estate markets, very little information is contemporaneous and therefore appraisers must rely on lagged market indicators and on recent and not-so-recent information about transactions and appraisals of comparable properties.[25] Appraisers may also update values conservatively and wait for confirmation of early market signals. In short, appraisal-based indices will trail market prices in up-and-down markets.

Third, aggregation of property appraisals which take place over the full course of the observation period will lead to additional smoothing of the index.

The use of smoothed and lagged data results in artificially lowering not only the standard deviation of real estate but also the contemporaneous correlation with the other asset classes. Real estate in isolation will appear to offer a higher reward per unit of risk than it really does, and, more importantly, the diversification potential will be overstated. The use of raw data skews the covariance/variance matrix towards an allocation to direct real estate. In fact, many studies based on uncorrected data recommend senselessly high allocations to real estate. Note too that the resulting auto-correlation will produce non-normal returns—returns incompatible with the hypotheses of modern portfolio theory's mainstream models.

These problems have prompted academics to design procedures to unsmooth and de-seasonalise the returns of appraisal-based indices. Unsmoothing procedures are rooted in the assumption that appraisals represent moving averages of contemporaneous and lagged information. The extent to which contemporaneous information is impounded into appraisals and the level of seasonality are either posited or estimated empirically. The unsmoothed contemporaneous component can thus be extracted from reported index values. Unsmoothed and de-seasonalised indicators appear to lead raw indices and exhibit higher volatility.

After unsmoothing the data for the period from 1987 to 2001, Hoesli, Lekander, and Witkiewicz (2003) justify allocations to all kinds of real estate of between 15% and 25%. Direct real estate is king and there is little room for listed vehicles. The optimal proportion of direct real estate in minimum-variance portfolios ranges from 5% to 15% for domestic investment and stands at 15% for international investment; reduction of risk ranges from 5% to 10% in the first case and from 10% to 20% in the second.

For France (from 1987 to 2004), Hoesli and Lekander (2006) find a risk reduction of 8% for a 10% allocation to French direct real estate and twice that for a combination of a 6% allocation to domestic real estate and an 8% allocation to international real estate. In either case, the maximum allocation to real estate is 22% and is composed solely of direct holdings.

The second shortcoming: failure to control for variable liquidity

An alternative to correcting the biases of appraisal-based indices is to try to develop indices based on recorded transactions. This presents a number of challenges linked to the limited and time-varying liquidity of the heterogeneous commercial real estate markets.

One problem with transactions-based indices is the possibility that properties that are transacted more often differ systematically from the population supposedly tracked by the index. Another problem is that the characteristics of the properties for which deals are consummated may differ from one period of time to the next and that the type and motivations of buyers and sellers may change at different stages of the cycle. These biases have been confirmed empirically, but studies suggest that their impact on indices is limited. Finally, liquidity will

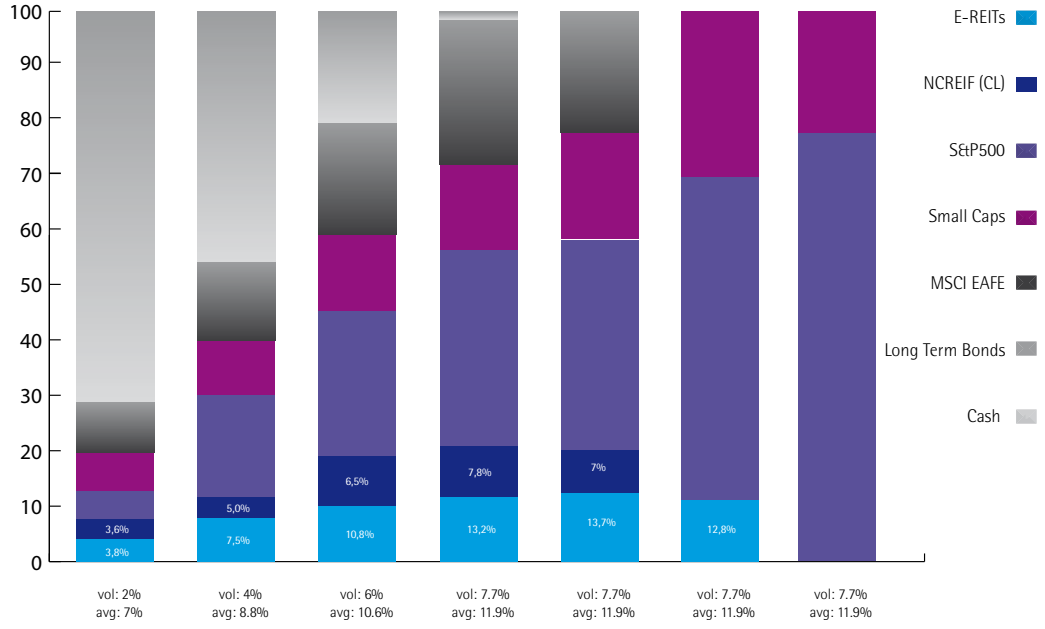
25 - Fisher (2003) observes that in the search for comparables, there is a trade-off between homogeneity and timeliness and that to minimise overall noise appraisers need to find the balance between comparable sample error (not-so-comparable comparables) and comparable lag error (not-so-recent comparables).

1. Real Estate as an Asset Class

not be constant over time in a regular transaction price series as it is positively correlated with the real estate cycle: rising property markets are associated with a shortening of the average time on the market and an increase in the volume of transactions; the opposite is true of falling markets. As a result, raw transaction prices reflect both property-specific characteristics and market-wide liquidity. This dual reflection has a significant bearing on indices; in response, Fisher, Gatzlaff, Geltner, and Haurin (2003) have developed constant-liquidity indices.

Using an unsmoothed and constant-liquidity direct real estate index, Feldman (2003) justifies a maximum allocation of 22% (as opposed to 30% before adjustments) to domestic real estate in the United States for the period from 1987 to 2001. Direct real estate and listed property corporations are complements rather than mutually exclusive alternatives—conservative investors are drawn to direct real estate for the large role it plays in diversification, whereas listed property companies, with their more attractive adjusted returns, are more often found in riskier portfolios (exhibit 9).

Exhibit 9: **Optimal multi-class allocation—United States 1987-2001 – Feldman (2003)**



As Liang, Myer, and Webb (1996) or Brown and Schuck (1996) have shown, uncertainty as to the parameters of the portfolio justifies a very wide range of ex post and ex ante allocations. Actual allocations may thus not be incompatible with theoretical results. All the same, the allocations recommended above are high, and it should be noted that these studies correct for only some of the problems mentioned in exhibit 8.

Taking into account asymmetric risk and other asset classes

Most asset allocation studies have been done in a mean-variance asset management context that assumes the normality of returns and the validity of the quadratic utility function for the description of investor preferences. In practice, real estate returns measured through valuations are not normal, and investors, unlike variance, are known not to approach profits and losses symmetrically. The results of the use of asymmetric measures of risk and lower moments and co-moments are convergent: Cheng (2001) finds

1. Real Estate as an Asset Class

that the model based on downside risk allocates much less to real estate; allocations increase as the return target increases but remain below 15% for a targeted return of 12%. Hamelink and Hoesli (2004a) find that allocations are "much more in line" with observed allocations when maximum drawdown is used a measure of risk.

The few studies that expand the study of multi-class allocation to take in traditional and alternative investments as a group come up with contrasting results: Georgiev, Gupta, and Kunkel (2003) find that real estate could be superfluous in the presence of commodities and hedge funds, whereas Terhaar, Staub, and Singer (2003) assert that among the possible alternative investments real estate could justifiably receive the highest allocations.

Taking into account liabilities

Most studies use an asset-management type optimal allocation model and fail to take into account liabilities. This approach is inappropriate for the major institutional investors. The obvious next step is to study asset-liability management models, but as yet little work on them has been done.

Chun, Ciochetti, and Shilling (2000) maximise the utility of the risk-adjusted surplus and find that because of the low correlation between listed real estate and liabilities, the allocations recommended by mean-variance studies—from 10% to 20% or more to real estate—generate risk from an ALM point of view; they recommend allocations of between 6% and 10% for the most conservative portfolios and these allocations decrease quickly as tolerance for risk increases.

Craft (2001 and 2005) as well as Chun, Sa-Aadu, and Shilling (2004) use a model to minimise the surplus variance of a pension fund subject to a minimum return requirement.

For the average United States pension fund, Craft (2001) recommends a maximum allocation of 16.2% to domestic real estate (1979-1998). Total allocation to the class and the share of direct vs. indirect real estate decrease as the fund's appetite for risk increases. For a conservative portfolio, Chun, Sa-Aadu, and Shilling (2004) recommend an allocation of 12.1% to direct real estate to highly risk-averse investors and find that real estate disappears quickly from riskier portfolios.

Craft (2005) shows that the larger the deficit of the pension fund, the smaller the investment in direct real estate. From 1978 to 2002 and for a fund with a surplus or with no deficit, maximum allocations are 12.6% to direct real estate plus 7% to listed real estate for a minimum-variance portfolio and 0% plus 11%-12% for medium-risk portfolios. A fund with a surplus of 5% and a low-risk policy can invest up to 14.8% and 6.9%.

American ALM studies allot less room to real estate than do asset management studies, largely because of its low correlation to liabilities as modelled by the study authors: excessive allocation would increase the volatility of the surplus or of the shortfall. With its negative correlation to liabilities, direct real estate can be found in more conservative portfolios as a result of its low risk. With their slight positive correlation to liabilities, REITs are less heavily penalised. Unfortunately, these studies neither unsmooth the returns from direct real estate indices nor neutralise liquidity fluctuations.

Booth (2002) studies the impact of liability structure on allocations by English pension funds and evaluates the benefits of domestic direct real estate for the period from 1984 to 2000. He recommends an optimal level of 10% for closed pension funds and of 5% to 10% for newly created funds. Booth and Matysiak (2004) show that the use of unsmoothed data reduces real estate risk in an ALM context; their work sheds new light on previous results and suggests that optimal allocation may be higher.
These early studies show that because the correlation of real estate and liabilities is lower than

1. Real Estate as an Asset Class

that of other asset classes allocations are scaled down in ALM. These studies are largely exploratory, however, and after unsmoothing the data the scale of the downward adjustment should be reduced.

Significant correlation with inflation, demographic risks, and long-term interest rates could justify the use of real estate as a liability hedge.

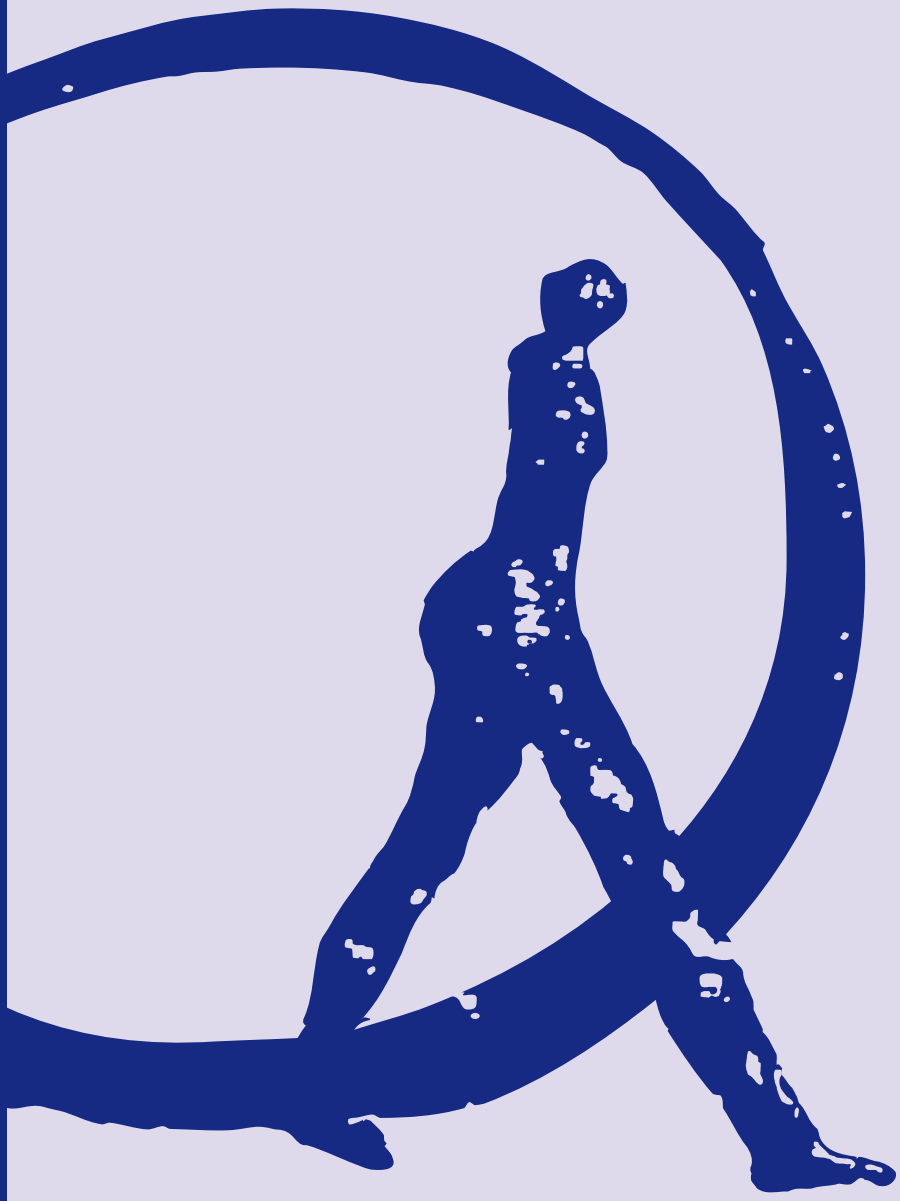
That real estate is a good hedge against inflation is no longer a unanimously held belief, but research results are highly susceptible to the methods and samples used: studies of the residential real estate markets and studies done over the long term confirm the usefulness of direct real estate when it comes to hedging against inflation.[26] Morell, Jones, Blundell, Walker, Waites, Cumberworth, Matysiak, and Winter (2004) show that correlation varies significantly, depending on whether the rent or the capital component of total real estate yield is taken into account—rent trends and income growth, a key indicator of pension fund liability trends, are closely correlated. Putting this finding into practice requires the utmost care in the composition of the portfolio or the use of financial engineering to create media for disaggregate exposure.[27] It should be noted too that a large rent component may be of use to pension funds that are currently meeting commitments, while capital gains may be more attractive to funds whose commitments are for the future.

We should mention as well that buildings have relatively long durations, making them potentially useful when immunising long-term liabilities—shares may have longer durations, but their volatility can reduce the effectiveness of the immunisation.

In short, the advantages of including real estate in a multi-class ALM portfolio merit further study. Corrected data, robust models, and realistic assumptions as to available asset classes and expected returns will go a long way towards elucidating ideal allocations.

26 - Bond and Seiler (1998), Quan and Titman (1999), Goetzmann and Valaitis (2006).
27 - Note, however, that Barber, Robertson, and Scott (1997) conclude for their part that between 1967 and 1994 real estate's (limited) usefulness as a hedge against inflation stems largely from the capital-gains component.

2. Real Estate Portfolio Management



2. Real Estate Portfolio Management

2.1. Portfolio management process and portfolio construction

2.1.1. Sources of performance, management strategies

Sources of performance

It should be kept in mind that the quality of the legal, fiscal, and financial structuring of the investment vehicle is key to its ultimate performance. There are then three branches of potentially value-adding activity in active real estate portfolio management:

1. Asset allocation, the quality of which depends on the quality of long- (strategic) and medium to short-term (tactical) forecasts. Professional standards required that the allocation be defined in accordance with the constraints and objectives of the investor.
2. Asset selection, the quality of which depends on the ability to spot real estate assets that are over- and underpriced with respect to current or planned use—the usual role of the property appraiser—and on the quality of negotiations for purchase and sale—the usual role of the acquisition and disposal team.
3. Asset/property management, the quality of which is shown by the ability to increase the net income generated by the portfolio or to enhance the value of the assets through physical changes (renovation, redevelopment, or repositioning), financial decisions (capital structure), and day-to-day management (optimisation of occupancy rates, lease portfolios, and so on).

This last source of value is accessible to the end investor or to the intermediary in charge of management, whereas with traditional assets, investors can hope to have a say in corporate decisions only through shareholder engagement or activism.[28]

Skills, diversification, and strategies

Hoesli and MacGregor (2000) propose a matrix of strategies for each skill. They emphasise the difficulty of index-based passive management in direct real estate: it is impossible to be in possession of the same buildings as the index, hard to diversify the specific risk of the buildings, and necessary to take charge of property management.

28 - *When compared with investment in widely-held companies, direct private equity investments may give the investor more influence on corporate decisions; however such investments will not grant direct control of assets.*

Exhibit 10: **Property portfolio management strategies based on manager's skills—Hoesli and McGregor (2000)**

		Manager's ability at setting structure	
		Good	Bad
Manager's ability at stock selection	Good	**Modern management** • Take positions based on forecasts • Use pricing models to identify buildings to buy and sell	**Traditional management** • Take benchmark positions • Use pricing models to identify buildings to buy and sell
	Bad	**Large funds** • Take positions based on forecasts • Diversifiy by buying a lot of properties	**Passive management** • Take benchmark positions • Diversifiy by buying a lot of properties

With Brealey (1983) as their point of departure, Brown and Matysiak (2000) note that the type of strategy viable is necessarily linked to the diversification of the portfolio. A diversified portfolio should limit asset turnover to minimise costs; a passive strategy is then "consistent". A poorly diversified portfolio, by contrast, calls for active management aiming for outperformance.

Management process

Hoesli and MacGregor recommend an active approach that corresponds to current industry practices. This approach is summarised in exhibit 11.

The authors note that diversification allows major investors to pay greater attention to allocation, but that unfortunately any allocation modifications are difficult for them given the amounts at stake.

2. Real Estate Portfolio Management

Exhibit 11: **Phases of active real estate portfolio management (Hoesli and MacGregor (2000))**

Statement of objectives	• Choice of benchmark. • Definition of objective for return over benchmark. • Definition of relative risk tolerance (in terms of tracking error, for example). • Definition of investment horizon for the achievement of the objectives and assessment of performance.
Analysis of existing portfolio	• Comparison of existing allocation and of benchmark allocation, analysis of recent performance.
Assessment of ability to reach objectives without allocation or selection changes	• For allocation, forecast of relative performance, of tracking error of portfolio (with respect to benchmark). Computation of the contribution of selection to performance and to tracking error. • Computation of the likelihood of reaching objectives without allocation or selection changes (with the help of total relative return and tracking error).
Allowances for restrictions on restructuring	• It may be necessary to keep certain buildings on which work to increase value is in progress or imminent. • High lot size and non-divisibility lead to discontinuities in possible allocations. The difficulty of diversifying specific risk makes it wise to set a maximum investment amount for any one building—an amount linked to the size of the real estate portfolio. The incremental cost of managing an additional unit, by contrast, makes a minimum necessary. • Need to evaluate returns beyond the usual one year horizon, given illiquidity and transaction costs.
Allowances for other practical considerations	• Need to consider timing of modifications (tactical consideration). • Need to allow for cash inflows/outflows: is the capital devoted to real estate increasing or must a part of the portfolio be sold to deal with outflows (redemptions or reductions in allocation)? • Market conditions: in bearish markets, sales are difficult, acquisitions possibly advantageous. • Transaction costs: high, must be taken into account. • Implementation capacity (qualified available human resources, for example) and the need to adapt it to changing environments.
Definition of new strategy	• New allocation. • Buildings to sell. • Types and location of buildings to acquire. • Identification of property management needs.

29 - They conclude: "Although a broad indication of the allocation to sectors is likely to be useful in terms of identifying a general risk class most decisions will be made at the individual property level. Identifying whether an individual property is under- or overpriced is likely to be more important than ensuring that the commitment of funds fits in with the output of an allocation model."

For smaller investors, allocation and selection are closely bound and for that reasons the strategy is deemed an iterative process.

Unlike Hoesli and MacGregor, Brown, and Matysiak give a very limited role in the management process to allocation by property type or by region—for them, a bottom-up approach with limits on overall levels of risk is more appropriate, as it is difficult to construct highly diversified real estate portfolios; they also highlight the importance of asset selection.[29] They point out that the conventional indicators for making real estate investment decisions (equivalent yields and internal rates of return) make incorrect allowances for risk and for risk premia and encourage the use of net present value with a discount rate linked to the systematic risk of the building and the expected market premium—the management of specific risk is altogether ignored.

2.1.2. Sources of risk and lines of diversification

Sources of risk in real estate

Like any investment, an investment in real estate is subject to business risk, financial risk linked to its level of debt, inflation risk, interest rate risk, management risk, legislative risk, and environmental risk; in addition, it is particularly vulnerable to liquidity risk. Exhibit 12 lists the possible sources of specific risk—diversifiable, in theory—and of systematic risk, which can be managed or hedged.

2. Real Estate Portfolio Management

Exhibit 12: **Sources of risk in real estate**

Risk specific to asset	Sector or geographic risk	Systematic risk
• Structure, condition of building, obsolescence • Location • Tenants (creditworthiness, concentration) • Leases and occupancy rates (structure, terms, and expiries)	• Property type • Local economic situation • Local supply and demand	• State of real estate markets • State of capital markets • International and domestic economic situation • Term structure of interest rates and availability of credit • Taxation • Inflation

Ling and Naranjo (1997) examine the systematic factors of the performance of listed and non-listed real estate from 1978 to 1994. They add the rate of growth of real per capita consumption and the real T-bill rate to the factors noted by Chen, Roll, and Ross (1986).[30] The growth of real per capita consumption, the real T-bill rate, the term structure, and unexpected inflation are found to be systematic factors for real estate.[31]

In an international study of the economic growth and supply/demand factors affecting returns in the office markets, De Wit and Van Dijk (2003) find that GDP/GMP positively influences real estate prices, while changes in unemployment and vacancy rate negatively influence prices. Rents are found to be positively linked to changes in GDP/GMP and negatively related to increases in stock, vacancy rate, and unemployment. Total returns are inversely related to the vacancy rate and positively linked to growth in GDP/GMP and to inflation. Overall, they conclude that changes in vacancy rates and unemployment rates are the most important indicators.

Lines of diversification

The different sources of building heterogeneity suggest lines of diversification—those investors resort to most heavily, property-type and geographic diversification, have been the object of the greatest number of academic studies.

Property-type and geographic diversification (domestic)

The assumption in property-type diversification is that classifications by type correspond to real differences in exposure to systematic risks, either on average or during different phases of the business cycle. A portfolio diversified by property type will thus be exposed to limited specific risk and to levels of systematic risk lower than that of the riskiest property type.

The assumption justifying geographic diversification is that buildings are bought and sold on local markets affected by supply and demand patterns that depend on specific factors as well as local exposure, whether structural or cyclical, to systematic risks.

The studies testify to the reality of the phenomenon but also to its relative power: the marginal gain from geographic diversification falls quickly, and portfolios of realistic size retain a significant share of diversifiable risk. The results for one property type are different from those for another: Cheng and Roulac (2007) find that for the United States geographic diversification is very efficient for residential real estate, advantageous for retail properties but less so for industrial properties, and not at all useful for offices.

Since Miles and McCue (1982), the vast majority of the many studies of various countries confirm the superiority of property-type diversification without calling into question the marginal advantages of geographic diversification. In the United Kingdom, the work of Andrew, Devaney, and Lee (2003), a twenty-year study of more than 12,000 buildings, strengthens these conclusions.

Hartzell, Shulman, and Wurtzebach (1987) suggest using economic regions rather than administrative

30 - The market portfolio, risk premium, slope of the term structure, industrial production growth, unexpected inflation, and changes in inflation forecasts.
31 - For a fixed-beta and fixed-premia model, only the first two factors are significant; for a variable-beta and variable-premia model, the last two are also statistically significant.

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divisions in studies of geographic diversification. Work on clustering geographic regions into homogenous economic regions has shown that this practice has greater potential for diversification. Papers such as those by Mueller and Ziering (1992) and Mueller (1993) have taken the approach even farther, discarding the notion of region altogether and relying directly on a base of local economic factors for greater diversification.

The use of economic rather than administrative regions increases the diversification potential of the geographic approach. This potential increases even more when diversification is by city but does not match the performance of diversification by property type. Indeed, cluster analyses of assets, such as those by Hamelink, Hoesli, Lizieri, and MacGregor (2000), reveal strong property-type dimensions to the clusters.

International diversification

Sirmans and Worzala (2003a; 2003b) survey the last twenty years of studies of international diversification—through both direct real estate and property companies—of mixed-asset and real estate portfolios. Nearly all of these studies reach the conclusion that international diversification is appropriate.

Common sense suggests that direct real estate markets are by nature less well integrated than financial markets, and papers such as those by McAllister (1999) and Chua (1999) confirm the higher costs of international real estate strategies, costs that act as brakes on international investment. Nonetheless, a study of twenty-one countries between 1987 and 1999 (Case, Goetzmann, and Rouwenhorst (1999)) documents a surprising correlation—largely a result of shared dependence on global economic changes—of domestic direct real estate markets; retail and office properties offer less potential for international diversification than do equities! Studying listed property companies in twenty-eight countries, Ling and Naranjo (2002) come to similar conclusions about this shared dependence. These results suggest that decorrelations of domestic economic cycles could guide a first approach to international diversification.

For listed property companies, Eichholtz, Huisman, Koedijk, and Schuin (1998) point to the existence of a continental factor that adds to the advantages of intercontinental diversification for North America and Europe. For direct real estate, Bond, Karolyi, and Sanders (2003) do likewise.

The benefits of international diversification are widely acknowledged but achieving this diversification requires taking into account property-type and geographic variations.

The few studies of the country and property-type components of international diversification suggest that the country effect is predominant. For 1990-1996, D'Arcy and Lee (1998) show that returns for 159 European cities are essentially accounted for by the country factor (31%); the addition of property-type (3%) and regional factors (1%) has, at best, a marginally positive effect on the model. In a study of more than 25,000 buildings between 1996 and 2002, Lee and Devaney (2004) reach similar conclusions: the explanatory power is limited to 2.8% for the country; 1.4% for the property type; and 1.4% for distinctions between primary and secondary cities.[32]

Hamelink and Hoesli (2004b) show that between 1990 and 2003 specific factors account for approximately half of property company performance. Toward the end of the period—and for non-specific factors—the country accounts for more than half of performance and the type of property for more than a quarter; other relevant factors were size and style. Likewise, Glascock and Kelly (2005) look at the property indices of seventeen countries between 1990 and 2002 and confirm the predominance of the country effect.

32 - These low explanatory powers reveal the predominance, for individual assets, of specific risk.

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Domestic diversification across property types reduces variance to 20% of that of the average property company. International diversification within a single property type reduces it to 8%. International diversification across property types achieves an additional reduction to 7%.

Traditionally, real estate investment has been domestic and the vast majority of institutional real estate portfolios have a very strong home bias. In an international setting, the heterogeneity, real nature, and need for physical management of the underlying translate into additional obstacles for the direct investor. Among them are the need for local knowledge and expertise, restrictions on foreign investment and political risk, taxation issues, the small scale and illiquidity of markets—especially in emerging economies. While these hurdles mean added costs and risks, they may also provide opportunities for higher returns. Relaxation of limits on foreign investment in real estate and the development of public and private indirect vehicles for international investment have brought about a boom in cross-border investment.

It should be noted that cross-border flows are concentrated on a small number of markets that are considered politically stable, economically mature, and large enough to support investment. Chen and Mills (2006) consider that only 27 countries worldwide are suitable for core real estate investment by institutional investors. Investor concentration on the most liquid markets can lead to flow-of-funds effects increasing country correlations and reducing the benefits of international diversification. Diversification benefits can likewise be subdued when buildings in different countries are leased to tenants that belong to the same globally integrated economic sectors. Looking at New York and London offices as examples of prime locations for international investment with comparable economic specialisations, Jackson, Stevenson, and Watkins (2005) document strong inter-linkages. Since links between total returns are stronger than they are between rental values, they conclude that the interrelation originates mostly in the capital markets through investor behaviour motivated by the size and liquidity of these two markets.

Foreign exchange risk is a major hindrance for international diversification outside of the home currency zone. As currency volatility is much higher than that of real estate, the returns on foreign-currency denominated investments will be largely dependent upon currency fluctuations. The predictability of currency movements is limited at best, so a hedging strategy is advisable. International allocation decisions must make allowances either for the high volatility of unhedged returns or for the cost of hedging. While a number of studies of international diversification conveniently assume currency risk away, Hoesli, Lekander, and Witkiewicz (2004) conduct hedged and unhedged analyses of the diversification benefits of real estate. They confirm the interest of real estate for portfolio risk reduction but emphasise that "allocation between domestic and non-domestic assets, however, varies substantially across countries, depending on whether returns are hedged or not."

Diversification by size and style

Since Roulac (1976), it has usually been acknowledged that there is a positive association between the size of a building (measured physically or by its value) and the return. The explanations for this association mention the liquidity premium of properties for which the market is very narrow, economies of scale, and lease diversification.

The styles proposed for the description of buildings and funds could, at the very least, constitute another dimension of the management of exposure to systematic factors, if not of diversification. For the present, these styles have been studied only from a perspective of performance measurement.

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The predominance of specific risk, non-normality, and their impact on diversification

Brown and Matysiak (2000) find that the stock market factor accounts for about 30% of the variation of an individual stock and that it takes on average 44 stocks to diversify 95% of the specific risk. They observe strikingly different results for real estate, where the real estate market factor accounts for only 9% of the risk of the average monthly valued property. Assuming that returns are normally distributed and that equal weighting of investments is possible, it takes an equally weighted portfolio of 171 properties to achieve 95% diversification. Using monthly valued properties is likely to introduce smoothing and downwardly bias the correlation between properties. Brown and Matysiak find significant increases in the average correlation between properties when they look at quarterly and annual returns, although coefficients remain low when compared with those prevailing in traditional asset classes. The intra-class diversification potential of real estate is lower than suggested by the above figures but it is easier to establish diversified portfolios: equal investment in thirty to forty buildings with normally distributed returns would suffice to achieve 95% diversification on average.

Unfortunately, it is not possible for an investor to hold the average portfolio, which means that the effective diversification of any portfolio of 30-40 properties could be significantly higher or lower than 95%. So, 95% diversification—with little margin for error—of an individual real-estate portfolio could require equal investment in hundreds of properties. Since properties are not divisible, equal-weighting is not an option and larger portfolios of value-weighed properties will be required to obtain the same level of diversification.

Finally, real estate returns have skewed and leptokurtic non-normal distributions that make them less diversifiable. Studying annual IPD property returns from 1981 to 2003, Young, Lee, and Devaney (2006) find that a ten-fold reduction in risk requires equal investment in 1,698 properties; under the assumption of normality, by contrast, this reduction requires investment in only 100 properties. .

Several observations are in order:

1. High diversification of a portfolio of direct real estate will be impractical for most investors—in the high transaction cost, high management cost environment of real estate, the marginal benefits of diversification will be weighed against its marginal costs and actual direct portfolios, even those of the largest investors, will not be 95% diversified.
2. Confronted with the impossibility of passive direct real estate investment through a highly diversified portfolio, investors will focus on active management and try to optimise portfolio returns instead of merely picking up the real estate market premium associated with a diversified property exposure. It then makes sense for the traditional real estate investor to try to optimise the alpha generated by property selection and management, since timing the markets requires dealing with high transaction costs, execution delays, and the diversification necessary for pure property-type/country bets.

OPC (2006) determined the capital required for direct portfolios replicating the performance of various segments of the British market depending on the average lot size and on the heterogeneity of each segment. The requirements (exhibit 13) show that, in practice, the difficulty of diversifying a specialised portfolio varies significantly from one segment to another.

It is extremely difficult to build and manage a conventional diversified real estate portfolio directly; the investor may opt then for an active direct strategy, if he has the means and the knowledge to do so, for intermediated diversification, or for a mixture dictated by the investor's means and skills and by the relative difficulty of the diversification. If the investor opts for the mixture, he may use vehicles diversified across property types or, if he

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prefers closer control over allocations, combine specialised vehicles by property type, country, and style—to the extent allowed by maturing markets.

Exhibit 13: **Capital required for property-type index portfolios by level of tracking error—OPC (2006)**

Capital required (£m) / Segment	5% tracking error	4% tracking error	3% tracking error	2% tracking error
Standard shops	28	42	74	157
Retail warehouses	86	129	259	1,013
Shopping centres	118	158	237	434
Other retail	40	60	100	169
London offices	152	243	455	1,229
South East offices	36	50	86	172
Provincial offices	36	58	87	166
Office parks	40	60	110	210
Industrials	32	51	90	212

Box 5: On the application of modern portfolio theory to real estate

The application of modern portfolio theory models to real estate runs up against data limitations (unavailability or low frequency, smoothing, non-normality, and cyclicality) and implementation difficulties (high transaction costs and delays, asset lumpiness, dominance of specific risk).

Gold (1995, 1996) points out that as a result of statistical uncertainty the efficient frontier is fuzzy and he recommends more robust allocation ranges—given the problems of measurement and execution, they are also more practical.

Pagliari, Webb, and Del Casino (1995) evaluate the usefulness of the CAPM for property-type allocation decisions. Inputting historical volatility, returns, and correlations, they note that the optimal portfolios are neither efficient ex post nor superior to approaches that equally weight different property types. They find greater stability in the variance-covariance matrix than in the vector of expected returns and—if returns cannot be forecasted—they suggest using modern portfolio theory to create minimum-variance portfolios. For property-type allocation, Coleman and Mansour (2005) outline a model which takes into account both skewness and kurtosis in input estimation, and uses semi-variance (downside risk) to incorporate asymmetric risk preferences—empirical tests are yet to be published.

For Graff and Young (1996), by contrast, segment correlations are so volatile that statistical tests cannot prove that geographical and property-type diversification are superior to a naive approach. They recommend that investors use common sense and experience rather than a variance-covariance matrix and a quantitative optimisation model to determine whether the costs of diversification beyond the investor's domains of expertise are justified by the expected reduction in the level of risk.

Young and Graff (1995), Graff, Harrington, and Young (1997), Young, Lee, and Devaney (2006), and Young (2006) show that asymmetry and the importance of the specific risk of buildings change over time and that infinite-variance models make for better descriptions of real estate return distributions than do Gaussian distributions. These international findings suggest that both the CAPM and, more broadly, any model based on the moments and co-moments of the assets, should be rejected.

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2.2. Performance measurement and analysis

Performance assessment should establish whether or not investment management has progressed toward or achieved its objectives during the period of observation. It is not simply a matter of communicating with the investor or aligning interests, but also of the information requirements of the portfolio management process. The contributions to management performance of allocation and selection are generally analysed: the aim is to assess where value was created or destroyed and to light the way for future choices.

Performance objectives are usually expressed either in terms of absolute return (real or nominal) or in terms of relative return (comparison to a peer group index, an individual benchmark, or a market index). Even if an absolute return is used as an objective, it can be interesting to work out ex post how performance was achieved.

2.2.1. Time-weighting and value-weighting

The monitoring of performance implies the assessment of returns. Two methods of calculating returns are commonly used: time-weighting and value-weighting. Time weighting compounds the returns observed over successive periods while ignoring the possible differences in the amounts invested in each period. Value-weighting takes into account variations in amounts invested and thus permits a measure of actual returns.

For a portfolio, the comparison of a time-weighted rate of return and a value-weighted rate of return provides an indicator of the manager's ability to make appropriate choices about the timing of allocations—on condition that he has been given the leeway to make these choices.

Time-weighting is the standard practice in core direct real estate investment and liquid real estate funds, the internal rate of return, the most frequently used value-weighted measure, is standard at the building level and is also commonly used for private equity funds.

When comparing investment choices it is crucial to avoid relying on incomparable bases for comparison—for example, an internal rate of return (IRR) computed from actual cash flows and a time-weighted rate based partly on capital variations appraised at regular intervals.

The computations require knowledge of asset values at each cash inflow or outflow; exact computations for non-listed real estate would require very frequent appraisals and be very costly. In this case, it is preferable to obtain approximate results with the help of sub-periods aligned with the normal frequency of appraisals—although in some countries or for some market participants this frequency may be low.

Performance assessments, during which assumptions about cash flows over the course of the year are made, are usually done annually; it is assumed, for example, that net income inflows and capital improvement outflows will take place at mid-year. If the composition of the portfolio is modified by the acquisition or sale of assets, it is advisable to work with exact dates. For all its indices, IPD computes monthly returns on the assumption that all posted flows take place at the beginning of the month; for assets that are not appraised monthly, IPD interpolates a capital value; monthly results are compounded to create quarterly or yearly indices.

2.2.2. Indices, benchmarks, and performance analysis

The measurement of relative performance or of overperformance implies the existence of a point of reference, usually known as a benchmark. The construction of a customised benchmark or of a "normal" portfolio is a major component of performance assessment.

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When a manager is tracking a published index, the index is the benchmark and should represent the neutral composition of the manager's portfolio. This tracking does not exclude market timing or asset selection but over multiple periods the manager should, on average, respect index weights. If the strategic allocation of the portfolio—in terms of systematic factors—differs from that of the index, the index is unsuitable as a benchmark.

If the manager does not track a market index, then he should build a customised benchmark that is representative of his strategy; these benchmarks may be obtained by mixing available market indices so that collectively they can map the manager's strategy. Property-type indices and private portfolio analysis services are appropriate sources for the construction of a customised benchmark.

Box 6: Can real estate indices be used as benchmarks?

Bailey (1992) explained that a valid benchmark should be:
1) Unambiguous (known components, known weights)
2) Investable (purchasable or replicable)
3) Measurable (computable by investor)
4) Appropriate (consistent manager's investment style and assumed risks)
5) Reflective of current investment opinions (manager has current investment knowledge of the assets that make up the benchmark)
6) Specified in advance (settable before the start of the evaluation period)

It is clear that the indices commonly used to measure the performance of direct real estate investment, whether they are appraisal-based indices or peer-group indices, do not fully comply with any of these conditions. The IPD market indices, for example, are ambiguous, not measurable, not reflective of investment opinions, and not specified in advance, as the underlying buildings are not identified. Because of the nature and number of their components, they are not investable. Finally, they will be appropriate only for some investors. That the breakdowns by property type and by geography are known and relatively stable over time mitigates the criticism but does not alter the verdict. As IPD (2007b) states, the use of one of these indices "as a benchmark for portfolio or manager performance" is inappropriate. By contrast, the use of an index of listed property companies as a benchmark is valid as long as the index is appropriate.

How the customised benchmark is built derives from defined objectives and constraints—the performance of a given period is then compared to the performance that would have been generated by allocation to passive media, with the deviations from the "neutral" or "normal" allocation serving to evaluate the value creation or destruction attributable to allocation and that attributable to selection. At its simplest, the performance analysis model takes the form:

Contribution of allocation:

$$\sum_j b_{P,j}\bar{R}_{INDEX,j} - \sum_j b_{BENCHMARK,j}\bar{R}_{INDEX,j}$$

Contribution of selection:

$$R_P - \sum_j b_{P,j}\bar{R}_{INDEX,j}$$

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With:

$b_{P,j}$
allocation to property type/segment j in the portfolio.

$\bar{R}_{INDEX,j}$
return on property type/segment j.

$b_{BENCHMARK,j}$
benchmark allocation to property type/segment j

R_P
observed portfolio return

To make sure that the portfolio has a level of risk comparable to that of the benchmark or to make the necessary adjustments, this breakdown should be complemented by a risk analysis.[33]

Performance analysis of listed and non-listed real estate portfolios has been studied by Young and Annis (2002), who conclude that it is not only devoid of prospective utility—as the investment process and the nature of real estate markets make the timely execution of trades difficult—but also potentially dangerous in that it slows down decision-making, encourages gaming the benchmark, and shifts the analysis towards variables they consider inappropriate.

In direct investment, selection refers not only to the choice of the asset but also to negotiations for acquisition or sale and to property management. It is possible to examine the sources of value creation for each building by singling out initial yield, which varies in accordance with selection and negotiation abilities, cash flow changes, which are largely a result of property management, and yield changes, which reflect selection and/or property management. Geltner (2003) suggests using this approach to break down the since-acquisition IRR into initial yield, cash flow change, and yield change.

As a complement to the performance analysis approach above—or when transparency of positions is lacking—it is possible to undertake a returns-based style analysis (RBSA)—as long as returns are available at a suitable frequency, which will not be the case with direct investments and the majority of non-listed funds. The merit of this approach is that it breaks performance down into one part attributable to exposure to various risks or styles and into another part that cannot be attributed but is linked to asset selection, to market timing, or to omitted factors; in return, it neutralises the value creation/destruction effect linked to an active position with respect to the benchmark, as it constitutes an ad hoc benchmark representative of the risks run and computes abnormal performance with respect to these risks. Schematically, the approach is a simple multiple regression of the type:

$$R_{P,t} = \hat{a}_P + \sum_j \hat{b}_{P,j} R_{INDEX,j,t} + \varepsilon_{P,t}$$

on condition that $\sum_j \hat{b}_{P,j} = 1$ and $\hat{b}_{P,j} \geq 0$

The use of style analysis in real estate is hindered by the limited availability of sufficiently frequent data and of style indices acknowledged as specific to real estate investment.[34]

With the help of seven property-type indices, Webb and Myer (1996) do a style analysis of twenty-six American commingled real estate funds between 1989 and 1995 and manage to account for nearly a third of the volatility of the funds (R^2=32%). Lee (1999) reaches R^2 of 64% for non-listed real estate funds by using ten real estate indices and one money-market index. These figures are lower than those for equity funds, a difference that can be linked first to the great heterogeneity of real estate and the need to use longer track records in compensation for the low frequency of data updates (although it must be admitted that given the longer holding periods of real estate assets there is less statistical noise)

33 - See Brinson and Fachler (1985), Brinson, Hood, and Beebower (1986), Brinson, Singer, and Beebower (1991).
34 - Marcato (2004) uses the return features of buildings to make robust style classifications (growth or value)—unfortunately, these indices are not (yet) used for performance measurement.

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and second to the average representativity of the style indices used. Nonetheless, Lee finds that that using an ad hoc benchmark is a better way to identify good and bad funds (in general, fewer funds outperform their ad hoc benchmark). Other observers have used the styles usual for equity analysis to study listed real estate: Liang and McIntosh (1998) look into REITs; Stevenson (2001) use nineteen factors to analyse thirty-four British property companies and find an R^2 ranging over time from 40% to nearly 90%; he also observes that property companies underperform with respect to their ad hoc benchmarks. Myer and Webb (2000), for their part, examine ten REIT managers and nine real estate funds between 1994 and 1996 and find an R^2 above 80% for a style analysis using real estate factors.

2.2.3. Risk-adjusted performance measures

Performance analysis allows identification of the allocation vs. selection and property management decisions that create or destroy value relative to a predefined benchmark, while style analysis provides an assessment of a portfolio's performance relative to an ad hoc benchmark representative of the risks it has incurred. Practical limitations and the limited expertise of a part of the public make it clear why other, simpler, indicators, such as the Sharpe and Sortino ratios, are commonly used. The accuracy of these ratios depends on the time-series properties of returns; serial correlation of returns—typical of illiquid instruments—biases risk indicators downward and overstates these performance indicators.[35]

Box 7: Basic risk-adjusted performance measures

Sharpe ratio

The Sharpe ratio intuitively measures the risk-adjusted performance of an asset. It involves dividing the return in excess of the risk-free rate (its risk premium) by the total risk of the portfolio as measured by its volatility.

$$Sharpe_P = \frac{E(R_P) - R_F}{\sigma(R_P)}$$

where $E(Rp)$ denotes the portfolio's expected return R_F denotes the return of the risk-free asset and $\sigma(Rp)$ denotes the standard deviation of the portfolio's returns

The main weakness of the Sharpe ratio is that it assumes that performance can be reduced to the mean and variance of the return distribution, which is true only when returns are normally distributed.

Sortino ratio

The Sortino ratio addresses this issue and is thus more relevant for gauging the performance of portfolios with skewed returns. It closely resembles the Sharpe ratio, but is defined as the ratio of the return in excess of minimal acceptable return (MAR) to the risk below MAR:

$$Sortino_P = \frac{E(R_P) - MAR}{BTSD_{MAR}} \qquad BTSD_{MAR} = \sqrt{\frac{1}{N}\sum_{i=1}^{N}\left[Max(0,(MAR - R_{P,i}))\right]^2}$$

Where N is the number of observations.

The Sortino ratio picks up on the asymmetry of returns, but the risks of extreme losses, which investors may have a marked aversion to, are not particularly penalised.

35 - For more on how Sharpe ratios are impacted and can be adjusted, see Lo (2002) and Getmansky, Lo, and Makarov (2004).

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2.3. Allocation adjustment

Performance analysis and forecasting models may encourage the investor to make strategic (benchmark changes) or tactical (changes in weighting with respect to the benchmark) allocation changes or to change his selection of assets to take advantage of opportunities to sell assets considered overpriced and to acquire those considered under priced. We will now take a look at the problems of actually making these adjustments which, in theory, are altogether desirable.

2.3.1. Adjustment on direct markets

Delays

Once the decision to sell a directly held building has been made, the search for a buyer, the negotiation of a price acceptable to both parties, and due diligences delay the sale for several months. Acquisitions are an equally lengthy process and development is longer still.

These delays are affected by the liquidity of the market segment (property type/geographical) and by features specific to the property (price, uniqueness). Liquidity is linked to conditions in the local market as well as to macroeconomic and financial factors affecting expectations and financing domestically and abroad. So the liquidity of property—entirely relative—varies significantly over time. Rising markets see increasing numbers of transactions, while falling markets see volumes drop sharply. Some types of properties are more sensitive to these variations than others, and the properties transacted during recessions are, on the whole, different from those exchanged in rising markets; for some properties, transactions at acceptable prices will be almost impossible for long periods of time.

High transaction costs

As a result of the organisation of the market and of formalities unique to buildings, the cost of a round trip is far higher in real estate than in the financial markets. In addition to broker commissions and fees due to other participants in the transaction, there are various duties and fees; among these fees, traditionally, is a high stamp or registration duty, not capped, based on the value of the transaction.[36]

Prohibitions

Investors enjoying advantageous tax provisions may find that their right to sell buildings is limited if they want to keep their advantages—for REITs, for example, short- and medium-term transactions or real estate development activities are limited.

Lack of stock

A significant share of institutional-quality buildings is in the hands of owner-occupiers and availability on the investment market varies considerably from one country to another and from one property type to another (appendix 2). For some property types and in certain segments, the investable stock may be extremely limited. Where rental space is in short supply, development or the acquisition of property to develop may be a solution. Finally, in consideration of the local nature of real estate markets, institutional investors may tend to focus on particular segments. The imbalance between available funds and available stock may make acquisitions very difficult and lead to excesses and cycles.

Market weight, capacity, and depth

When an investor is large, decisions to make allocation changes must make allowances for possible limits on market capacity and liquidity. The in-house availability of the necessary human resources must also be verified.

Transfer of fractional interests

When buildings are held in common with other investors, the transfer of interests requires negotiation with these investors. A fractional interest in a building is generally less liquid than the building itself.

36 - Of course, the transfer of a building may also result in a capital gain or loss that may or may not be subject to taxation and assignable to real estate or non-real estate sources of profit, and at a rate that can vary in accordance with the duration for which the building is held.

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Allocation decisions must thus be made with full knowledge of the direct and indirect costs and of the delays involved in the execution of the decision; the limited availability and quality of information will, in addition, require allowances for large margins of error—in the end, it will take particularly clear signals to justify portfolio modifications.

2.3.2. Adjustment of investment in non-listed vehicles

Variable liquidity

In 2001, an IPF study showed that, on the whole, financial advisers, investors, and asset managers considered non-listed collective vehicles less liquid than the buildings themselves. This view may be less clear-cut today, but investment in closed funds generally takes place in the primary market and secondary markets are very illiquid.

Some open-ended funds provide greater allocation flexibility, but maturity intermediation is a risky activity that gives the manager an incentive to hold liquid assets that can dilute the real estate characteristics of the investment and to require notice for redemptions or even to suspend them altogether in the event of a liquidity crisis. As is the case on the underlying market, the liquidity of non-listed vehicles is subject to inter-temporal variations and is reduced in falling markets.

Potentially high transaction costs

Transaction costs are variable, but in general they are comparable to those in the underlying market: the transfer of shares in non-listed vehicles may be subject to taxes comparable to those on the transfer of buildings; fees on the front-end (at subscription) and on the back-end (at redemption), the bid-ask spread, and the difference to NAV for funds traded in secondary markets must be taken into account as well. Allocation to a fund may, finally, require a two-phase due diligence—one phase to ascertain the quality and risks of the portfolio, the other to ascertain the quality of the manager.

Lack of stock and purity

The non-listed vehicles market is not complete and it may be difficult to find a product that corresponds to a specific segment. In the past, most vehicles were of the core type and were diversified, but there are more and more specialised and/or more aggressive funds; they do not, nonetheless, cover all segments and styles.

In addition to the absence of consensus on the notion of style, it should be noted that with the loss of control over assets, the institutional investor may find the manager drifting from the allocation objectives stated by the fund (for example, risky buildings added to a core fund for seemingly better performance).

Their insufficient size may mean that most of them are far from being perfectly diversified, but non-listed vehicles facilitate the diversification of a real estate portfolio, allow delegation to specialists, and provide access to otherwise inaccessible segments. As such, they are useful strategic allocation tools for small- and medium-size institutional investors as well as for larger ones, although imprecision and possible style drift can result in complications. Their liquidity, however, fluctuates greatly and transaction costs are substantial—they are not a satisfactory solution for tactical allocation.

2.3.3. Adjustment using listed vehicles

Clear liquidity and cost advantages but an underdeveloped market

From the allocation point of view, listed real estate holds out the promise of rapid low-cost transactions.

However, it is underdeveloped in most countries, which results in limited overall capitalisation; in an incomplete market (lack of property-type specialists); and in securities with variable levels

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of capitalisation and liquidity—few property companies can match the features of large caps in the stock markets. Within these limits, listed real estate vehicles allow the implementation of dynamic allocation strategies.

Limited substitutability

Using listed real estate to alter the exposure of illiquid direct and non-listed real estate investments synthetically is thus very appealing. However, listed real estate is evaluated altogether differently from direct investments and non-listed vehicles. In the short term, its statistical properties are radically different; this makes managing overall exposure of direct investments and non-listed funds using listed vehicles highly complex at best.[37]

2.4. Measuring and managing risk

Risk should of course be approached with respect to the portfolio as a whole, a broad view that implies making allowances for its interaction with other assets and with liabilities. In practice, it is in the context of strategic allocation that these allowances are made, and risk is then usually managed in each asset class without considering other classes or liabilities.

2.4.1. Risk measures

We will now review the main indicators used by academics and professionals to gauge the risk of real estate investments.

It should be noted that the linked problems of data (limited availability, low quality, and lack of transparency) and illiquid direct real estate markets can make it hard to calculate accurate measures and lessen their usefulness when it comes to risk management through dynamic asset allocation.

Central moments and normality

The analysis of the distribution function should never be limited to the first order (mean) and second order (standard deviation) moments, especially with a class whose returns are typically not normally distributed. Normality should be tested and if it cannot be confirmed, particular attention should be given to the third (skewness) and fourth (kurtosis) central moments (box 8). Cheng (2005), who has attempted to validate measures of systematic asymmetric risk in real estate, notes the existence of a premium associated with skewness whatever the property type may be.

Dealing with auto-correlation

Given that the underlying real estate market is illiquid and that the appraisal process is conservative, investment returns are liable to be auto-correlated. In that case, it becomes difficult to measure the real exposure of the portfolio to the different risk factors. We thus recommend testing for autocorrelation and implementing remedial procedures before calculating the different performance and risk indicators (box 9).

Asymmetric risk measures

There are two reasons for using asymmetric risk measures: the non-neutrality of investors with respect to the direction of risk—bad surprises are resented more than good ones are appreciated—and the asymmetry of returns, which makes it inappropriate to use a symmetric distribution such as the normal law which is fully characterised by its mean and variance. Generalised co-lower partial moments may be used to derive more realistic models (box 10).

37 - Seiler, Webb, and Myer (2001) study the substitutability of long and short positions in listed and non-listed real estate and the possibility of shorting an equity REIT index instead of directly selling private real estate holdings. They construct efficient frontiers based on five years of expected returns and compare the frontiers constructed solely with direct property-type indices and those where an equity REIT index has been substituted—the frontiers are very different and those constructed solely with direct real estate are dominant. The results for mixed-asset portfolios are more promising: property-type weights may vary, but allocation to real estate remains stable. The results from the short positions are disappointing: weights are unstable and the synthetically rebalanced portfolios have levels of risk far higher than those that are rebalanced physically. These results are probably due in part to the use of direct indices that were not unsmoothed and indirect indices that were not deleveraged. An attempt to replicate these results that controls for these factors and takes a long-term perspective would be worthwhile.

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Box 8: Standard deviation, skewness, kurtosis and test for normality

Standard deviation

The variance of portfolio returns is defined as:

$$\sigma_P^2 = E\left[R_{P,i} - E(R_{P,i})\right]^2 = \sum_i \frac{\left(R_{P,i} - E(R_{P,i})\right)^2}{N}$$

where $R_{P,i}$ corresponds to the i^{th} return of the observed series of N returns

Since return differences are squared, the units of variance differ from the units of return. This is why one usually works with the square root of the variance i.e. the standard deviation or volatility of returns.

Skewness

The skewness indicator measures the return distribution function's asymmetry coefficient. For an exhaustive series of N returns, the skewness is equal to:

$$S_P = \sum_i \frac{\left(R_{P,i} - E(R_{P,i})\right)^3}{N.\sigma_P^3}$$

where $R_{P,i}$ corresponds to the i^{th} return of the observed series of N returns, and σ_P is the standard deviation.

Applied to a normal distribution, the skewness would be equal to 0. Investers should value positive skewness in long positions as it implies that the probability of above average returns is higher than that of below average returns.

Kurtosis

Kurtosis allows the fatness of the distribution tails to be assessed. A high level of kurtosis therefore means that there are extreme returns (outliers). The kurtosis is calculated as follows:

$$K_P = \sum_i \frac{\left(R_{P,i} - E(R_{P,i})\right)^4}{N.\sigma_P^4}$$

where $R_{P,i}$ corresponds to the i^{th} return of the observed series of N returns, and σ_P is the standard deviation.

Applied to a normal distribution, the kurtosis would be equal to 3. That is why we more commonly use the excess kurtosis, i.e. the differential obtained compared to a normal distribution (K-3).

Detecting non-normality

The Bera Jarque indicator tests the normality of a distribution function. It presents the advantage of simultaneously analysing the third and fourth order moments of the distribution function.

$$BJ_P = N\left[\frac{S_P^2}{6} + \frac{(K_P - 3)^2}{24}\right]$$

where N is the number of observations.

Under the assumption of normality, the BJ statistic follows a Chi-squared distribution with 2 degrees of freedom. When the value of statistic computed from a large sample is higher than a critical value (typically 6 for a level of significance of 5%), the assumption of normality is rejected.

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Box 9: Testing and remedying autocorrelation

The Ljung-Box (1978) test statistic can be used to assess the level of auto-correlation:

$$Q_p = N(N+2)\sum_{k=1}^{m}\frac{\theta_k^2}{N-k}$$

where N is the number of observations and θ_k the k^{th} order autocorrelation coefficient.

Under the assumption that the auto-correlation coefficients of order 1 to m are null, the Q statistic follows a Chi-squared distribution with m degrees of freedom.

Numerous methods have been proposed to solve the problem of the auto-correlation of real estate returns; in appendix 9 we apply the Geltner (1993) model to unsmooth NPI data between 1978 and 2006 and find a 58% upward revision in volatility.

Box 10: Downside risk measures

An IPF (2002) report devoted to risk measurement and management concludes that if a single measure of risk in real estate has to be recommended, it should be semi-deviation, as it captures non-normality and produces fund rankings that are the least dissimilar to the rankings generated from other statistics studied.

(Below mean) semi-deviation measures the volatility of returns below the average return, while below-target semi-deviation captures the variability of returns below a moving benchmark--e.g., risk-free rate, market index.

$$Semi-deviation = \sqrt{LPM_2(E(R_P), R_P)} = \sqrt{\frac{1}{N}\sum_{i=1}^{N}\left[Max(0,(E(R_P) - R_{P,i}))\right]^2}$$

$$BTSD_{R^*} = \sqrt{LPM_2(R^*, R_P)} = \sqrt{\frac{1}{N}\sum_{i=1}^{N}\left[Max(0,(R_i^* - R_{P,i}))\right]^2}$$

where R^* is a moving benchmark

These are nested in the general co-lower partial moment formula:

$$CLPM_n(R^*, R_X, R_Y) = \frac{1}{N}\sum_{i=1}^{N}\left[Max(0,(R_i^* - R_{X,i}))\right]^{n-1}(R_i^* - R_{Y,i})$$

Letting n=2 yields semi-variance and semi-covariance measures which can be used in a Markowitz-like framework to derive a downside risk efficient frontier that takes better account of investor preferences (as in Coleman and Mansour (2005)).

Extreme risk measures

Extreme risks can have catastrophic consequences for investors (reputation risk, temporary inability to meet obligations, bankruptcy). For this reason it is important not only to weigh the average risks reflected in the central moments of the distributions but also to examine the extreme events located in the tails.

Maximum drawdown

The simplest measure of extreme risk involves calculating the maximum loss recorded by the portfolio during the period of analysis or the maximum drawdown, i.e., the biggest loss recorded in comparison with the highest level reached by the portfolio during the period.

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$$Maximum\ Drawdown = \min_{0 \le t \le T} \left[\frac{NAV_t}{\max_{0 \le i \le t}(NAV_i)} - 1 \right]$$

This measure is generally accompanied by the number of months for which the loss was realised and the number of months required to compensate for the loss.

Value-at-Risk (VaR)

The maximum drawdown does not, however, allow the average extreme risks of a fund to be characterised. In order to measure the extreme risks more accurately, it is essential to use instruments such as the value at risk (box 11).

Box 11: Approaches to VaR calculation

The so-called parametric approach to VaR calculation involves explicitly assuming that the returns follow a known distribution. Such an assumption introduces model risk which may be more or less severe. Assuming normally distributed returns–as is most often done–is not appropriate for the alternative universe. If the Gaussian assumption is nevertheless made, the VaR can be calculated explicitly by using the following formula:

$$P(dW \le -VaR) = 1 - \alpha \qquad VaR = n\sigma W dt^{1/2}$$

where n is the number of standard deviations at $(1-\alpha)$, σ is the standard deviation, W is the present value of the portfolio, dt is a year fraction, and dW is the variation in the value of the portfolio.

The VaR measures potential losses that arise habitually or regularly; it does not mention the consequences of exceptional events. Taking exceptional events into account exacerbates the problem of statistical estimation.

In the case of a VaR that is calculated from the distribution of past returns, a historical VaR, it is necessary to have a very large amount of data to obtain a significant sample of events. This sample risk problem, which already exists in the traditional universe, is exacerbated in the real estate universe because of the low frequency of the data.

Favre and Galeano (2002) suggest using the Cornish-Fisher VaR as a pragmatic solution to the VaR calculation in a fat-tail distribution environment. This method is a compromise that balances model risk and sample risk. It consists of calculating a VaR using a normal distribution formula and then using a Cornish-Fisher expansion to take the skewness and excess kurtosis into account:

$$z = Z_c + \frac{1}{6}(Z_c^2 - 1)S + \frac{1}{24}(Z_c^3 - 3Z_c)K - \frac{1}{36}(2Z_c^3 - 5Z_c)S^2$$

where Z_c is the critical value of the Gaussian law at probability $(1-\alpha)$, S the skewness, and K the excess kurtosis.

The adjusted VaR is therefore equal to:

$$VaR = -W(\mu + z\sigma)$$

where μ is the mean.

It should be noted that if the distribution is normal, S and K are equal to zero and consequently, $z=Z_c$, and we come back to the Gaussian VaR. Further interesting extensions of the VaR such as marginal or incremental VaR are presented in EDHEC (2005).

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2.4.2. Breakdown of risk

The measures above are the consequences of risks taken—identifying these risks is interesting and can be done with the help of factor decomposition. Ex post analysis of risk may be informative, but good risk management implies ex ante risk control and thus analysis of the portfolio as it is, analysis of the impact of possible changes, and the use of various methods to reduce risk or to transfer it.

Asset risk

Blundell (2003) states that Jones Lang LaSalle deems statistical approaches to the analysis of volatility of little use because the measure of historical volatility is generated in part by buildings that are no longer in the portfolio, because they rely on smoothed appraisal data, because they have no diagnostic value, and, finally, because the traditional rebalancing approach of portfolio management is much more costly than are other methods of managing risk. Blundell proposes a model for the decomposition of volatility into twelve risk indicators affecting capital values and income (exhibit 14).

Scores presented on a radar chart allow the identification—with respect to an absolute objective or to a peer-group average—of danger zones, zones that result in complementary analyses and signposts for a possible rebalancing through acquisitions, disposals, and property management.

Exhibit 14: **Blundell's breakdown of the volatility of a real estate portfolio (2003)**

Factors affecting capital values	Factors affecting income
• Size • Property-type concentration • Segment concentration • Geographic concentration • Weight of central London • Expected income growth • Development exposure	• Tenant creditworthiness (value-weighted) • Void rate • Lease-expiry concentration (value-weighted mean) • Tenant concentration • Current yield

The correlation of four of the above factors and measures of return as well as of absolute and relative risk was evaluated ex post for 130 portfolios between 1993 and 2002. Neither development exposure and risk nor development exposure and return appear correlated; there is a significantly positive correlation of size and risk but not of size and return; unsurprisingly, deviations from property-type weights i.e. active bets and risk as well as return are significantly positively correlated; current yield and absolute risk are negatively correlated. An additional factor, average property-type beta, is more closely correlated to both return and tracking error. The evaluation of the other factors was done with measures of risk-taking unique to 2002; this less stringent evaluation indicates that both geographic concentration and tenant concentration are correlated positively to tracking error but there does not appear to be any reward for tenant concentration. Blundell, Fairchild, and Goodchild (2005) attempt to predict tracking error over three years from current portfolio characteristics and find optimal results (R^2 of 0.45) with a five-factor model of the previous variables. They are: weighted beta (strong positive relationship to risk, weaker positive correlation with returns), difference in sector balance (with a relationship to risk and returns identical to that of weighted beta), income yield (high income return reduces tracking error and has a positive impact on returns), exposure to development (positive relationship to risk with no compensating impact on returns), lot size (relationship to risk and return identical to that of exposure to development).

Leverage risk

As a potential magnifier of outcomes, leverage is a significant risk which, along with the volatility of the underlying asset generating the cash flows necessary to service the debt, is one of the two

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main causes of default. Gordon and Tse (2003) recommend using VaR to gauge leverage risk in real estate portfolios.

Exchange rate risk

Currency volatility is markedly higher than the volatility of real estate returns, so the returns on investment in currency zones beyond those of the investor's benchmark currency will be considerably affected by currency movements.

2.4.3. Risk management

Diversification

The objective of the techniques of risk management is to ensure that—at given levels of return and keeping in mind other obligations—portfolio risks are minimised, or, at the very least, that they remain below critical levels. Diversification is usually the most important technique. Its aim, strictly speaking, is to reduce the idiosyncratic risk of the portfolio. More broadly, it refers to a spreading of investments around various segments resulting in an average exposure to systematic risks.

Dynamic allocation

Dynamic allocation consists of changing the structure of the portfolio in response to market changes. The use of this risk-management technique in non-listed real estate runs up against substantial delays, costs, and execution risks. This technique is feasible with the most liquid instruments, but it must be kept in mind that some open funds reserve the right to suspend redemptions and that mid-caps are subject to significant liquidity fluctuations.

Guaranteed products

One possibility for the draconian reduction of risk is to give up any investment other than that in principal-protected products. These products are available in some countries, such as the United Kingdom, but are mainly aimed at retail investors. The guarantee of the principal comes at the cost of possible caps or reductions on returns, or of seizure or withholding of current yield. These passive solutions must be held until maturity and have no developed secondary market.

Use of derivatives

Interest rate risk that arises from leverage may be managed with standard derivatives. Options can protect the portfolio from unfavourable movements; forward/future contracts and swaps can guarantee a rate of exchange. In indirect investments, credit protection could conceivably be purchased to serve as a shield from the consequences of leverage gone awry.

The partial or total hedging of exchange rate risk can be done "naturally"—in other words, by borrowing in foreign currency—or by resorting to derivatives. While cash-flows from rents are highly predictable, there is considerable uncertainty surrounding the final sale price of an investment that is held for several years; rents should thus prove easier to hedge than capital values. Another issue is that derivatives are mostly short-term contracts and as such cumbersome hedges for long-term real estate investments. Further information on hedging techniques appropriate for long-term assets could be gleaned in corporate finance texts.

Property derivatives hold great promise for real estate investment and risk management, as they could allow investors to take on, reduce, and hedge exposure to the overall direct market or specific property sectors in a time-efficient and cost-effective way. From a risk management perspective, derivatives allow hedging of the systematic component of real estate risk, thereby enabling managers to insulate their portfolios from wider market movements. Another possibility is to use property derivatives to implement dynamic asset allocation strategies synthetically. Note, however, that these techniques will prove effective only for highly diversified portfolios.

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Tenanting and property management

Direct control of assets allows the investor to use preventive and/or corrective measures to limit risk. For example, attention to tenant and business sector diversification could reduce economic risk without requiring portfolio reallocation while, at the property level, initial due diligence and ongoing monitoring of tenants' creditworthiness and/or contract guarantees could reduce tenant default risk and/or its impact. Likewise, pre-acquisition due diligence and good property management will help identify risks to avoid, control, or transfer.

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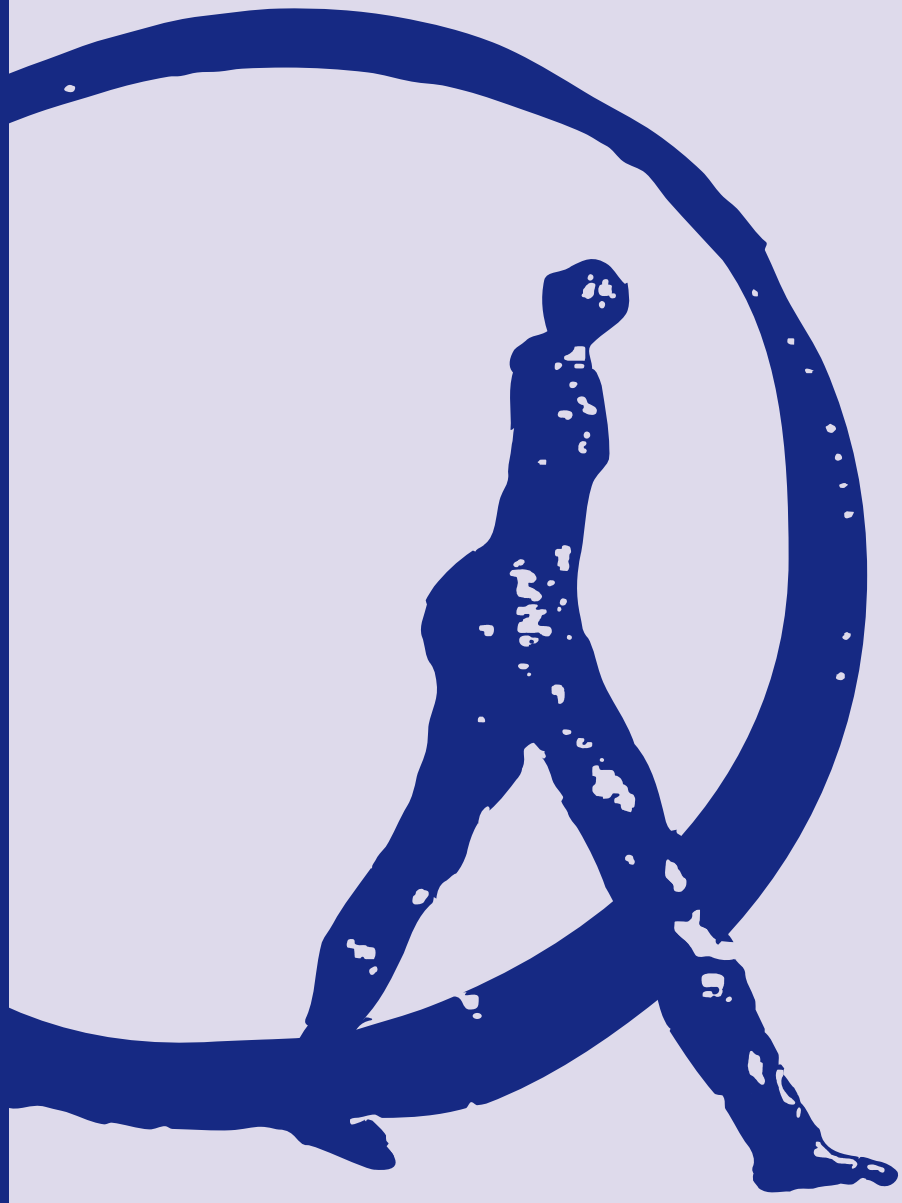

3. Property Derivatives

3.1. The property derivatives market

Each of the quadrants of real estate investment can provide underliers for derivatives (exhibit 15) traded over the counter or on an exchange.

Exhibit 15: **Examples of property derivatives**

	Privately placed underlier	Publicly traded underlier
Equity	• Total Return Swaps on direct commercial real estate index • Housing price index derivatives	• Listed property company / REIT index derivatives
Debt	• Total Return Swaps on loans	• Mortgage-backed securities index derivatives

Box 12: Reminder on over-the counter as opposed to exchange-traded derivatives

• Over-the-counter markets are self-regulated and financial market authorities exercise little oversight of them. They offer a great degree of flexibility in the adaptation of contracts to the needs of the users,[38] and they are organised around brokers and dealers who post bid and ask prices. In the absence of a central counterparty of the clearinghouse type, the contracts bind two final counterparties and allowances must be made for default risk—here called counterparty risk. In these markets, contracts are generally held until maturity; unwinding requires the agreement of all parties.

• Derivatives exchanges are regulated and supervised by market authorities, offer standardised contracts (size, expiry date, tick size, and so on) and prices are usually set by transparent auctions. Liquidity is provided by the central order book and supplemented by market makers. Transactions are anonymous and done through clearing members with solid finances; the clearinghouse acts as counterparty. The risk of default is further lowered by initial margin requirements, daily marking to market, and margin calls (in the event of unfavourable market swings). Unwinding—with the execution of an offsetting order—can take place at any time. Derivatives exchanges are suitable for liquid products and can offer lower transaction costs.

38 - Standardised contracts may account for the majority of volume, but the terms of these contracts—even if only the sizes and the expiry dates—are flexible.

We examine below the derivatives of property equity, which have heretofore been based on REIT or direct real estate indices.

3.1.1. Emergence of a market for swaps on commercial real estate indices

History and development of the market for swaps on IPD indices

The failures of FOX and REIM

The property derivatives market got off to a false start in the United Kingdom with the London-based futures and options exchange (FOX). The volume of transactions was modest for the brief existence of the exchange—from May 1991 to October 1991—which was closed when it became clear that the bulk of its activity was simulated.

The late 1990s saw the failure, for want of government authorisation, of a plan for an over-the-counter futures market backed by a score of institutional investors and known as the Real Estate Index Market.

Barclays' experiences

A modest market was reborn when Barclays had its investment bank help it reduce its exposure to commercial real estate. Medium-term fixed-income products matching the total yield of the IPD—Property Index Certificates (PICs)—were first offered in 1994. In late 1996, the bank offered two futures contracts—Property Index Forwards (PIFs) on the capital component of the index; in 1999 it listed Property Index Notes (PINs), fixed-income products paying the current yield of the annual

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IPD index and with a redemption value linked to changes in the capital component of the index since the issue of the note.

Birth of a modern property derivatives market

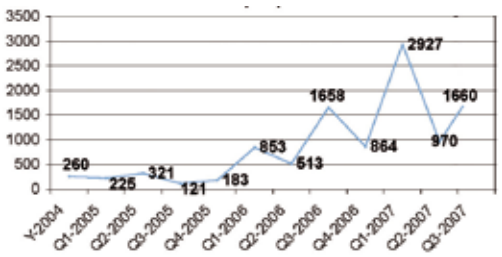
In the late 1990s, at the urging of PruPIM, the real estate investment managing arm of Prudential, the property derivatives users association (PDUA) was created. This association did significant work educating professional associations and potential users of these products in an effort to win their support and to lobby the regulatory authorities to lift the obstacles to the viability of this market.

In late 2002, with the decision of the FSA to allow life insurance companies—which hold a very large proportion of the stock of invested real estate—to include real estate swaps and forward contracts as admissible assets in the computation of their solvency ratios, a new era for property derivatives began in the United Kingdom. The 2004 standardisation of the taxation of property derivatives lifted an additional obstacle. Since June 2004 twenty-one investment banks have acquired licenses to use IPD indices to offer property derivatives, and an active over-the-counter market for total return swaps has sprung up in the UK.

Acceleration and internationalisation of the market

2006 was the year that the market shot up in the UK (exhibit 16); it was likewise the year it was exported to France. The first quarter of 2007 saw the volume of UK transactions at nearly £3 billion and the first transactions in Germany; at the end of the third quarter, Switzerland joined the club of European nations with a market for credit derivatives linked to IPD indices. Asia posted its first transactions (Australia, Japan) in the second and third quarters of 2007.

Exhibit 16: **Notional value of IPD UK derivatives for quarter of reference (£bn)**



Source: IPD, November 2007

Size and liquidity

At the end of the third quarter of 2007, the cumulated volume of transactions on British IPD index derivatives had reached £10.5 billion. This figure may be modest in view of the total value of investable commercial real estate (which a late-2006 IPD estimate puts at £350 billion), but it must be kept in mind that property is usually held for long periods. In mid-2007, the liquidity of the British IPD swaps market was nonetheless still limited and characterised by seasonality. Exhibit 17 shows volumes transacted in the nascent markets of continental Europe.

It is advisable that an index used for a credit derivative be representative (coverage, property-type composition) as well as reliable (regular appraisals of buildings contracted to outside appraisers rather than done in-house, diversification of contributors) and that it have a sufficiently long track record. From this perspective, the European IPD indices that are most mature for use as an underlier are those for Ireland, the Netherlands, Finland, and France.

Exhibit 17: **Notional value of swaps initiated (number of transactions) on IPD France and Germany indices (£m)**

Amount	Quarter 1—2007	Quarter 2—2007	Quarter 3—2007
France	400 (11)	186 (17)	108 (19)
Germany	-	158 (20)	109 (20)

Source: IPD, November 2007—totals of bids and asks

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United States—behind Europe

The two starts of NPI swaps

Following in the footsteps of IPD, CSFB and NCREIF partnered in mid-2005 to create an over-the-counter market for real estate swaps on the appraisal-based quarterly NCREIF Property Index (NPI); CSFB obtained an exclusive license to use the index through April 2007. With only six months to go to this expiry date only two small transactions had been reported.

Some may argue that these lags in the US are linked to the fact that the NPI cannot be considered a representative index of direct real estate as (i) it tracks the investments of only one class of investors—tax-exempt institutions—(ii) its coverage of the universe is limited—$247bn worth of properties or circa 10% of the investable investment grade stock—and (iii) its property mix, with a concentration in core prime properties, is peculiar when compared to the underlying stock of real estate. However, whether or not the NPI is representative of the commercial real estate universe, it is the oldest index available and is established as a benchmark for direct real estate investments by institutional investors.

A likelier explanation for the lack of transactions may be the business model adopted by NCREIF, which, by awarding a monopoly to CSFB, did not favour goodwill on the part of the investment banks that could have fostered market development through marketing and liquidity provision.

Reluctant to enter an uneven playing field, other investment banks apparently forced CSFB to renounce its exclusivity in the fall of 2006 and NCREIF announced new licenses had been awarded in March and April 2007. Transaction volumes have increased with the arrival of these new market participants, but the market is still in its infancy; these volumes, after all, have reached $300 million over the semester following this second start to the market.

Beyond NPI: direct real estate indices competing to serve as underlier for derivatives

Appendix 10 lists the new US commercial real estate indices created to bolster the derivatives markets. Their shared goal is to provide a more faithful and more current image of changes in the property markets than does the NPI, which is subject to lag, smoothing, and seasonality. They differ in their methods for treating (or not treating) the quality and liquidity fluctuations observable in the market. S&P/GRA offers transactions indices based on the moving averages of prices per square foot, MIT/RCA (Moody's/REAL) uses the repeat-sales method to produce constant quality indices, and Rexx provides indices for the offices market from local market data and from macroeconomic analyses—it positions itself as a local specialist.

In September 2006, the Chicago Mercantile Exchange (CME) and Global Real Analytics (GRA) announced a first-quarter 2007 launch of real estate futures and options on GRA Commercial Real Estate Indices. The CME was endeavouring to create exchange-based derivatives markets in commercial real estate just as it had created an organised market for housing derivatives. In November 2006, Standard & Poor's partnered with GRA to publish the re-branded indices and in January 2007 Charles Schwab took over GRA. S&P/GRA re-launched their indices in August 2007 with the CME blaming the delay on the merger and organising a late-October 2007 launch.

According to MIT/RCA, a consortium has been working on developing a forward market on their indices. Early estimates referred tentatively to Q1-2007 for a launch. At the end of September 2007, Real Estate Analytics—one of the three original partners of the MIT/RCA index—announced it had reached an agreement with Moody's. The rating agency will compute the index in place of MIT and will provide analyses, while Real Estate Analytics, proprietor of the computation method and holder of the rights to use the RCA database,

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will be in charge of developing and structuring—in association with the intermediaries—the derivatives based on these indices, now renamed Moody's/REAL Commercial Property Price Indices.

Rexx is present both on the OTC market, where it is courting intermediaries, and on the organised market since the International Securities Exchange announced at the end of April 2007 that it was launching Rexx derivatives.

Attempting a forecast

Having a diversity of indices vying to underlie property derivatives poses difficulties and creates opportunities. Brokers may find pitching property derivatives challenging as the number and heterogeneity of underlying indices could puzzle investors and reinforce a wait-and-see attitude. The US market is liable to fragmentation and could be stillborn if deals are distributed among indices in a way that prevents the emergence of a pool of liquidity large enough to support a sustainable market. On the other hand, and provided scale could be achieved in multiple derivatives markets, diversity would provide investors with a range of options and create opportunities for arbitrage between indices as highlighted by Clayton (2007).

Nevertheless, we consider this flurry of indices detrimental to market development. Faced with a brokers' alliance to develop NPI derivatives and lacking the status of benchmark in a crowded marketplace, the various non-NPI transaction-based indices are likely to be hard-sells. At this very early stage of the US property derivatives market, the prospects may be better for niche players than for head-on challengers to the NPI.

3.1.2. Housing derivatives

Halifax index derivatives

Residential real estate is not a core sector for institutional investment in the United Kingdom, and for this reason it is absent from IPD indices of commercial real estate. An over-the-counter market for options and futures on the hedonic Halifax (HBOS) housing price index—with a cumulative notional volume of as much as £2 billion by mid-2007, according to Reuters—has developed concurrently with the IPD index-linked swaps markets.

Derivatives based on S&P/Case-Shiller indices

The S&P/Case-Shiller indices are single-family US home-price indices that use the repeat sale pricing method to measure housing markets. In September 2007 the twenty metropolitan region indices were supplemented by two composite indices (aggregates of ten and twenty regions) and one national index.

In May 2006, the CME created housing options and futures contracts[39] based on a version of the S&P/Case-Shiller indices calculated monthly on a rolling sample of two months. Initially, the contracts—settled to a composite index and to markets in ten major cities—were offered for one year and on a quarterly cycle. Trading volume has remained modest: a few dozen transactions per day and, according to the CME, a cumulative notional volume of approximately $350 million as of midpoint of the year (2007). In September 2007, in response to demand from investors for longer terms, the CME began offering contracts extending to eighteen months on a quarterly cycle; to thirty-six months on a biannual cycle; and to sixty months on an annual cycle.

Derivatives based on RPX indices

The Residential Property Indices (RPX) created by Radar Logic use transaction prices in an attempt to measure daily changes[40] in the price per square foot of residential real estate. Twenty-five metropolitan area indexes and a composite are offered. An over-the-counter market for RPX index derivatives, centred around six broker-dealers and three inter-dealer brokers, was launched in September 2007; the first transaction was a total return swap.

39 - The advantages highlighted by the CME are: exposure to real estate values without direct ownership of properties, lower transaction costs than incurred in buying and selling individual homes, opportunities for hedging, portfolio diversification, access to a unique asset class, a way to make trading real estate a liquid and short-term investment, and an opportunity to benefit from down markets.

40 - The transactions serve to estimate the parameters of the power laws found to be characteristic of price distributions; the indices are extracted using a proprietary formula.

3. Property Derivatives

3.1.3. Equity REIT index derivatives

Dow Jones U.S. Real Estate Index futures from the Chicago Board of Trade

In February 2007, CBOT launched a futures contract based on the Dow Jones U.S. Real Estate Index, an index comprised primarily of REITs.

The contract has a quarterly expiry, a multiple of $100 and a tick size of $10; it is typically settled in cash.[41] It is traded on the CBOT electronic trading platform and benefits from market maker and liquidity provision programmes. This contract has so far attracted little interest; in an effort to boost participation the exchange has extended its waiver of trading fees—as of the beginning of Q4-2007 open interest was extremely low and volume extremely thin.

FTSE EPRA/NAREIT Indices derivatives

For several years, investment banks have been offering options based on the EPRA Euro Zone index.

In October 2007, Liffe launched on the Paris market two futures contracts based on the FTSE EPRA/NAREIT Europe and on the FTSE EPRA/NAREIT Euro Zone indices. The FTSE EPRA/NAREIT Europe Index covers approximately 100 listed property companies in fifteen countries. The FTSE EPRA/NAREIT Euro Zone Index covers approximately fifty property companies in nine countries. These contracts have a trading unit of €10 per index point and a tick size of €5. They are offered with quarterly expiry dates and contracts are available for the three nearest quarterly maturities; they are settled in cash and benefit from market maker contracts.

3.2. Standard contracts and transactions

Total return swaps (TRSs), property linked notes based on IPD UK indices, and Halifax housing-price index derivatives account for the bulk of real estate derivatives traded in Europe—and thus in the world.

3.2.1. Total return swaps

Global real estate index swaps against LIBOR (or EURIBOR) + premium

The most common swap has a buyer (seller) of real estate exposure make (receive) periodic payments of the LIBOR or EURIBOR plus a designated premium and receive (pay) the total return on the IPD All Property index (exhibit 18). For swaps on IPD indices, payments on the property leg on the contract are typically made annually, while payments linked to the inter-bank market are made quarterly (exhibit 19); this mismatch is an impediment that legitimises the growing use of quarterly indices.[42]

All payments are based on the notional amount agreed to by the parties. This notional principal never changes hands; the impact of a default is thus greatly curtailed. The use of a financial intermediary with an excellent credit rating as a counterparty to all transactions reduces credit risk even more (exhibits 18-19).

For the buyer, this transaction is economically equivalent to the borrowing of the notional amount at the floating inter-bank rate plus the spread and the subsequent investment of this principal in the assets underlying the index.

Derivatives promoters emphasise this similarity with the physical market and the advantages of derivatives over bricks-and-mortar transactions: stamp duty and other legal and agent fees can be avoided, operations can be executed and unwound swiftly, there is no need for parties to exchange principal or upfront cash flows or for a buyer to deal with property management of the underlying assets, and a covered seller can retain ownership and operational management of its properties.

Other swaps on IPD indices

Sector for all-property swaps appeared in the third quarter of 2005, in an attempt to meet the readjustment needs of real estate portfolios. Sub-sector for all-property swaps appeared in the

41 - CBOT accepts exchanges for physical transactions against securities for which price dynamics are "reasonably" correlated with price dynamics in the DJUSRE index. Such securities might include portfolios of stocks or ETFs such as the iShares Dow Jones U.S. Real Estate Sector Index fund and the streetTRACKS DJ Wilshire REIT fund.

42 - A high-quality quarterly index implies a high frequency of outside appraisals of capital values.

3. Property Derivatives

Exhibit 18: **Total Return Swap All Property Index vs. Libor + Spread**

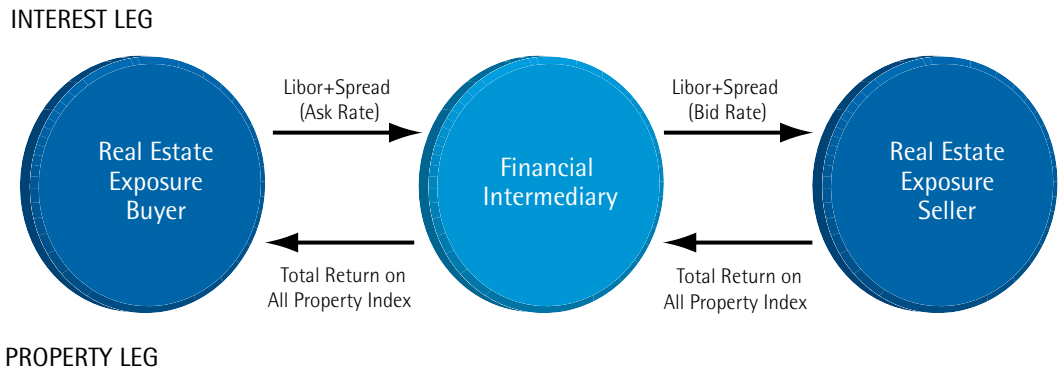
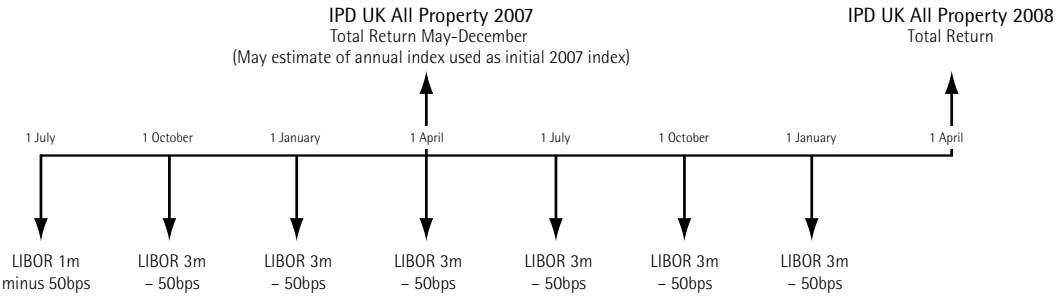


Exhibit 19: **TRS Cash-Flow Chart (Buyer)**
2-year (19-month) All Property vs. LIBOR swap, spread: -50bps (Ask)
Trade Date: 15 June 2007 Swap starts 1st June 2007 and ends 31st December 2008



third quarter of 2006. As of mid-2007, sector and sub-sector swaps were very rare. Likewise, some market participants have expressed interest in swaps of various components of the total return, but as of mid-2007 no such transactions had been made public.

Swaps on NPI

The products offered by CSFB were comparable to those available in the UK markets, but at the outset the all-property swap concerned only capital value (the return on which is more volatile, making it an underlier more suitable for a derivative) and the only swaps involving property types were those of one property type for another; a swap for the overall return on the all-property index has since been made available.

3.2.2. Property linked notes, property investment certificates

Property linked notes (PLNs) or property investment certificates (PICs) are debt securities whose coupons and redemption value are linked to the performance of a real estate index. Unlike total return swaps, these bonds require the buyer to pay when they are issued.

For the buyer, the transaction is economically equivalent to a cash investment of the amount of the issue price in the assets underlying the benchmark real estate index: it may not offer the leverage of swaps, but this transaction has many of the same advantages in terms of costs, execution speed, and taxation. Its status as a debt instrument may also confer an advantage over swaps, inaccessible to investors who are not authorised to invest in derivatives.

3. Property Derivatives

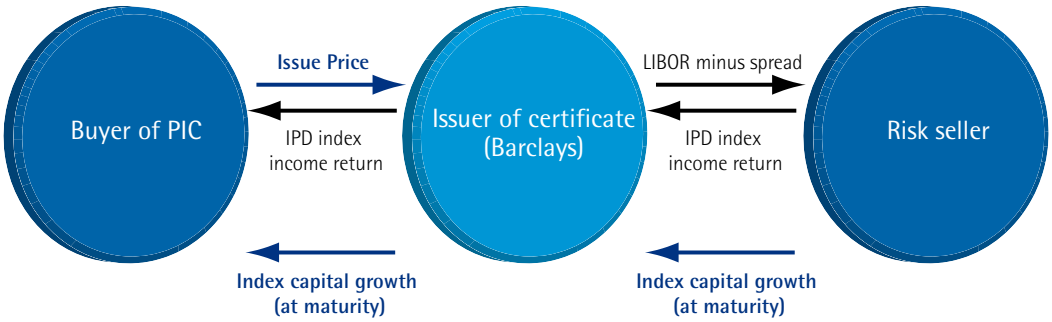
A conventional PIC has the dealing bank (Barclays-Protego) issue certificates (usually with maturities of three, five, or seven years) whose exposure is managed by transacting with a seller of real estate exposure that receives a LIBOR-spread for the duration of the certificate (this seller of real estate exposure has often been Barclays itself). The buyer of the PIC is exposed to real estate risk for the duration of the certificate. The income return of the benchmark property index is paid quarterly while the capital return (which may be a gain or a loss) is paid out at the time of redemption. The benchmark is the all-property IPD index; Barclays takes a commission of 280 basis points. Barclays and Protego are active participants in a secondary market of limited liquidity.

Since their rebirth in 2004, Barclays has issued approximately £900 million worth of PICs.

3.2.3. Housing derivatives

Halifax index derivatives are traditional forward contracts and options. The two parties to a forward contract agree in advance to a certain progression of the index and at maturity the buyer (the seller) of exposure receives (pays) the difference, whether

Exhibit 20: **Conventional property index certificate**



positive or negative, between the real level of the index and that of the contract. In this way, both buyer and seller are assured of a price at which the transaction will take place. The buyer of an option, on the other hand, has the right but not the obligation to buy (call option) or to sell (put option) at a predefined strike price; the buyer of the option will exercise his right only if the terms of the options contract are more advantageous than those of the market; the payment of a premium compensates for the seller's asymmetric position.

Options and futures on S&P/Case Shiller indices are similar, but they are traded on an organised market that reduces credit risk through the intermediation of a central counterparty and through a margining mechanism.

In the United Kingdom, financial intermediaries such as Abbey, Newcastle Building Society, or Skipton Building Society have sold retail investors medium-term structured products linked entirely or in part to the Halifax index; to manage their risk, these companies are thus likely to use forward contracts based on the index.

3.3. Uses of derivatives and their limits

3.3.1. Theoretical uses

Derivatives allow exposure to real estate risk to be managed much more efficiently—in terms of liquidity, cost, granularity, swiftness, or flexibility—than in the underlying market (when an investable underlying asset is available). They can be integral to investment/diversification, to hedging, or to arbitrage (exhibit 21). For investment, the advantages of direct real estate derivatives are

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particularly clear (box 13). The underlier of derivatives of listed property companies may well be investable or easily replicable, liquid, and fine grained, but derivatives transactions nonetheless have lower transaction costs, greater flexibility (they are not subject to rules limiting the use of short selling on the stock markets), lower costs for short positions, offer greater savings on securities borrowing, and provide greater amounts of leverage.

The main current users of commercial real estate derivatives are insurance companies, pension funds, and investment banks as well as other asset management firms, hedge funds, and real estate specialists. Investment banks, which have sold housing-linked structured products, mortgage lenders, and hedge funds are active participants in the market for derivatives of housing price indices.

Exhibit 21: **Advantages and theoretical uses of real estate derivatives**

Advantages	Uses
• Diversified exposure without physical ownership of underlying asset • Opportunity for negative net exposure • Lower transaction costs • Swiftness of execution • Lower minimum investment • Higher liquidity than that of the physical market • Leverage	• Hedging • Long or short exposure to an impracticable underlying asset • Diversification • Synthetic rebalancing

Box 13: Reduction of costs of exposure to direct real estate

For the United Kingdom (over a ten-year period), Goldman Sachs (2006) put the annual costs of ownership of direct real estate at 248 basis points and at 295 basis points for non-listed funds. At these levels, real estate derivatives could, depending on current margins, offer advantages in terms of direct costs, advantages that are naturally greater in the medium and short term. The situation is comparable in the rest of Europe, but less so in the United States, where transaction costs in physical markets are lower. It should be noted as well that the "cost" of a swap (the spread over the inter-bank rate) is paid over time, while large acquisition costs must be paid upfront when investing in direct real estate or in non-listed vehicles. Likewise, the investor in a total return swap wins (or loses) on the change in capital values over the duration of the contract (exhibit 19), not just upon resale or settlement.

When it comes to investment and diversification, derivatives can help to establish a diversified exposure to real estate, they can diversify the real estate portfolio without requiring intervention in the underlying markets, and they can be used to invest in segments that were previously inaccessible as a result of regulatory requirements or for want of the necessary human or financial resources. For allocation management, derivatives transactions facilitate strategic and tactical modifications and reduce the time frames of investment in real estate.

Derivatives are likewise useful for hedging, as they can immunise a portfolio against risks inherent to the market or to a single property type and allow investment managers to focus on generating alpha through asset selection or property management.

Arbitrage strategies that attempt to profit from the imperfect integration of direct and indirect markets or of different indirect markets may also rely on derivatives.

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Derivatives can be used as well to take net short positions—that is, "selling" the market or a segment in anticipation of downturns. Derivatives also permit relative strategies, the aim of which is to profit from the expected divergence or convergence of various segments of the market.

Finally, these products allow the investor to profit from leverage or to gain access to interest rates that can be more advantageous than those in direct investment; synthetic leverage, moreover, may benefit from tax treatment more favourable than that accorded more conventional forms of debt.

It should be noted that improved management of risk in general and of real estate risk in particular should have a positive impact on the broader economy. The price information generated by the derivatives market can also benefit the spot market by improving its efficiency—as the real estate market lacks transparency and is relatively inefficient, the gains could be clear, and, as Case, Shiller, and Weiss (1993) note, the economy could benefit from a lessening of the shocks caused by the boom-and-bust cycle of real estate.

Exhibit 22: **Possible uses of real estate derivatives**

Strategy	Motivation	Example
Synthetic investment	• To achieve diversified exposure to possibly inaccessible regions or property types. • To reduce the tracking error of an existing portfolio. • To guarantee terms for a future acquisition.	• Investor takes a long position and pays EURIBOR+spread for yield on chosen index.
Hedging an existing portfolio, alpha extraction	• To neutralise the market risk to the portfolio so that the investor can focus on producing alpha. • To freeze a particular market situation without having to sell portfolio—real estate cycle strategy. • To guarantee terms for a future sale.	• A building owner (or developer) takes the short position on a swap: he pays the index yield and receives EURIBOR+spread. • For a 100% hedge, the total return on the portfolio is EURIBOR+spread+(total return on real estate assets held less total return on index)=EURIBOR+spread+alpha on real estate assets held.
Synthetic allocation or risk management	• Tactical modification of current exposure (by overall exposure, by property type, or by region).	• An investor increases/decreases his exposure to German real estate by taking a long/short position on a swap for all-property Germany and EURIBOR+spread.
Selling the market	• To achieve negative net exposure to the market to profit from an expected downturn.	• An investor takes a short position on a swap: he pays the index yield and receives EURIBOR+spread. If the index yield is negative, the investor receives additional funds from the party holding the long position.
Arbitrage and speculation	• To profit from spreads between direct and indirect markets, among indices from different suppliers, among different indices from the same supplier, and so on (relative value strategies, long/short strategies).	• An investor shorts the IPD UK index and goes long on the FTSE/MSS index. He pockets the differential. • An investor shorts the offices index and goes long on the retail index: he receives the differential between the yields on the retail and offices indices plus the initial difference (positive or negative) between the spreads on the two swaps. He benefits from a widening of the spread.
Leverage	• To achieve notional exposure beyond direct capacity.	• The investor takes a long position and pays EURIBOR+spread for the yield on the index of his choice. The notional amount is not exchanged, but all the ensuing streams, positive or negative, are calculated in proportion to this amount.
	• To invest synthetically, profiting from lower financing costs.	• The investor takes a long position and pays EURIBOR+spread for the yield on the index of his choice—the cost of financing may be lower in the swaps market than in the physical market.
	• Synthetic leasing of real estate holdings (followed by repurchase).	• An investor issues a PIC—he receives the capital and pays the index yield until the reimbursement of the certificate at issue price plus or minus movements in the capital value of the index.

3. Property Derivatives

Exhibits 22 and 23 list possible uses of real estate derivatives and show the likely users of property derivatives and their strategies.

The advantages of these products are limited by practical problems: limited number of data points for most direct real estate underliers, very low levels of liquidity, high levels of volatility, evaluation difficulties, short maturities, and counterparty risk. Other possible problems involve quality, representativity, and transparency, in addition to the frequency of the benchmark indices. Besides these problems with the products themselves, investors have investment policies to uphold and may need extra training in the use of derivatives; for some, there are legal, fiscal, and accounting rules that make the use of derivatives less attractive.

Exhibit 23: **: Likely users of property derivatives and their strategies**

Insurance companies and pension funds	• Tactical asset allocation • Synthetic rebalancing • Strategic asset allocation • Hedging of price risk
Investment banks	• Market making (liquidity provision) • Hedging of price risk
Property companies and property funds	• Hedging of price risk • Tactical asset allocation • Synthetic rebalancing • Alpha extraction
Hedge funds	• Relative value strategies • Long/short strategies
Mortgage lenders/investors/insurers	• Hedging of default risk

3.3.2. The fallacy of real estate derivatives as a hedge

In the absence of derivatives, the nature and transaction costs of investment in direct or non-listed real estate make hedging difficult or relatively inefficient just like they wipe out most arbitrage opportunities.

Hedging the risk of a portfolio of direct real estate with a direct index derivative

Promoters of direct real estate derivatives often assert that index derivatives can be used to neutralise a portfolio's exposure to real estate market risk (or beta) so that it delivers only specific performance (or alpha). However, these promoters rarely qualify the relative importance of market risk on the returns of portfolios representative of the real estate holdings of their targeted institutional clientele. Typically, hedging strategies are either only alluded to or illustrated simplistically. A recent research note on property derivatives prepared by a leading bank provides an illustration of "efficient hedging between portfolio and index return" that sees a manager of a €10m portfolio who has observed an 85% correlation with its country index use a TRS to hedge against a fall in the market. The note assesses the impact of swapping the index return against a fixed rate, using a one-for-one hedge, by looking at TRS payments and overall returns from the hedged vs. non hedged portfolios over the life of the swap. It considers only two states of nature: a "baseline" scenario where the return of the hedged portfolio is only slightly less than that of the non-hedged position and a "risk" scenario where the hedged portfolio is much more attractive. An equal weighting of the two scenarios results in a "marked reduction of risk" and the note concludes that "this effect is of major importance especially to institutional investors who have held out the prospect of a minimum return to their clients.".

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When the asset whose price fluctuations are to be hedged is not exactly the same as the underlying of the derivatives contract or when the contract expiry date does not coincide with the execution date of the spot transaction to be hedged, basis risk—cross-hedge basis risk and time-basis risk—reduces hedging effectiveness. Analysing the correlation between the values of the position to be hedged and the prices of the available derivatives can help determine the contract(s) to be used for hedging. When there is uncertainty about the timing of the transaction, time-basis risk can be reduced by using combinations of contracts surrounding the expected transaction date.

The match with the underlying of the derivatives contract may be perfect for major currencies and large capitalisation stocks on which contracts exist and near perfect for key commodities. However, derivatives markets are far from complete and managing the price risk of a given asset on which no contract is available will require cross-hedges involving close or not-so-close substitutes. Instead of identifying a substitute with a high correlation to the asset, the investment manager could identify the fundamental risks driving asset returns and then hedge price risk with derivatives proxying for each of them. Risk not accounted for by fundamental factors—if not a result of factor omission or model misspecification—is specific to the asset and cannot be hedged; in a portfolio, however, it is diversifiable.

To hedge the market risk of a portfolio with index futures contracts—which we will assume are perfectly positively correlated with the underlying index—the optimal position to hold so as to minimise the volatility of the hedged position can be shown to be:

$$h = \rho_{R_P,R_M}\,\sigma_P / \sigma_M = \sqrt{R^2}\,\sigma_P / \sigma_M = \sigma_{P,M} / \sigma_M^2 = \beta_P$$

where ρ_{R_P,R_M} ($\sigma_{P,M}$) is the coefficient of correlation (covariance) between portfolio and index returns, σ_P (σ_M) is the standard deviation of portfolio (index) returns, R^2 is the coefficient of determination of the regression of portfolio returns against market returns, and β_P is the slope of the regression line.

The number of contracts to hold to offset the market risk in the portfolio is then given by h or β_P times the ratio of the value of the portfolio to the nominal amount of the contract. Note that the naive one-for-one hedge is obtained only when the correlation between the portfolio and the index is equal to σ_M / σ_P or, equivalently, when the slope of the regression of the portfolio returns against the index returns is one.

The hedge ratio is directly positively linked to the importance of the market factor as an explanatory variable of portfolio variability or, in other words, to the correlation between the index used to proxy the market and the portfolio. A 2007 IPF report looked at the possibility of replicating the IPD UK index through direct investments using a sample of 1,700 properties from the IPD UK universe over the period from 1994 to 2004. Using IPD properties, the study upwardly biases correlations with the IPD index, resulting in an upward bias of the importance of the market factor and in a downward bias of the average tracking error: tracking the IPD index with properties that are not part of it will be harder.

The figures reported in exhibit 24 suggest that most portfolios will be poorly correlated with the index–taking the average value of the commercial property in the IPD UK database (€23m at the end of 2006) and assuming equal-weighting to be possible, it would take approximately €1.15bn of IPD properties to establish, on average, a portfolio which could be effectively hedged with an IPD derivative (an R^2 of 80% is traditionally considered the threshold for hedging effectiveness). At this level and assuming a normal distribution for the tracking error (not a conservative assumption), a 2% deviation of the portfolio vis-à-vis its benchmark would still occur at least once every three years, and a 1% deviation almost two

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Exhibit 24: **: Diversification and tracking error within a sample of 1,700 properties**

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

Source: IPF (2007)

Probability of large deviations under the assumption that the tracking error is normally distributed

Probability of deviation >100bps	n.a.	85.2%	80.5%	74.4%	**63.2%**	51.6%	38.0%	20.0%
Probability of deviation >200bps	n.a.	70.9%	62.2%	51.3%	**33.9%**	19.4%	7.9%	1.0%
Probability of deviation >500bps	n.a.	35.0%	21.8%	10.2%	**1.7%**	0.1%	0.0%	0.0%

years out of three. Operating without these bold assumptions about equal weighting, about the possibility of obtaining the "average portfolio" and about normality of the tracking error will make the size requirement for effective hedging significantly higher. As a result, index property derivatives will be poor hedging instruments for all but the largest portfolios of direct commercial real estate. For direct investors in property, hedging-related demand for derivatives could be limited to the major real estate investment managers and trusts. Indeed, looking for a €10m bricks-and-mortar real estate portfolio with an 85% correlation to the market index will be like looking for the proverbial needle in a haystack.

The fact that property derivatives based on large indices will be poor hedging instruments for individual portfolios has a direct impact on their accounting treatment. To use hedge accounting, hedging effectiveness must be demonstrated. For the US, the summary of statement 133 of the Financial Accounting Standards Board (FASB) states: "an entity that elects to apply hedge accounting is required to establish at the inception of the hedge the method it will use for assessing the effectiveness of the hedging derivative and the measurement approach for determining the ineffective aspect of the hedge. Those methods must be consistent with the entity's approach to managing risk". Appendix A of the standard requires the use of statistical or other numerical tests for hedge effectiveness, unless a specific exception applies.[43] Under International Accounting Standard reporting, the same issue arises with IAS 39. Failure to qualify for hedge accounting will cause the use of derivatives to increase accounting volatility... quite a sorry result for an economic hedge imperfect though it may be.

While the risk management argument has often taken centre stage in the promotion of property derivatives, the specificities of the class render hedging with index-based derivatives ineffective for all but the very largest traditional real estate investors. Therefore, when marketing to investors holding physical real estate, brokers and investment banks should probably emphasise the remarkable diversification benefits of index-based investments. Property derivatives provide investors in search of alternative beta and new tools for alpha generation a relatively liquid synthetic exposure to the commercial real estate market, exposure that allows the use of a range of familiar investment and arbitrage strategies unavailable in the physical real estate market.

Cross-hedging the risk of a portfolio of direct real estate with derivatives based on REIT securities indices

CBOT and Liffe suggest that their derivatives based on REIT share prices can be used to manage the risk of a portfolio of direct real estate. For CBOT, REIT indices are "a good proxy for the underlying U.S. commercial real estate market" because the fundamentals[44] are "reflected in REIT share prices". For CBOT, the distribution requirements

43 - Grant (2002) notes that "The high-effectiveness requirement is intended to have the same meaning as the 'high correlation' requirement of SFAS No. 80 (SFAS No. 133, para. 389), which has been interpreted to mean either that the cumulative changes in the hedging derivative should offset between 80 percent and 125 percent of the cumulative changes in the fair value or cash flows of the hedged item (Swad (1995)), or that the regression of changes in the hedged item on changes in the derivative should have an adjusted R^2 of at least 80 percent (Lipe (1996))".

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REITs are subject to as well as their tax status are the causes of a "direct and clear" link between the underlying market and the share prices of these trusts. Likewise, Liffe writes that REIT securities indices "are a good proxy for direct real estate investments".

CBOT fails to mention that REITs are not limited to tax-exempt activities and that—despite the effect of distribution requirements on net income—the importance of amortisation in real estate leaves plenty of room for manoeuvres that can weaken the link mentioned above. It should be noted as well that the leverage of the REIT and its public trading are fundamental elements that will distort signals from the underlier. CBOT makes no mention of studies that would back up its stance, which might appear to make good sense to a newcomer to real estate but is anathema to more experienced professionals. Our survey has documented the low contemporary correlation of REIT securities indices and direct property indices, the reasons for this low correlation, and possible directions for future research into the substitutability of these two modes of access to real estate. In the absence of derivatives based on direct indices, those based on REIT securities indices could in the short term be used—no less than interest rate derivatives[45]—for cross-hedging, and long-term benefits may be greater still; the study of these subjects has yet to begin.

Hedging the risk of a portfolio of REITs with a REIT securities index derivative

The creation of a highly diversified portfolio of REITs is within the means of all institutional investors; it follows that a REIT securities index derivative—though it may not fill a vacuum in terms of access to the market—can serve as a hedging instrument for a portfolio of REIT shares.

3.3.3. The challenge of hedging real estate derivatives

Hedging of direct property index derivatives

Development of the IPD and the NPI swap markets is hampered by the fact that the underlying indices, as appraisal-based measures of private commercial real estate performance, are not tradable. Consequently, these hedging instruments are hard to hedge in a reliable, easy, swift, and cost-efficient manner. As a result, intermediaries may shy away from liquidity provision and be tempted to settle for matching up buyers and sellers (any mismatch creates gap risk, which must be managed by the intermediary and requires compensation under the form of a higher cost of derivatives to the buyer).

Because the underlying is unavailable for dynamic replication strategies, the pricing and hedging of direct property derivatives is challenging. To convince financial institutions to accept the risk of derivatives underwriting and provide more liquidity to investors, advances in the hedging of property derivatives are required.

The merits, feasibility, and implementation methods of both cash and synthetic hedging of derivatives must be addressed. Cash hedging of derivatives written on non-investable indices would rely on direct property and real estate fund investments to manage the derivatives exposure of the underwriters, while synthetic hedging would use risk-factor replication to create portfolios of assets with high correlation to property. Whatever the route chosen, reducing the cross-hedge basis risk of the derivatives underwriter is the guiding light. It is perfectly feasible to establish general results on the nature of the optimal trading strategy involving the hedging proxy as well as an estimation of the tracking error caused by relying on an imperfect substitute for the underlying—this tracking error is reminiscent of that caused by using discrete hedging with tradable underliers.

44 - For CBOT, lease rates, vacancies, development costs, and property transaction values.
45 - Between 1990 and 2005, according to the CISDM (2006), the correlation of the MIT/CRE transaction-based index and the FTSE/NAREIT was 0.06%; correlation of the MIT/CRE index and the S&P500 was likewise 0.06%; the correlation of this index and the Lehman Aggregate Bond index was -0.07%. The benefits of REITs securities index derivatives for hedging a direct real estate portfolio are not apparent, as there are stock or bond derivatives that, although equally ineffective, are much more liquid.

3. Property Derivatives

The difficulty in replicating a non-investable index like the IPD All Property—which we emphasised above by computing the probability of large deviations at the various portfolio sizes—not only makes cash hedging very difficult but also casts doubt on the validity of prices at which derivatives are transacted; this is because arbitrage between the physical property market and the derivatives market is challenging, making pricing by arbitrage unrealistic.

FTSE and MSS may have provided additional possibilities in the second half of 2006 by offering an index and sub-indices which they claim are representative of direct property investments and investable through fund and sub-funds with daily NAVs. These index providers hope to attract investors interested in a (largely) passive exposure to the U.K. commercial property market, but more importantly, to position themselves as the platform of choice for investment banks that wish to offer property derivatives and real estate structured products. This is a new development and it remains to be seen whether this hybrid product is sufficiently representative and transparent to constitute an attractive alternative to the wider-based and more well-established IPD indices. Theoretically, investments in the fund can be used for cash hedging of derivatives underwritten on the associated index. Cash hedging of this sort is attractive as it minimises tracking variance/basis risk; however, it does not eliminate the need for other hedging techniques unless an active market for short-selling the underlying emerges. In practice, it will be fascinating to find out how a property fund established with a base of £100m will handle massive inflows and outflows of capital.

Hedging of REIT index derivatives

The underlying of REIT index derivatives can be invested in directly (ETFs, index funds) or indirectly (the index constituents are known and have been chosen for their market float and their liquidity). Short-selling the underlying is also possible. In these conditions, the hedging of derivatives by the issuer poses no problems. Note too that for listed derivatives a part of the liquidity is provided by the market and does not require risk-taking on the part of the market makers and that the standardisation of derivatives contracts should allow the market maker quickly to offset the risks of one position by serving as counterparty to the opposing position.

3. Property Derivatives

Box 14: Pricing real estate derivatives

The body of literature on real estate derivatives pricing is very slight and, as Lim and Zhang (2006) note, it studies above all the pricing of total return swaps. Buttimer, Kau, and Slawson (1997) create a two-state model to price derivatives on a real estate index and on an interest rate. The model assumes that the index follows a Brownian motion. Björk and Clapham (2002) generalise the previous model to semi-martingales and show that the arbitrage-free price is equal to zero. Patel and Pereira (2006) show that this model is not sound in the presence of counterparty risk. Lim and Zhang study pricing by arbitrage analysis and by equilibrium analysis; we present their findings and comment on them below.

The simpler approach to pricing the swap is to use the spot-forward parity theorem: this approach requires making the assumption that replicating the real estate index is possible and that there is neither counterparty risk nor transaction costs. We may know what to think of these assumptions, but arbitrage analysis is worthwhile all the same. If it is possible to create a portfolio whose return characteristics match those of the index, a risk-free hedge can be created with the portfolio and the swap. The holder of the long position in a total return swap receives the yield on the real estate index in exchange for a fixed spread F over the inter-bank rate. The swap is priced through this spread, for which it is possible to demonstrate that:

$$F = \left[1 - \frac{1}{(1+r_n)^n}\right] \Bigg/ \sum_{i=1}^{n} \frac{1}{(1+r_i)^i}$$

where r_n is the return on a zero-coupon bond with a maturity of n years.

It is the same spread as for fixed-for-floating rate swaps. By combining a total return swap on a real estate index and an interest-rate swap, the fixed spreads cancel each other out; the price of the swap is the inter-bank rate. It is, of course, a theoretical price that assumes the possibility of perfect arbitrage.

As arbitrage analysis requires untenable assumptions, equilibrium analysis may be more realistic. The point of departure for this analysis is the principle that the expected risk premium should be constant across markets. If investors use swaps to adjust their exposure to real estate, then for the investor who goes short on the index as a hedge for a real estate portfolio from which he expects a return E(r), the spread F should fulfil the following condition:

$$E(r) + F + E^{A}(r_{index}) \geq r_f$$

where $E^A(r_{index})$ is his estimation of the total return on the index and r_f the risk-free rate.

For the buyer of real estate risk, whose funds were hitherto returning the risk-free rate, the relation is:

$$E^{B}(r_{index}) - F + r_f \geq r_f + E(\pi_{index})$$

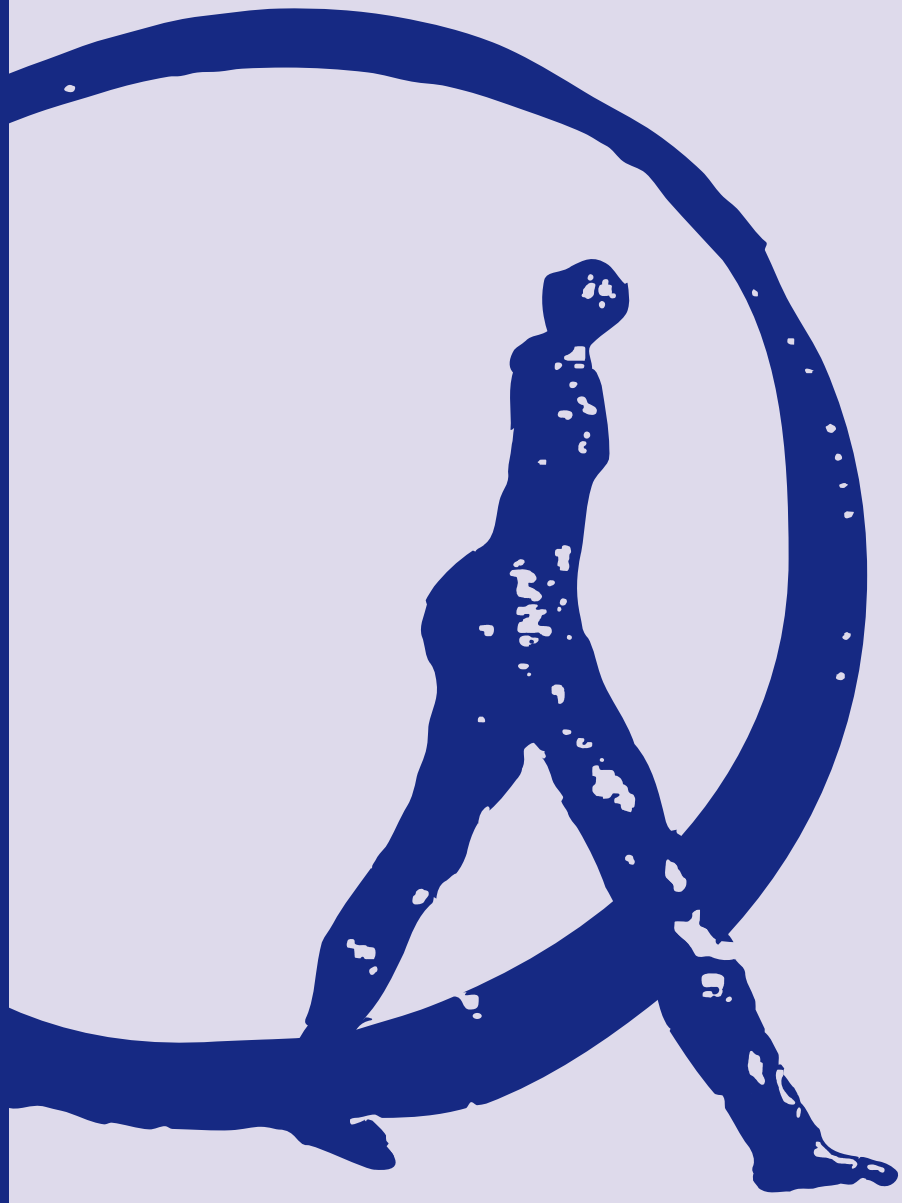
where $E^B(r_{index})$ is his expectation of the total return on the index and $E[\pi_{index}]$ the expectation of the risk premium of the return on the index.

Noting that $E(r)=E(\pi_{portfolio})+r_f$ where $\pi_{portfolio}$ is the risk premium, it follows that:

$$E^{A}(r_{index}) - E(\pi_{portfolio}) \leq F \leq E^{B}(r_{index}) - E(\pi_{index})$$

Assuming that the risk premium on the portfolio is the same as that on the index, the spread over the risk premium is straddled by the expectations of the total return on the index of both buyer and seller of risk. If both buyer and seller have the same expectations, then $F=E(r_{index})-E(\pi_{index})$. At equilibrium $E(r_{index})=r_f+E(\pi_{index})$. Therefore, $F=r_f$. The unrealistic conditions here depend on identical risk premia and on the existence of a consensus, but it is interesting to note that once again the price of the swap is the inter-bank rate.

4. Survey Results



4. Survey Results

4.1. Description of sample

4.1.1. A variety of institutions

The questionnaires for the EDHEC Real Estate Investment and Risk Management Survey were addressed to leading institutional investors in Europe between November 2006 and May 2007; three types of institutional investors were targeted: end-investors (insurance companies, pension funds, and foundations), diversified asset managers, and real estate specialists (real estate investment managers and property companies). The questionnaire was structured around a series of consistent themes as follows: the perception and experience of real estate investment, real estate investments and investment programmes, risks and performance of real estate equity investments, and property derivatives.

The study generated responses from 143 European institutional investors representing a total volume of close to three trillion euros of assets under management and over €400 billion of real estate assets.[46] The key investor groups targeted make up over 90% of the sample. As can be seen from Exhibit 25, pension funds, insurance companies, and foundations represent 35% of our sample, diversified asset managers 31.5% and real estate specialists 26.6%. 4.2% of respondents are private bankers and family offices and 2.8% advisers.

46 - Based on 118 reported total allocations and 112 reported real estate allocations.

Exhibit 25: ***Breakdown of respondents by category***

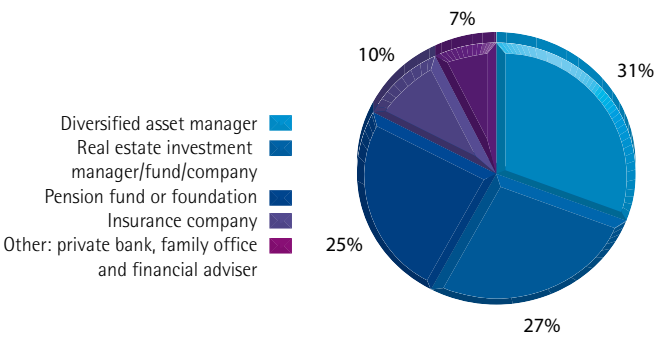


Exhibit 26 shows the breakdown of respondents by country—80.4% of respondents are headquartered in the countries of EU15; other EU countries make up 2.1% of respondents and 14.7% of respondents are from Switzerland. The key geographic biases in the study—with respect to underlying investable markets (appendix 3)—are the over-representation of Switzerland and France and the under-representation of Germany and the United Kingdom. We have verified that the results are not affected by problems of geographic composition.

Exhibit 26: **Breakdown of respondents by country**

Germany	7.0%
Austria	0.7%
Belgium	4.2%
Denmark	3.5%
Spain	2.1%
Finland	1.4%
France	28.0%
Italy	3.5%
Lithuania	0.7%
Luxembourg	0.7%
Norway	1.4%
Netherlands	8.4%
Poland	0.7%
Portugal	0.7%
United Kingdom	18.2%
Russia	0.7%
Slovenia	0.7%
Sweden	2.8%
Switzerland	14.7%

Exhibit 27 gives the breakdown of respondents by total assets; the presence of very large asset managers results in mean assets under management of €23.4 billion. The median, €2.45 billion, gives a better indication of the size of the average investor in our sample.

Exhibit 27: **Breakdown of respondents by assets (€ million)**

Not available/applicable	17.5%
Less than 100	8.4%
100-500	9.1%
500-1 000	8.4%
1 000-2 500	16.1%
2 500-5 000	11.2%

4. Survey Results

5 000-10 000	9.1%
10 000-25 000	9.1%
25 000-100 000	6.3%
over 100 000	4.9%

4.1.2. Experienced real estate investors with significant allocations

As shown in exhibit 28, 86% of respondents have standing real estate investments and boast an average (median) experience of 24.5 (15) years in the field. Another 3.5% of respondents are in the process of implementing their first real estate investment decision while 5.6% of surveyed organisations are currently considering investing in real estate. Altogether, a mere 4.9% of our sample does not plan to invest in real estate. Exhibit 28 shows that pension funds and insurance companies as well as specialised managers are the investor types with the most experience of real estate in our sample. Nevertheless, 84.5% of the diversified asset managers in our sample either have standing real estate investments or are currently making them.

As Exhibit 29 shows, small, medium, and large real estate investors are well represented in our sample. 32% of the reported real estate allocations are between zero and €100m, 28% between €100m and one billion euros, 30% between one and ten billion, and 10% are above ten billion euros. Average real estate holdings stand at €3.7bn (€4bn if firms that do not invest in real estate are excluded), while the median real estate portfolio is €500m (€600m), the size of the average private real estate vehicle in Europe. Finally, it is worth noting that the average institutional investor that took part in our survey has a relatively modest team—a median of three members—dedicated to real estate investments.

When interpreting results by investor type, it is important to remember that the average investor of each type in our sample has very different real estate holdings: the average (median) property specialist surveyed has real estate investments worth €8bn (€3bn) vs. €2.4bn (€210m) for pension funds and insurance companies and €1.8bn (€100m) for diversified asset managers. Since size matters tremendously when it comes to diversification on the direct real estate market, key related results have been checked for size sensitivity and meaningful relationships have been pointed out where relevant.

Exhibit 29: **Breakdown of respondents by real estate assets (€ million)**

Not available/applicable	22.4%
Zero	7.0%
Less than 50	9.8%
50-100	8.4%
100-250	11.2%
250-500	4.9%
500-1 000	5.6%
1 000-2 500	10.5%
2 500-5 000	7.7%
5 000-10 000	4.9%
10 000-20 000	5.6%
over 20 000	2.1%

Exhibit 28: **Real estate investment experience by real estate assets by type of investor**

	Standing investment	Currently investing	Weighing investment	No planned investment	Average experience in years (median)
Pension funds and insurance companies (50)	90.0%	0.0%	4.0%	6.0%	30.3 (20)
Diversified asset managers (45)	77.8%	6.7%	8.9%	6.7%	20.5 (7)
Real estate specialists (38)	97.4%	2.6%	0.0%	0.0%	22.7 (20)
Others (10)	60.0%	10.0%	20.0%	10.0%	15.3 (8)
All investors	86%	3.5%	5.6%	4.9%	24.5 (15)

4. Survey Results

4.1.3. Senior respondents

Exhibit 30 demonstrates that survey respondents are chiefly senior officers shaping investment policies and making allocation decisions.

Exhibit 30:
Breakdown of respondents by title or function

Chairman, CEO, MD	14.0%
Deputy CEO	3.5%
Director Pension Fund	2.8%
Trustee	0.7%
Principal/Partner	1.4%
CFO	7.7%
CIO	14.7%
Deputy CIO	0.7%
CIO Alternative Investments/Real Estate	7.0%
Fund/Portfolio Manager	14.7%
Head of Research/Chief Investment Strategist	6.3%
Investment Officer/Manager	4.9%
Investment Analyst/Vice President	9.1%
Consultant or Adviser	4.2%
Risk manager or chief operating officer	2.8%
Product Director	2.8%
Marketing/Investor relations	2.8%

4.2. Perception of real estate as an asset class

Our questionnaire examines first of all the existence and boundaries of real estate as an asset class. Categories of underlying real estate instruments, organised by the quadrant model described in chapter 1, are summarised below.

Exhibit 31:
Categorisation of real estate instruments in the quadrant model

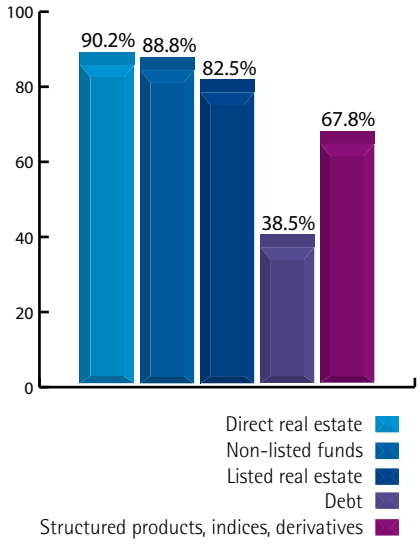
	Privately placed	Publicly traded
Equity	• Direct investment • Private property companies • Private collective instruments	• Public property companies • Publicly traded collective schemes
Debt	• Direct lending • Private collective investments in mortgage debt	• Mortgage-backed securities

With a single exception,[47] all respondents recognised real estate as a distinct asset class; Exhibit 32 outlines the bounds of this class. It is clear that there is a very great openness toward indirect exposure to the risk of equity investments in real estate and mixed feelings when it comes to real estate debt.

4.2.1. Equity products: a modern vision of the real estate asset class

Exhibit 32 may show that the more traditional the vehicle for exposure to the risk of equity investments is, the more likely it is to be recognised as part of the real estate asset class, but it also shows that significant percentages of respondents consider both listed and non-listed indirect vehicles part of this class. The proponents of a restricted view of real estate investment are a minority: 4.2% equate the real estate class to directly-acquired property and 14.7% think that non-listed investments alone (direct or through funds) qualify as real estate. 72% of respondents recognise the three modes of equity investment: direct acquisition of property, acquisition of shares of non-listed funds, investment in listed property companies.

Exhibit 32:
What investments belong to the real estate asset class?



47 - A diversified asset manager with € 10 million of real estate assets under management.

4. Survey Results

Exhibits 33 and 34 display responses by type of investor and size of real estate portfolio. Counter-intuitively, whereas restrictions on access to direct real estate are loosened as the portfolio grows, openness toward indirect instruments increases; likewise, real estate specialists are also the most open to indirect modes;[48] these results are consistent with the hypothesis that experience of the asset class magnifies openness.

Exhibit 33 shows slight differences in the rates at which diversified asset managers accept investments in the quadrants of the real estate asset class; additional analysis shows that the differences are linked to the size of the real estate portfolio; when investors with less than €100 million allocated to real estate are not counted, the rates at which these investors accept direct real estate and non-listed funds as part of the asset class are similar to those at which pension funds and insurance companies do.

Structured real estate products, investable indices, and real estate derivatives are viewed with favour, as 67.8% of the investors in our sample consider these innovations part of the real estate asset class. Exhibit 33 shows that diversified asset managers are the most likely to do so. After controlling for portfolio size, this acceptance is confirmed: it seems that greater knowledge of these products—not the problems faced by smaller portfolios when it comes to access to traditional real estate—is the primary explanation for this result.

4.2.2. Mixed views on debt products

Overall, 38.5% of respondents view real estate debt [49] as integral to the asset class, but this figure masks strong differences of opinion between specialists in real estate and non-specialists. 63.2% of real estate specialists view debt as part of the real estate asset class, but only 29.5% of the rest of our sample shares this view. Exhibit 33 shows that pension funds and insurance companies are much less likely to view debt as part of the asset class, whereas diversified asset managers are somewhat more open. Exhibit 34 may suggest a strong link between portfolio size and attitude toward real estate debt, but further study shows that the link is an illusion created by the over-representation of real estate specialists among the largest portfolios, which confirms the findings above.[50]

4.2.3. Acceptance of the quadrant model

From the point of view of the quadrant model, 72% of those responding to the questionnaire take an approach compatible with allocations across equity products—the Northwest and Northeast quadrants—but only 29.4% use an approach encompassing all four quadrants—meaning with debt included. Exhibit 33 shows approach differences by investor type and confirms that real estate specialists alone have a view of the real estate asset class

48 - The result remains the same after controlling for size.
49 - The survey was taken before the heightening of the subprime credit crisis in the summer of 2007.
50 - These findings may be linked to the flexibility of investment policies: it is the duty of real estate specialists to invest primarily in real estate, and debt is a complement to equity investments; diversified asset managers have more flexible mandates, whereas pension funds are bound by strict allocation policies by broad asset class and include real estate debt among other debt instruments.

Exhibit 33: **Acceptable investments in real estate asset class by type of investor**

	Direct real estate	Non-listed funds	Listed real estate	Debt	Structured products, indices, derivatives	All equity instruments	All equity instruments and debt
Pension funds and insurance companies (50)	94.0%	92.0%	86.0%	18.0%	66.0%	76.0%	16.0%
Diversified asset managers (45)	82.2%	80.0%	82.2%	46.7%	80.0%	66.7%	31.1%
Real estate specialists (38)	97.4%	92.1%	86.8%	63.2%	65.8%	81.6%	52.6%
Others (10)	80.0%	100.0%	50.0%	10.0%	30.0%	40.0%	0.0%
Total	90.2%	88.8%	82.5%	38.5%	67.8%	72.0%	29.4%

4. Survey Results

compatible with that of the quadrant model. Note that acceptance of the quadrant model does not necessarily mean that allocation to the real estate asset class is accomplished by means of a composite index of debt/equity, public/private instruments.[51]

Exhibit 34: **Acceptable investments in real estate asset class by size of real estate portfolio (€ million)**

	Direct real estate	Non-listed funds	Listed real estate	Debt	Structured products, indices, derivatives	All equity instruments	All equity instruments and debt
Not available/applicable (32)	84.4%	81.3%	81.3%	37.5%	65.6%	62.5%	25%
Less than 100 (36)	80.6%	88.9%	80.6%	25.0%	69.4%	63.9%	16.7%
100-1,000 (31)	100.0%	87.1%	77.4%	35.5%	61.3%	74.2%	25.8%
1,000-10,000 (33)	97.0%	93.9%	87.9%	51.5%	75.8%	81.8%	45.5%
More than 10,000 (11)	90.9%	100.0%	90.9%	54.5%	63.6%	90.9%	45.5%

4.3. Real estate investment policy

Part two of our questionnaire examines the reasons and vehicles for allocation to real estate as well as the levels of allocation.

4.3.1. Objectives of allocation: diversification, performance, hedging

Exhibit 35 shows that for non-specialists, the three major reasons for allocation to real estate are diversification of the overall portfolio, attractive risk-adjusted performance, and protection from inflation (or deflation). Among the reasons chosen by investors, diversification is by far the leader; with 44.6% of respondents choosing it as their primary reason for allocation to real estate and 24.8% choosing it as their second reason, it is mentioned as the first or second reason more than any other. It is also the most frequently chosen of the three main reasons, with an intensity of 27.2%. The belief that the asset class offers attractive risk-adjusted performance[52] also becomes apparent, as is mentioned as the first reason for investment by 26.7% of respondents and as the second reason by 23.8%, making it a more popular choice than any but diversification. With an intensity of 20.5%, it is in second place overall. Protection from inflation, with an intensity of 11.3%, is in third place. The other reasons with an overall score above 5% are the high income component of total real estate returns (8.6%), which shows a demand for return stability and capital protection, exposure to alternative beta (7%), which is diversification by another name, and potential capital gains, which is a reason linked to performance.

If we pool the reasons linked to diversification (E and J), to performance (A, B, C, H, K), and to portfolio hedging (D, F, G, I), those linked to diversification remain the primary incentive for investors.[53]

The scant relative importance accorded reasons linked to alpha (A and C) seems to suggest that the search for alpha is of secondary interest.[54] These results can be interpreted as a confirmation of the maturity of investors as well as of the modesty of their ambitions with respect to an asset class that they may find more challenging. But the excellent performance of real estate over the last few years may account for the better scores obtained by reasons linked both to alpha and to beta (B, H, K) or to beta alone (D, E, F, G, I, J); in a less favourable situation, it would be unsurprising if investors, no longer satisfied with market performance, took a more discriminating approach.

51 - Incidentally, the matter of allocation to the real estate class has little relevance for real estate specialists.
52 - This belief, which implies that the real estate market is poorly integrated into capital markets, is widely held; it is probably linked to the use of standard risk measures and data not corrected for biases.
53 - Reasons linked to performance take first place among the first three reasons, but with two choices out of eleven, diversification is at an automatic disadvantage, whereas with five choices out of eleven, performance is at an advantage.
54 - Study of the subpopulations shows that pension funds and insurance companies accord very little importance to the search for alpha in real estate (overall score of 2.8%) and that it is a secondary motivation for diversified asset managers (overall score of 11.5%).

4. Survey Results

Exhibit 35: **Top three reasons for investing in real estate—real estate specialists excluded**

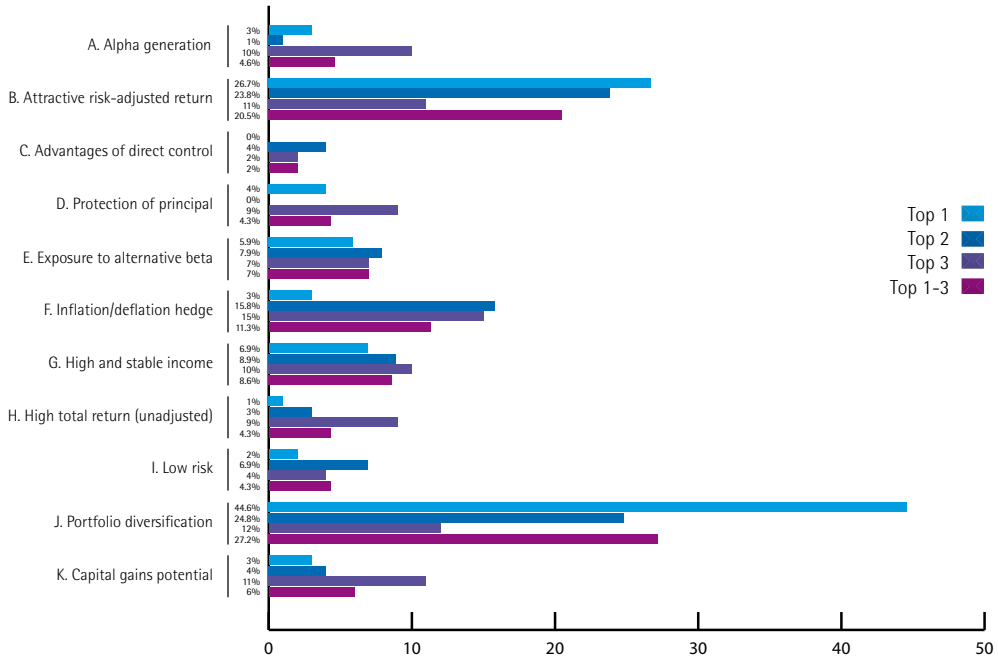
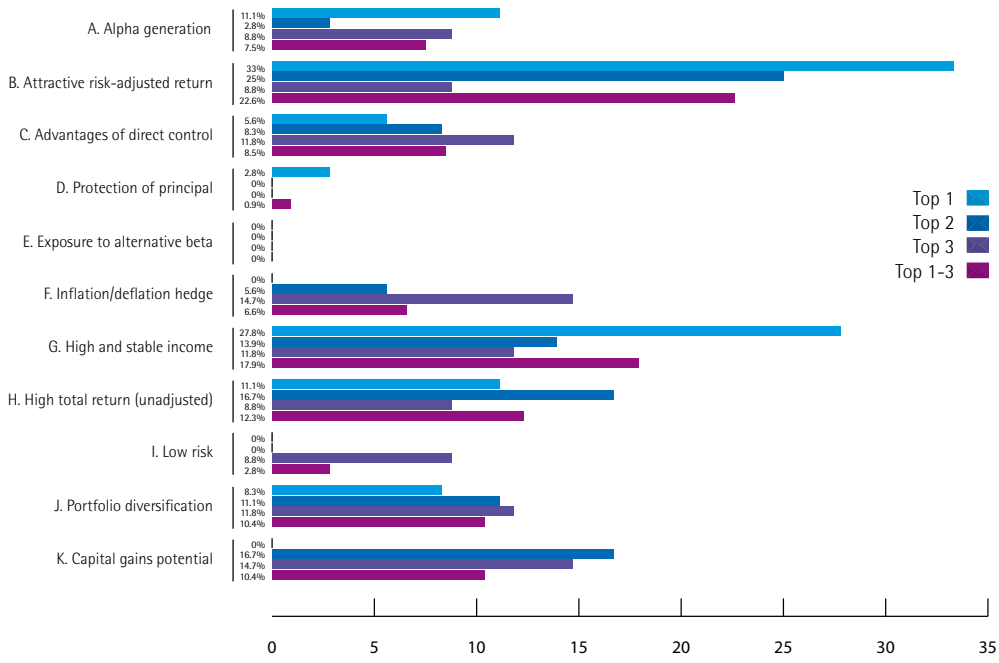


Exhibit 36 shows that the main investment justifications for real estate specialists are risk-adjusted performance, the high and stable income, and the high total return. As real estate specialists are obliged to invest in this asset class, it is only natural to see that for them investing in real estate for reasons of portfolio diversification is of little interest. Their reasons reflect the expectations of their clients: overall investment performance and regular distributions. The greater interest in the search for pure alpha (A and C) is consistent with the specialisation of these investors and with the primacy of performance.

Exhibit 36: **Top three reasons for investing in real estate—real estate specialists only**



4. Survey Results

4.3.2. Allocation policy

74.5% of those who responded (not including real estate specialists) take an approach to investment in real estate that views this asset class as a class of its own; 1% classify real estate within a catch-all alternative asset class; 1% are content with the properties they own and occupy; and 23.5% invest opportunistically.[55] Exhibit 37 suggests that recognition of real estate as an asset class is linked to the size of the real estate portfolio.

Exhibit 37: **Targeted allocation to the real estate class and opportunistic orientation by size of real estate portfolio (€ million)**

	Average (median) target allocation	Average (median) range floor (median)	Average (median) range ceiling	Opportunistic investments
Not available/applicable (25)	9% (10%)	5.6% (5%)	13.1% (15%)	37.5%
Less than 100 (34)	8.9% (8%)	5.3% (4%)	13.1% (11%)	30%
100-1,000 (26)	10.1% (10%)	4.3% (5%)	13.4% (14%)	20%
1,000-10,000 (14)	11.7 (12.5%)	8% (9.5%)	14.7% (15%)	0%
More than 10,000 (6)	9.8% (10%)	6% (5%)	12.3% (13.5%)	0%
All investors	9.9% (10%)	5.7% (5%)	13.5% (13%)	23.5%

Exhibit 38: **Targeted allocation to the real estate class and opportunistic orientation by type of investor**

	Average (median) target allocation	Average (median) range floor	Average (median) range ceiling	Opportunistic investments
Pension funds and insurance companies (50)	9.8% (10%)	6.8% (7%)	12.9% (13%)	10.9%
Pension funds alone (36)	10.2% (10%)	7.8% (7.5%)	13.4% (15%)	14.3%
Insurance companies alone (14)	8.5% (9%)	4.5% (3%)	11.9% (12%)	0%
Diversified asset managers (45)	9.9% (10%)	4.1% (4.5%)	14.1% (15%)	33.3%
Others (10)	12.5% (12.5%)	5% (5%)	15% (15%)	40%
All investors	9.9% (10%)	5.7% (5%)	13.5% (13%)	23.5%

4.3.3. Investment vehicles

Exhibit 39 shows the vehicles for real estate allocation used by the institutions responding to our questionnaire. The main findings are the very small role for pure debt products, the respect for the traditional hierarchy of real estate equity vehicles, and the still limited share of structured products, index products, and derivatives.

Although the capitalisation of mortgage debt is very high, mortgage debt products account for only 3% of the funds allocated to real estate by the investors in our sample. Our conclusion is that real estate debt is classified by investors as a fixed-income product and that the quadrant model is not used for allocation to real estate.

The data from the entire sample suggest allocation to real estate is divided equally between direct and indirect investment. Exhibits 40 and 41 show that this balance is only a façade, as real estate specialists invest 75% of their funds directly, double what other investors do. Exhibits 42 and 43 show that pension funds and insurance companies respect traditional hierarchies in their equity allocations, as they allocate first of all to direct real estate, then to non-listed vehicles, and finally to listed property companies, whereas diversified asset managers prefer listed property companies to non-listed vehicles.[56] This preference is consistent with the shorter investment horizons and the greater liquidity needs of these investors. Exhibit 43 also shows that, overall, diversified asset managers are, as might be expected, more open to new vehicles, findings that are consistent with our previous remarks.[57]

55 - The data reveal that opportunistic investments are the work of small investors. For these opportunists, the average (median) investment in real estate is €94 (€100) million. The largest allocation is €300 million.
56 - Further analysis shows that this preference cannot be accounted for by size differences.
57 - For these results, however, it is impossible to ascertain the effect of portfolio size, as most of the asset managers who expressed great interest in these products failed to report the size of their portfolios.

4. Survey Results

Exhibit 39:
Allocation to the various real estate investment vehicles—overall sample

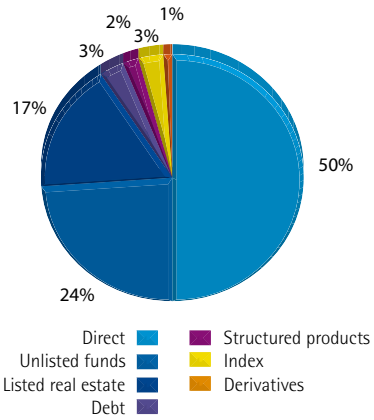


Exhibit 40:
Allocation to the various real estate investment vehicles—real estate specialists only

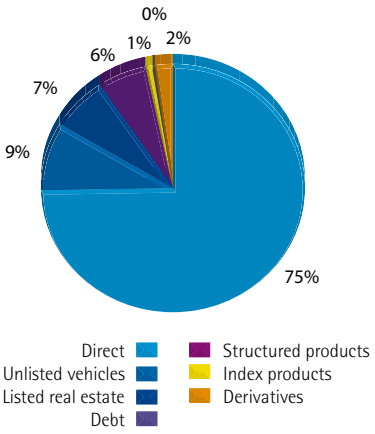


Exhibit 41:
Allocation to the various real estate investment vehicles—real estate specialists excluded

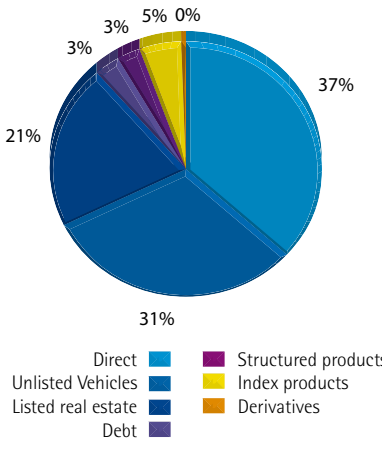


Exhibit 42:
Allocation to the various real estate investment vehicles—pension funds and insurance companies

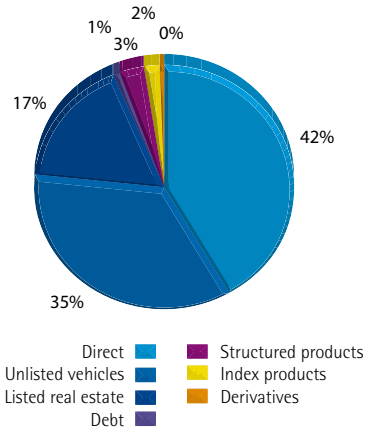
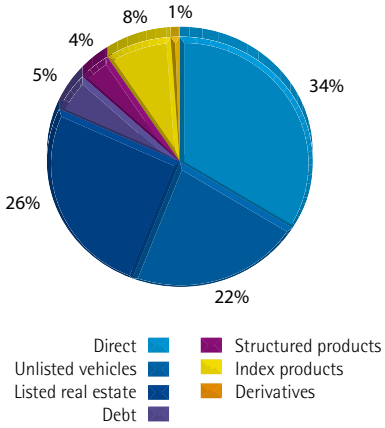


Exhibit 43:
Allocation to the various real estate investment vehicles—diversified asset managers



Exhibits 44 and 45 show a positive relationship between portfolio size and allocation to direct real estate; this relationship illustrates the problems of lumpiness and the difficulty of diversifying the real estate portfolio that we highlighted in chapter 1. Between portfolio size and non-listed vehicles, by contrast, there is a negative relationship; in keeping with our work on correlation in chapter 1, investors view non-listed vehicles as the closest substitute for direct investment.

4. Survey Results

Exhibit 44: **Allocation to the various real estate investment vehicles by size of real estate portfolio (€ million)**

	Direct	Non-listed vehicles	Listed	Debt	Structured products	Indices	Derivatives
Not available/applicable (32)	42.91%	19.60%	11.77%	5.68%	9.20%	8.44%	2.40%
Less than 100 (36)	29.41%	41.99%	23.06%	0.61%	0.71%	3.68%	0.54%
100-1,000 (31)	46.51%	23.48%	22.04%	3.04%	0.80%	4.13%	0.00%
1,000-10,000 (33)	71.10%	12.54%	13.89%	1.35%	1.05%	0.03%	0.03%
More than 10,000 (11)	54.55%	25.18%	5.27%	13.64%	0.00%	0.00%	1.36%
All investors	49.16%	24.08%	16.68%	3.50%	2.41%	3.46%	0.71%

Exhibit 45: **Allocation to the various real estate investment vehicles by size of real estate portfolio—real estate specialists excluded (€ million)**

	Direct	Non-listed vehicles	Listed	Debt	Structured products	Indices	Derivatives
Non available/applicable (25)	28.49%	25.00%	13.56%	7.89%	12.78%	11.72%	0.56%
Less than 100 (34)	24.83%	44.64%	24.64%	0.58%	0.77%	3.96%	0.58%
100-1,000 (26)	38.53%	27.91%	26.37%	1.33%	0.95%	4.91%	0.00%
1,000-10,000 (14)	60.67%	18.60%	19.66%	0.71%	0.35%	0.00%	0.00%
More than 10,000 (6)	63.00%	25.40%	5.60%	5.00%	0.00%	0.00%	1.00%
All investors	37.41%	30.60%	21.02%	2.54%	3.14%	4.96%	0.34%

In our sample, the real estate asset class essentially spans the various modes of equity investment; in the next section of our questionnaire, we examine performance assessment tools and the perceived risks of these investments.

4.4. Real estate equity investments

4.4.1. Performance measurement

The first question in this part of the questionnaire forces respondents to choose a single benchmark for performance measurement. In so doing, it is possible to ascertain whether the real estate asset class is approached as an absolute or relative return class. Exhibit 46 shows that absolute return measures predominate. 80.6% of real estate specialists and 52.1% of other investors report that they first set nominal or real absolute return objectives. More than half of pension funds (56%) resorted to relative return measures—the only category in which a majority of investors in our questionnaire did so.

The specialists who use a relative return measure almost invariably choose a direct property index, a choice in keeping with their choice of investment vehicles (exhibit 40). Other investors rely on direct and indirect indices—much preferred to composite indices,[58] peer group indices, and other benchmarks—in equal measure. It is noteworthy that pension funds alone—they report using composites and peer group indices—wield the full complement of benchmarks.

Analysis of the indices mentioned by the investors who take a relative return approach shows that for direct real estate benchmarks in Europe IPD indices have a monopoly; when it comes to indirect indices, there is more competition. For listed European real estate, EPRA indices have a clear lead over GPR indices and the use of IEIF indices is an exception; domestic indices are mentioned as well. Respondents note few benchmarks for non-listed indirect real estate, a reflection of the shortage mentioned in chapter 1; those mentioned include the INREV international indices, the HSBC/AREF/IPD PPF for the United Kingdom, and the values of German open funds.

58 - Three of these composite indices encompass both direct and indirect real estate; the fourth is a 100% listed real estate composite.

4. Survey Results

Exhibit 46: **Benchmark used for real estate equity investments**

	All investors	Real estate specialists	Other investors	Diversified asset managers	Pension funds	Insurance companies
Nominal absolute return	39.2%	66.7%	29.3%	35.9%	17.6%	40.0%
Real absolute return	20.0%	13.9%	22.8%	25.6%	17.6%	20.0%
Direct index	17.7%	16.7%	18.5%	17.9%	20.6%	30.0%
Indirect index	13.1%	2.8%	17.4%	17.9%	20.6%	10.0%
Composite index return	3.1%	0.0%	4.3%	0.0%	5.9%	0.0%
Peer group index	3.1%	0.0%	4.3%	0.0%	2.9%	0.0%
Other	0.8%	0.0%	1.1%	0.0%	5.9%	0.0%
None	1.5%	0.0%	2.2%	2.6%	8.8%	0.0%

The second question in this part deals with the five most useful indices for performance assessment. It turns out that 46.7% of the investors who take a mainly absolute approach to performance measurement also use relative return measures. Overall, 68.5% of respondents use relative return benchmarks as a primary or secondary gauge of the performance of their real estate investments.[59] Detailed analysis of responses shows the appropriateness of benchmark choices: direct indices are used to track the performance of direct investments, property company indices are used to track the performance of investment in property companies, geographic indices are used to track the performance of investment along geographic lines, and so on. The IPD and NCREIF direct property indices enjoy monopolies in the regions they cover. The family of indices from EPRA is by far the most popular for the assessment of investments in listed real estate—its only serious challengers are the indices supplied by GPR, and they are mentioned little more than a third as often. IEIF, S&P/Citigroup, or Dow Jones Wilshire receive only a few mentions.

4.4.2. Risk factors

Our questionnaire then examines the main sources of risk driving the returns on real estate equity investments, the links between these returns and macroeconomic variables, and the use of these variables for portfolio management.

Exhibits 47 and 48 show that the investors who responded to our questionnaire view idiosyncratic risks as the main factors behind the performance of real estate investments: for specialists as well as for non-specialists, the factor most frequently mentioned first, and the most frequently mentioned of the three main risk factors, is that which refers explicitly to the specific features of the property (location, use, size, age, architecture, and so on). These results tally with the facts highlighted by the statistical analyses of chapter 1, which identified specific risks as predominant and examined the reasons for the difficulty of diversifying them.

For real estate specialists, the other key factor that is made apparent is also specific—lease terms and tenant creditworthiness. These responses reveal a conventional approach to real estate investment, in the context of which specialists largely view the leverage for added value at the property level; this approach is explained by proximity to the underlying asset (exhibit 40) and by the difficulty of adding value through allocation when it comes to direct real estate investment. Other investors identify property-type risk (mentioned by 24.3% percent of respondents as one of the three main risk factors) and infra-continental geographic risk[60] (18.3%), results that likewise tally with the conclusions we draw in chapter 2.

59 - 130 investors responded to the first question on the benchmark and 81 to the second. Of the 77 investors reporting an absolute return approach, 35 did not respond to the second question, 6 mentioned absolute benchmarks (IRR, value-added, set real or nominal yield, current yield), and 36 mentioned relative benchmarks (as well as composites of relative and absolute benchmarks). Of the 53 investors reporting a relative benchmark in response to the first question, 39 responded to the second question and spell out the relative benchmarks they use. So, overall, 68.5% of those who respond to the first question use relative return benchmarks as a primary or secondary means of assessing the performance of their real estate investments.

60 - Geographic or economic region within a particular continent (international region, country, region of a country).

4. Survey Results

Exhibit 47: **Top three sources of risks driving real estate performance—real estate specialists only**

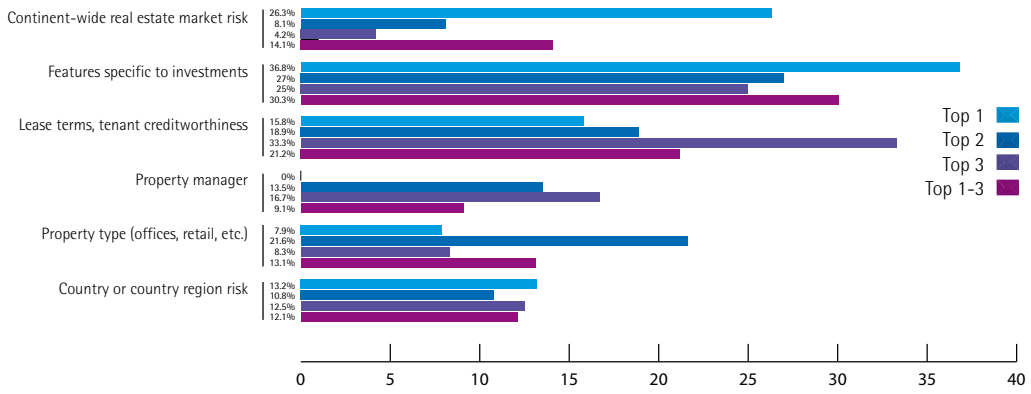


Exhibit 48: **Top three sources of risks driving real estate performance—real estate specialists excluded**

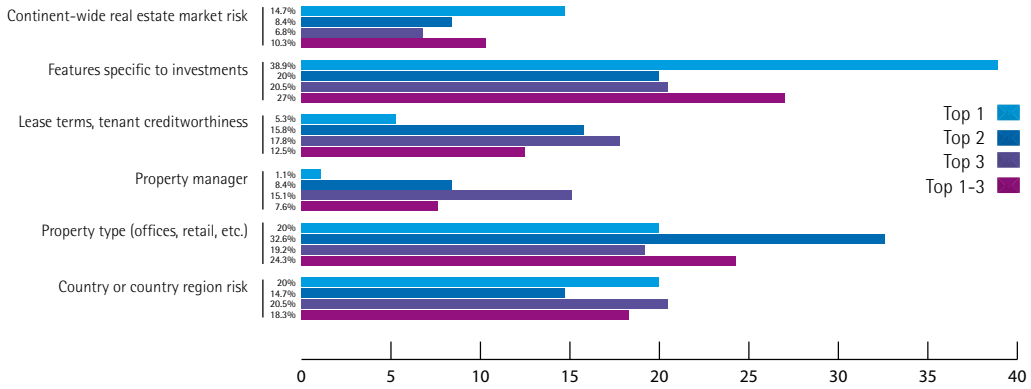


Exhibit 49 shows the estimated correlation of several macroeconomic variables and the returns on real estate equity in the absence of leverage. Investors believe that there is a marked positive correlation of real estate returns and GDP growth, a positive correlation with employment and with inflation[61] and—less clearly—a negative correlation with treasury rates.[62] A quarter of the investors surveyed chose not to comment on the links between real estate returns and credit or stock market risk premia, and among those who did opinions are very divided.[63] The convictions of these investors justify diversification or international allocation strategies driven by economic fundamentals.

61 - A finding consistent with the use of real estate investments as a hedge against inflation.
62 - The first three correlations are consistent with the findings of Ling and Naranjo (1997).
63 - Real estate specialists see a slightly positive correlation with the credit risk premium and a slightly negative correlation with the stock market risk premium, but for other investors it is the other way around.

Exhibit 49: **Estimated strength and direction of correlation of unleveraged real estate equity returns and various economic variables**

	GDP growth		Employment		Inflation		Treasury rates		Credit risk premium		Stock market risk premium	
High negative correlation (-2)	1	0.8%	3	2.5%	4	3.2%	29	24.6%	12	11.5%	5	4.9%
Low negative correlation (-1)	4	3.2%	7	5.7%	10	8.1%	43	36.4%	39	37.5%	29	28.2%
Absence of correlation	1	0.8%	8	6.6%	8	6.5%	5	4.2%	17	16.3%	28	27.2%
Low positive correlation (+1)	46	36.8%	64	52.5%	51	41.1%	26	22.0%	26	25.0%	31	30.1%
High positive correlation (+2)	73	58.4%	40	32.8%	51	41.1%	15	12.7%	10	9.6%	10	9.7%
No response	18		21		19		25		39		38	
Average	1.49		1.07		1.09		-0.38		-0.17		0.12	

4. Survey Results

Exhibit 50 identifies the variables tracked by investors as they make real estate investments; it shows that real estate specialists rely heavily—more so than other investors—on macroeconomic data when making investment decisions.[64]

Exhibit 50: **Economic variables tracked in the context of real estate investments**

	GDP growth		Employment		Inflation		Treasury rates		Credit risk premium		Stock market risk premium	
Real estate specialists	32	86.5%	30	81.1%	34	91.9%	32	86.5%	20	54.1%	10	27%
Other investors	61	75.3%	42	51.9%	57	70.4%	61	75.3%	23	28.4%	23	28.4%

Exhibit 51 shows the geographic divisions for which economic data are analysed in the context of real estate investment. It shows that specialists have a much more local view than do other investors. As a result, countries (83.3%), major cities (69.4%), and regions (66.6%) are most important to specialists, whereas other investors are interested above all in countries (55.8%) and continents (53.5%). These findings are consistent with the greater proximity of specialists to the underlying asset and with the top-down, intermediated allocation approach of other investors.

Exhibit 51: **Geographic level at which economic variables are tracked in the context of real estate investments**

	World	Continent	Country	Political region	Economic region	Major city	Not used
Real estate specialists	22.2%	50.0%	83.3%	22.2%	44.4%	69.4%	11.1%
Other investors	19.8%	53.5%	55.8%	8.1%	19.8%	29.1%	15.1%

64 - This contrast is less sharp after controls for real estate portfolio size.
65 - Allocation limits are an unsophisticated approach that can be rationalised as a good-sense rule in the presence of uncertainty stemming from information of suspect quality or insufficient quantity, flaws characteristic of some of the real estate markets in which the participants in our survey invest.

4.4.3. Risk management techniques

After identifying the sources of risk affecting real estate returns, our questionnaire attempts to identify common risk management practices.

Exhibits 52 and 53 show how useful investors think various approaches to risk management are. Diversification emerges as the sole suitable approach for real estate specialists and the most useful for other investors. Of the other possibilities, only limits on allocation to real estate find favour among non-specialists; principal-protected structured real estate products are deemed not very useful and derivatives get a wary welcome.[65] Real estate specialists, who are unable to cap the share of real estate in their portfolios, consider derivatives and structured products even less useful as risk management tools.

Exhibit 52: **Usefulness of various risk management approaches—real estate specialists**

	Not useful (-2)	Not very useful (-1)	Somewhat useful (+1)	Very useful (+2)	Average weighted score
Capping allocations to real estate	50.0%	11.8%	20.6%	17.6%	-0.56
Diversifying the real estate portfolio	5.7%	5.7%	25.7%	62.9%	1.34
Investing in principal-protected products	54.8%	29.0%	12.9%	3.2%	-1.19
Using property derivatives	43.3%	23.3%	33.3%	0.0%	-0.77

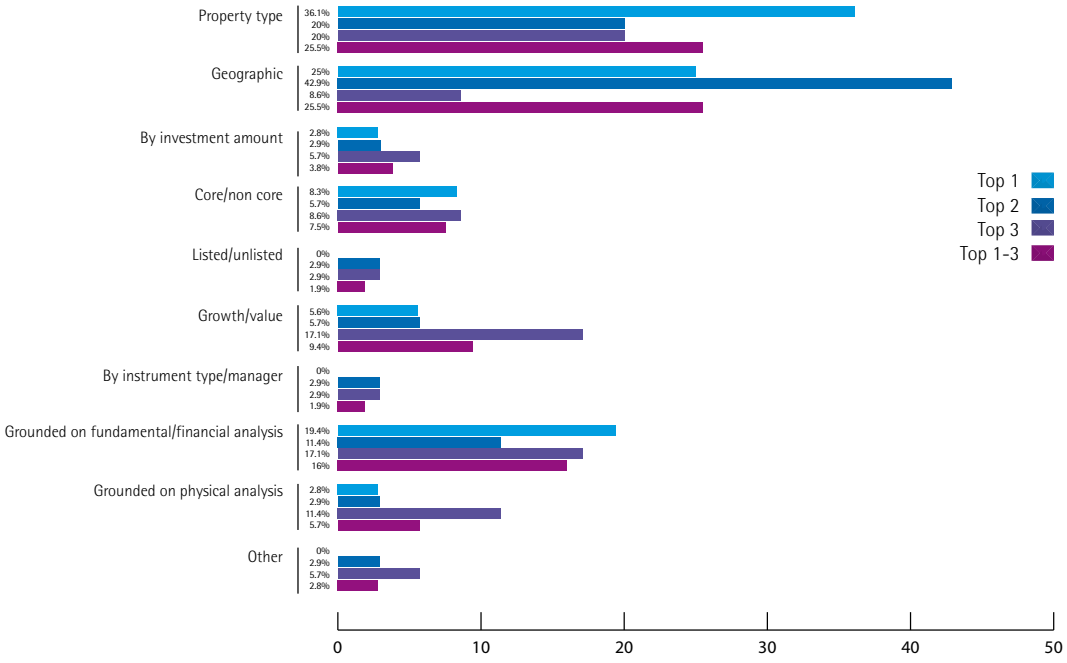
4. Survey Results

Exhibit 53: **Usefulness of various risk management approaches—real estate specialists excluded**

	Not useful (-2)	Not very useful (-1)	Somewhat useful (+1)	Very useful (+2)	Average weighted score
Capping allocations to real estate	2.2%	11%	33%	53.8%	1.25
Diversifying the real estate portfolio	0%	2.2%	23.3%	74.4%	1.70
Investing in principal-protected products	43.2%	36.4%	15.9%	4.5%	-0.98
Using property derivatives	28.7%	33.3%	29.9%	8%	-0.45

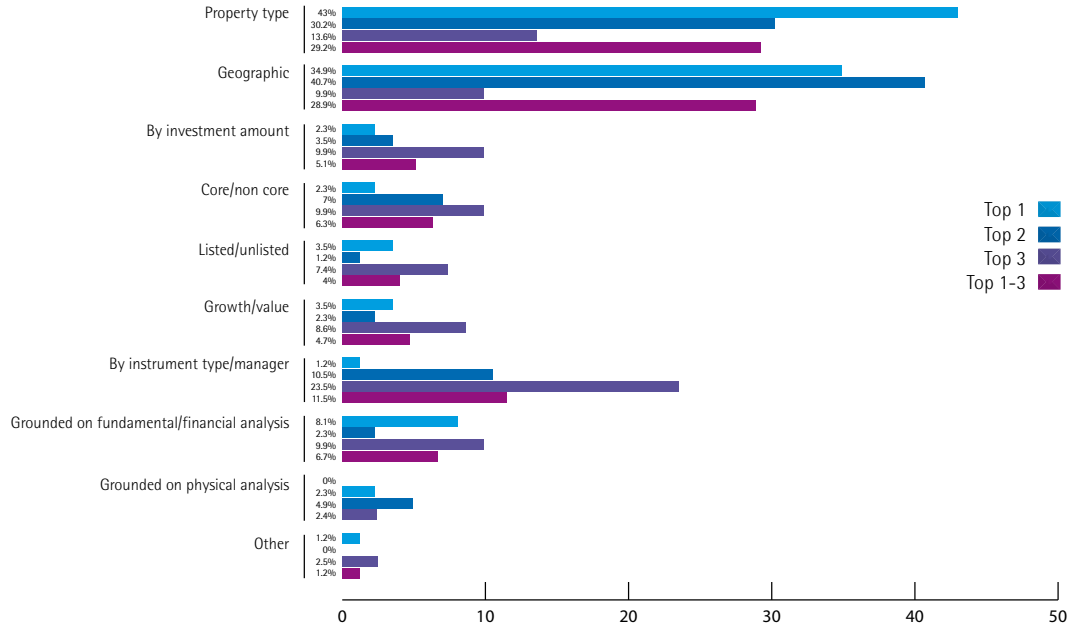
Exhibits 54 and 55 show the diversification approaches deemed most appropriate by the investors responding to our questionnaire. In keeping with the findings of part one of our survey, and entirely consistent with the risk factors identified above, investors identify diversification by property type and diversification by geography as the two main approaches to diversification. For specialists, a third approach is grounded on financial analysis; style considerations (growth vs. value, core vs. value added or opportunistic) are important as well. For other investors, the third approach to diversification is by type of instrument or by manager, an approach that shows the specific concerns of those investing indirectly in real estate. That investors fail to distinguish between listed and non-listed instruments is noteworthy.

Exhibit 54: **Usefulness of various diversification approaches—real estate specialists only**



4. Survey Results

Exhibit 55: **Usefulness of various diversification approaches—real estate specialists excluded**



4.5. Property derivatives

4.5.1. Experience and perception of property derivatives

The last part of our questionnaire examines property derivatives. Our first step was to survey investors as to their experience and perception of the real estate derivatives markets.

Exhibit 56 shows that 81% of investors responding to the questionnaire have no plans to use real estate derivatives in the near future, 5% have used them, and 16% plan to do so in the short term. Exhibit 57 shows that real estate specialists are less interested in derivatives; analysis by size reveals that the draw of derivatives increases as the size of the portfolio grows.

Exhibit 56:
Do you use property derivatives?

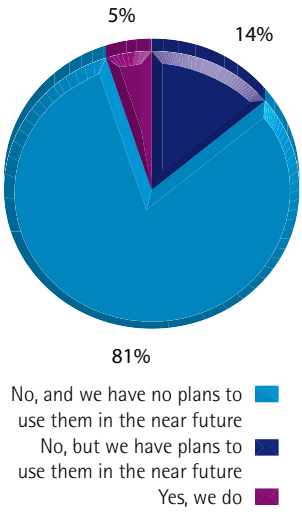


Exhibit 57: **Attitude towards property derivatives**

	Users	Use planned by end 2007	No short-term plans or use
Real estate specialists (38)	2.6%	10.5%	86.8%
Other investors (100)	6.0%	15.0%	79.0%

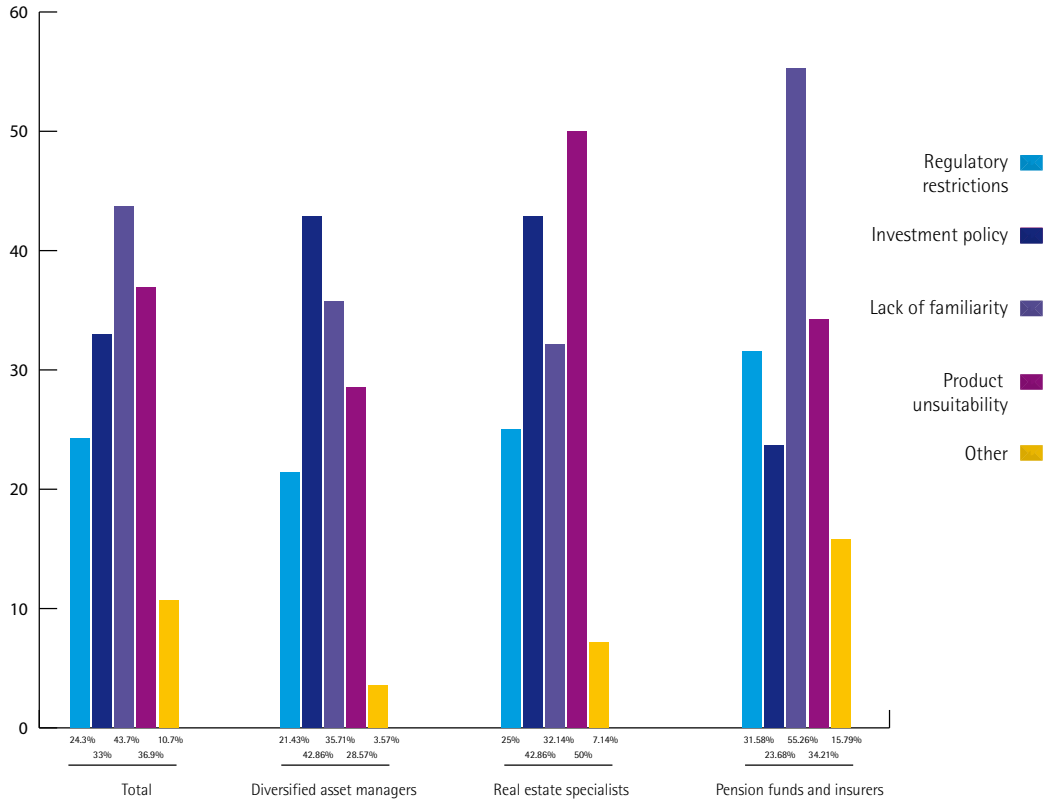
4. Survey Results

Exhibit 58 lists the reasons for this rejection of real estate derivatives.[66] 50% of real estate specialists consider existing products unsuited to their needs. The difficulty of hedging risk with existing index derivatives (a difficulty arising from the preponderance of specific risk in direct real estate portfolios), a problem we examine in chapter 3, is a possible reason for these results. Their limited geographic reach (when our questionnaire was administered, only the United Kingdom had a developed derivatives market) is another; geographic analysis of the data—of limited reliability, given the small sample—suggests, by contrast, that two-thirds of UK-based specialists deem these products inappropriate: rejection of these products appears closer to unanimous among the specialists who are more likely to be familiar with them. The other reasons for the failure of specialists to resort to derivatives are the investment rules in force in the respondent's organisation (for 42.9% of those responding) and, to a lesser degree, a lack of familiarity with the products (32.1%).

For pension funds and insurers, the lack of familiarity with real estate derivatives[67] is the primary obstacle to the use of these products (55.3% of 38 respondents), followed by their unsuitability (34.2%) and by regulatory restrictions (31.6%).

For diversified asset managers, internal investment policies are the main obstacle (42.9%), ahead of a lack of familiarity with the products (35.7%) and their unsuitability (28.6%).[68]

Exhibit 58: **Reasons for rejecting derivatives**



66 - As many as five responses were possible; on average, 1.5 were provided.
67 - Familiarity with real estate derivatives is apt to be greater among the managers of larger real estate portfolios.
68 - There is a size effect: for asset managers with a real estate portfolio of €100m or less, the lack of familiarity, followed by investment polices, is the main problem; for the others, investment policies, product unsuitability, and regulatory issues are all major impediments.
69 - 94.4% of the investors who answer the question.

4.5.2. Awareness of product and uses

The derivatives market is, for most investors, synonymous with the market based on IPD indices: half of the investors who returned our questionnaire responded to this question and 61.1% of them are familiar only with the derivatives linked to IPD indices and only 5.6% of those who are familiar with a real estate derivative[69] are unaware of the IPD indices derivatives market. Exhibit 59 shows that total return swaps on IPD indices are far and

4. Survey Results

Exhibit 59: **Awareness of various property derivatives**

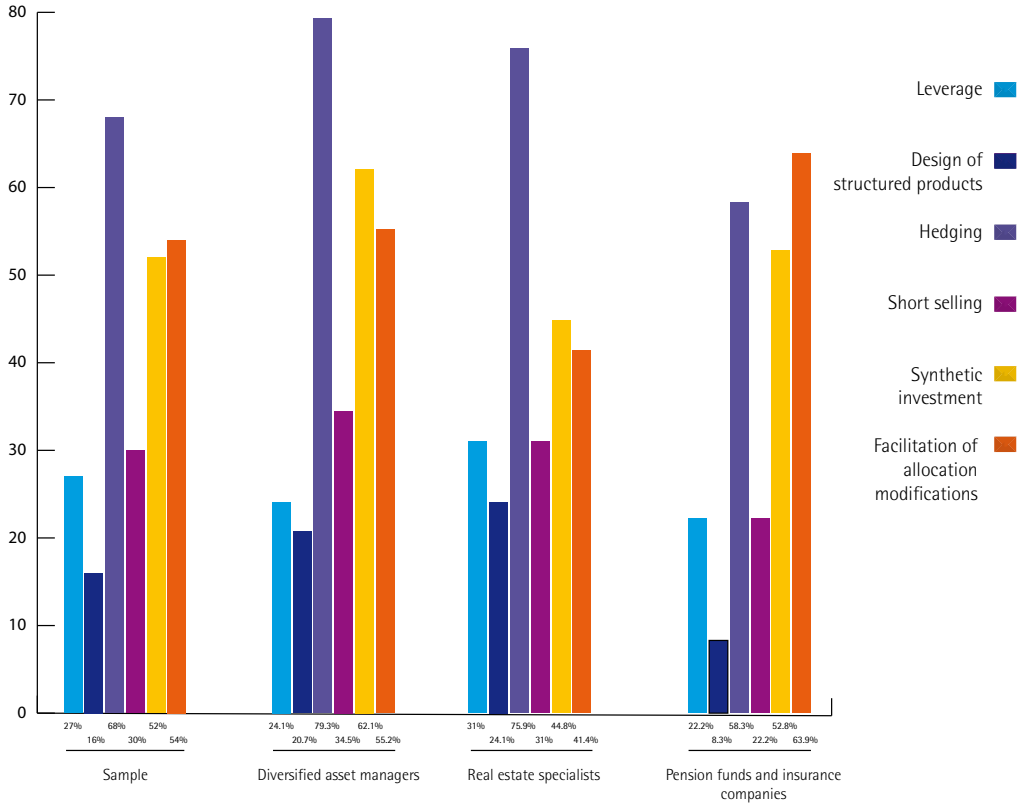
	TRS IPD	Warrants IPD	TRS NPI	Warrants HHPI	Futures HHPI	Futures CSW	None	Other (Put EPRA)
Total (72)	86.1%	33.3%	23.6%	11.1%	13.9%	13.9%	5.6%	1.4%
Real estate specialists (22)	86.4%	36.4%	13.6%	4.5%	9.1%	4.5%	4.5%	0.0%
Other investors (50)	86.0%	32.0%	28.0%	14.0%	16.0%	18.0%	6.0%	2.0%

away the most well known real estate derivatives (86.1%). Likely beneficiaries of the halo effect, warrants on IPD UK indices are the second most frequently mentioned derivative (33.1%). In third place are total return swaps on the American NPI index. Housing price index derivatives bring up the rear and are little known. Real estate specialists are much less familiar with derivatives of commercial real estate in the United States than are other investors—and hardly familiar at all with derivatives linked to housing markets.

Exhibit 60 shows that investors see three main uses for real estate derivatives: hedging, synthetic investment, and synthetic portfolio management. More "speculative" activities such as leveraging or short selling are considered secondary.

Hedging is the first use mentioned by diversified asset managers (79.3%) and by real estate specialists (75.9%), far ahead of synthetic investment (62.1% and 44.8%) and synthetic portfolio management (55.2% and 41.4%). Pension funds and insurance companies put synthetic portfolio management (63.9%) ahead of hedging (58.3%) and synthetic investment (52.8%). Given the difficulty of hedging and of synthetic portfolio management with direct property index derivatives, it is unlikely that these expectations will be met, and suppliers of indices would do well to acknowledge the limited potential of these derivatives in this respect and, after the fashion of the interest groups that worked for the removal of regulatory obstacles to the use of property derivatives in the United Kingdom, emphasise their other advantages.

Exhibit 60: **Possible uses of derivatives**



4. Survey Results

Exhibit 61 shows that the results in Exhibit 60 are largely independent of size. The stability of hedging as a possible use of derivatives is surprising; hedging, after all, is more effective with larger portfolios, as we note in chapter 3. There is a negative relationship between the notion that derivatives can serve as a synthetic investment vehicle and portfolio size, a finding consistent with the difficulties faced by small investors in their attempts to gain access to the asset class; this negative relationship is magnified when the influence of diversified asset managers, the investors most sympathetic to synthetic management, is neutralised.

Exhibit 61: **Possible uses of derivatives by size of real estate portfolio (€million)**

	Leverage	Design of structured products	Hedging	Short selling	Synthetic investment	Portfolio rebalancing
Not available/applicable (20)	35.0%	15.0%	75.0%	40.0%	40.0%	50.0%
Less than 100 (19)	21.1%	21.1%	68.4%	36.8%	73.7%	52.6%
100-1,000 (24)	25.0%	8.3%	70.8%	20.8%	41.7%	41.7%
1,000-10,000 (26)	26.9%	15.4%	65.4%	30.8%	53.8%	57.7%
More than 10,000 (11)	27.3%	27.3%	54.5%	18.2%	54.5%	81.8%
All investors (100)	27.0%	16.0%	68.0%	30.0%	52.0%	54.0%

A question about the acceptability of using an index rather than conventional vehicles as a diversification tool is intended to shed additional light on this notion of synthetic investment. Exhibit 62 shows that 65.6% of investors view an investable European real estate index or a derivative of that index as the best means to diversify the real estate portfolio of an institutional investor with a strong home bias. Exhibit 63 shows that, although indices are viewed as the best means by all types of investors, it is diversified asset managers who are most drawn to them. These results also show that non-specialists choose listed real estate as the second most favoured means of diversification, whereas specialists view it as the least effective solution, preferring instead to put non-listed funds in second place.[70] Interest in listed real estate as a means of diversification is less pronounced in larger portfolios, whereas interest in indices increases. These results are consistent with the progressively larger allocations to direct real estate (as suggested by Exhibit 45) and with the challenges—discussed in chapter 2 of our survey—of using listed real estate to diversify direct investments.

70 - An INREV study (2007) of the investors in non-listed funds finds that the three main reasons for investment in these funds were to gain access to professional management (style, local presence), to achieve international diversification of the real estate portfolio, and to diversify the overall portfolio.

Exhibit 62: **Is a European index a suitable diversifier for a direct real estate portfolio with a strong home bias?**

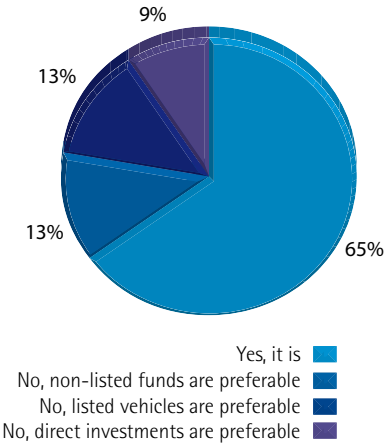


Exhibit 63: **Acceptability of a European index as a real estate portfolio diversifier—by type of investor**

	Total (128)	Diversified asset managers (42)	Real estate specialists (35)	Pension funds and insurers (42)	Others (9)
An investable index or derivative thereof is an appropriate tool	65.6%	76.2%	60.0%	64.3%	44.4%
Non-listed funds are preferable	12.5%	4.8%	20.0%	9.5%	33.3%
Listed real estate is preferable	13.3%	11.9%	8.6%	21.4%	0.0%
Direct investment is preferable	8.6%	7.1%	11.4%	4.8%	22.2%

4. Survey Results

Box 15: On the utility of real estate indices as vehicles for investment and diversification

Access to real estate indices makes it possible to attain a level of diversification that would be unattainable through direct real estate investments. Indices allow investors to take passive positions representative of a country or property type that may not be accessible to direct investment. These indices may be used dynamically to generate alpha, but intrinsically they are pure beta products.

Exhibit 64 lists the main reasons, as identified by our questionnaire, for investment in real estate, and it assesses the relevance of real estate indices as a response to these reasons; it shows that indices have definite potential as vehicles for passive investment in real estate.

Exhibit 64: **Relevance of real estate index as an investment vehicle in relation to real estate investment motivations—real estate specialists excluded**

Reason for investment	Expectation	Relevance of indices
Diversification	Beta	Complete
High risk-adjusted performance	Alpha + Beta	High
Inflation hedging	Beta	Complete

Exhibit 65: **Relevance of real estate index as a diversifier with respect to key sources of risk**

Source of risk	Requirement	Relevance of indices
• Specific risk - Characteristics specific to assets - Lease terms and tenant creditworthiness - Property manager	Diversification	Complete
• Geographic risk - Country- or region-wide - Continent-wide	Diversification	Complete
• Property-type risk	Diversification	Complete

Exhibit 65 examines the relevance of indices as diversifiers with respect to the management of the risks of real estate portfolios as identified by the investors who responded to our questionnaire. It shows that indices are an excellent means of real estate portfolio diversification.

Exposure to two types of indices is available to investors: listed property companies and REITs indices and direct real estate indices.

Equity REIT indices can be replicated easily and are investable through index funds, ETFs, and, more recently, derivatives; they are liquid, transparent, and relatively inexpensive. As we saw in chapter 1, the listed real estate section is still incomplete and somewhat narrow in most European countries, a situation that creates problems of index diversification and representativity. With the generalisation of listed real estate investment trusts, this section is growing quickly, and it is now possible to construct a European index with an acceptable level of concentration. To be representative of the European listed property company market, current commercial indices are nonetheless constructed on capitalisation weightings; they do not attempt to provide a true picture of (and are not representative of) the geographic or property-type dimensions of the underlying market. The development of listed real estate in Europe could eventually allow the construction of alternative indices aiming for composition representative of the stock of commercial real estate. The high correlation to the stock market and its weak short-term correlation to the underlying market, by contrast, are unlikely to disappear as the market grows, as they are intrinsic to listed real estate.[71]
In the short term, investment in listed property companies does not generate risks and returns representative of those of direct real estate. For this reason, it is hard to use an equity REIT index to diversify or manage synthetically a portfolio of direct holdings.

71 - Studies of American and European data show that correlation with stock markets has a tendency to decline over time but remains high nonetheless. It is not at all our aim to deny the utility of listed property companies as a means to diversify a securities portfolio, but the diversification potential of direct real estate is far higher and it cannot be achieved through listed property companies.

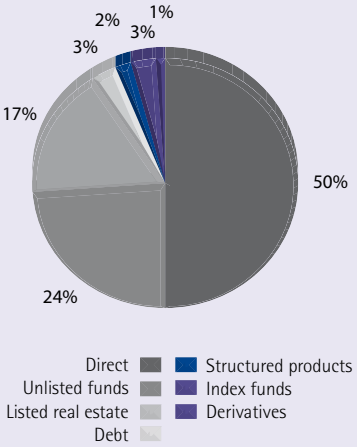
4. Survey Results

Direct real estate indices, based on appraisals of buildings already held by investors or on transactions, are by nature non-investable; derivatives must be used to take a synthetic position on these indices. A hybrid was created in June 2006 by FTSE and MSS, which launched the first investable direct real estate "index". The value of this index is determined by the daily pricing of a fund invested in various funds as well as directly—the index thus becomes directly investable via the fund. In addition to offering liquidity and investability, the FTSE/MSS UK commercial property index lays claim to representativity through its indirect exposure to a large amount of property, the types of which are monitored to match those of the underlying market.[72] The index was also built around components selected for their likelihood of delivering outperformance; as a result, it is not a pure beta product.

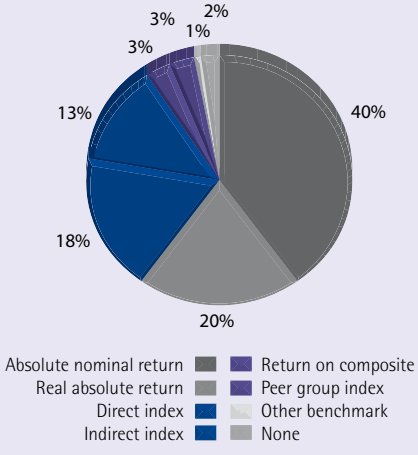
Direct indices are guarantors of maximum diversification, as their wide bases allow the diversification of risk specific to properties and they are not directly exposed to stock market risk. They are pure beta products, with yields on a property type or on a region, and serve as a hedge against selection risk (alpha stable at zero). They curtail style drift (composite indices) or eliminate it altogether (property-type indices) and reduce operational risk (or its impact) significantly. Instruments based on direct real estate indices greatly facilitate access to the underlying market and allow investors to remove themselves from the usual difficulties of the direct market (high information and transaction costs, long lead times and minimal liquidity, the predominance of specific risk, substantial property management requirements). The limits of these instruments are the limits of the indices they are based on (transparency, representativity, frequency, direct investability, and liquidity) and their synthetic or hybrid nature.

Exhibit 66 compares current allocations to index-based solutions and the upper limit of their medium-term potential, as reckoned by investors who report using relative return measures as a primary approach to gauging performance. As investors report that they are open to using index vehicles as a means of international diversification, this comparison indicates the great potential of offers built around passive exposure to real estate. 81% of investors have no plans to invest in derivatives in the near future (exhibit 46), so index funds and funds of funds seem to be the most promising medium-term alternatives.

Exhibit 66:
Current and potential market share of index-based solutions in real estate investment
Market share of index-based solutions: 4-6%



Potential of index-based solutions: 31-37%



72 - On its launch, and according to its promoters, the underlying fund had an exposure to more than 2,500 properties representing € 10 billion of category one commercial real estate—by comparison, the IPD UK index included 11,010 properties with a total value of € 220 billion. With an initial € 150 million in assets, the fund will have to manage problems of capacity and liquidity provision.

4. Survey Results

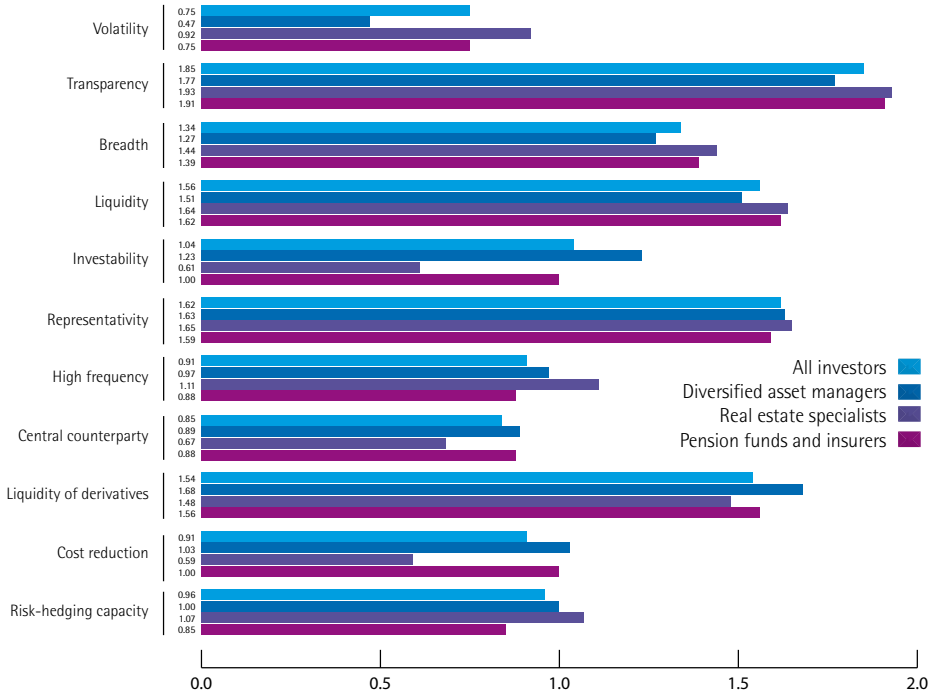
4.5.3. Key success factors for property derivatives markets

The last part of our questionnaire examines the key success factors for property derivatives markets and what investors view as the ideal characteristics of derivatives contracts.

Exhibit 67 shows that investors consider all the criteria suggested—with respect to both indices and contracts—significant to the success of a real estate derivatives market.[73] The transparency of the index underlying the contracts is the primary requirement. Investors also deem its representativity and its breadth very important. The liquidity/investability of the index is a noteworthy criterion as well, particularly among non-specialists. On the other hand, the frequency of the index and its volatility—which, by boosting demand linked to hedging and speculation, could make derivatives more liquid—are deemed less important. As far as other contract characteristics and market matters are concerned, the main investor demand, far ahead of demand for effective hedges, for cost-reduction capacities, and for a central counterparty to reduce risk, is for contract liquidity. We see that cost reduction is relatively more important for non-specialists and, unsurprisingly, that the importance of hedging effectiveness is positively associated with portfolio size. The great importance of liquidity and the more modest role of hedging effectiveness are consistent with an approach that uses derivatives as vehicles for synthetic investment and portfolio management, two of three main uses of derivatives as reported by the investors responding to our questionnaire (exhibit 60). This finding can be viewed as a positive sign by derivatives promoters, since the quality of these vehicles when it comes to hedging the risk of portfolios of direct real estate is a weakness. Of course, if we assume that liquidity is important to investors only because the market is not liquid at its present stage of development, then it can also be viewed negatively. We are confronted with the problem of kick-starting a virtuous cycle of liquidity: some investors remain absent from the market because of its insufficient liquidity, but it is their absence that prevents the market from becoming more liquid.

73 - Each criterion received a score on a scale of four gradations: very important (+2), somewhat important (+1), secondary (-1), not important (-2). There were between 102 and 110 responses for each score.

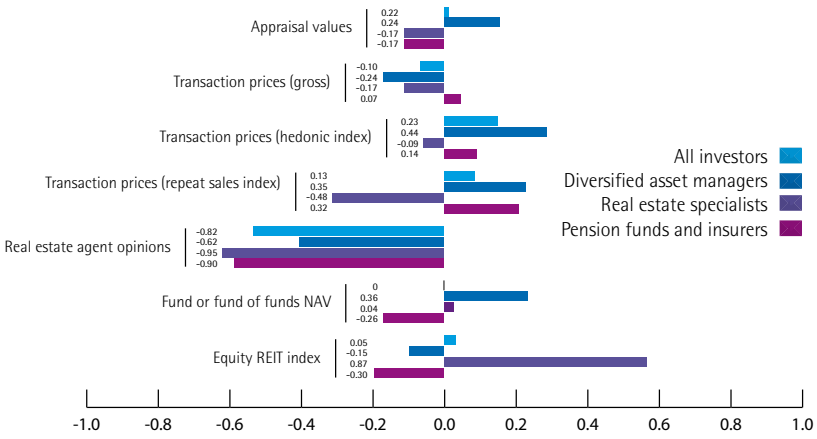
Exhibit 67: **Key success factors for property derivatives linked to underlier, contract specifications, and market characteristics**



4. Survey Results

Exhibit 68 shows comfort levels[74] with respect to the various methods of constructing the indices relied on for derivatives transactions. The main finding is that indices based on surveys of real estate agents are rejected unanimously; given the key concerns about transparency, liquidity/investability, and representativity/breadth, the reasons for this unanimous rejection are clear. The exhibit also shows that non-specialists seem to prefer constant quality transactions-based indices (hedonic ones, in particular) to appraisals-based indices,[75] that nearly all investors have negative opinions of gross transactions-based indices, and that methods based on the net asset values of funds, funds of funds or REITs get a mixed reception.[76]

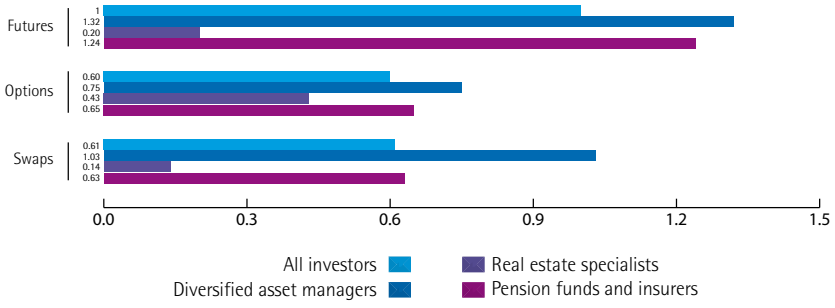
Exhibit 68: **Comfort level vis-à-vis various index construction methods**



The last section of our questionnaire deals with investor preferences as to types and characteristics of derivatives for investment and risk management.

As Exhibit 69 shows, investors prefer futures contracts, but it is swaps that account for nearly all of current market volumes. Overall, real estate specialists do not believe that derivatives are very useful; options fare better than futures and swaps, which may reveal an interest in hedging against the risks of poor performance. Non-specialists, by contrast, have little use for options, probably as a result of their lower utility as a means for exposure and of their higher upfront cost.

Exhibit 69: **Usefulness of various types of derivatives for investment and risk management**



74 - The score noted is again an average of the scores—on a scale of four gradations—provided by the respondents to our questionnaire. These more technical questions received from 82 to 89 responses.
75 - The mistrust of these indices by the very types of investors who contribute to them accounts for this finding.
76 - Interestingly, these last two options are the only ones to find favour among real estate specialists, who report a low level of comfort with all the methods used to construct direct real estate market indices—cynics might conclude that the more familiar an investor is with an index type, the less likely he is to trust it.

4. Survey Results

Exhibit 70 reveals that investors are content with total return derivatives and that there is little demand for disaggregating rents and capital values. As rents tend to add stability to total returns, a derivative of the capital (rent) component of a real estate index is more (less) volatile than a derivative of the total return and is thus more (less) attractive when it comes to speculation. These findings suggest that derivatives contracts based on the capital-value component of indices are not urgently needed, as the contracts currently on offer are able to respond to investor needs.

Exhibit 70: **Usefulness of various types of index component derivatives for investment and risk management**

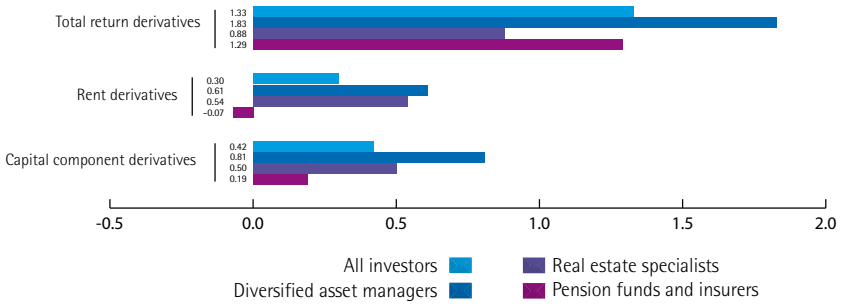
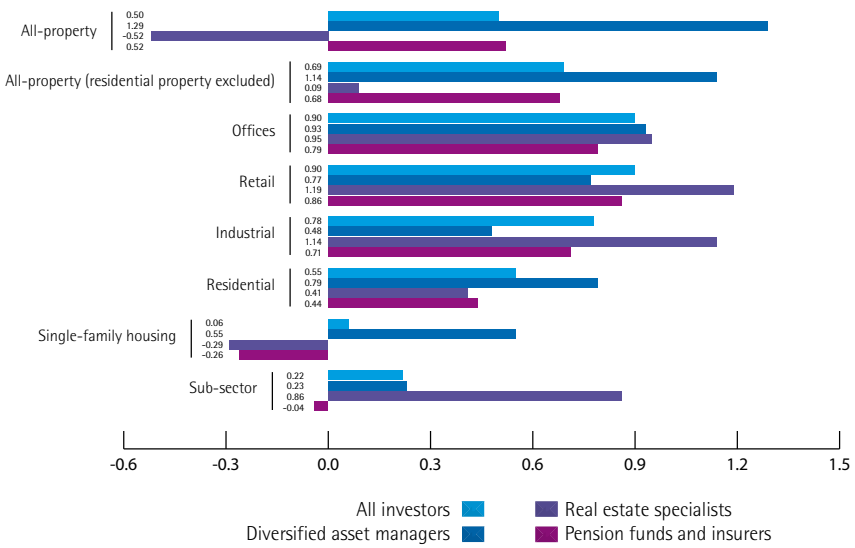


Exhibit 71 shows the usefulness of derivatives by property type. Real estate specialists have a neutral view of all-property index derivatives as long as residential properties are excluded, consider property-type (sector) and sub-sector index derivatives somewhat useful, and have no interest whatsoever in derivatives linked to housing price indices. These results are consistent with the needs for fine-grained synthetic management and portfolio hedging. Pension funds and insurance companies focus on commercial property indices and are also interested in all-property indices; these results are consistent with demand for synthetic management and hedging. Diversified asset managers with more than €100 million invested in real estate express opinions comparable overall to those of pension funds and insurance companies but are more interested in all-property indices. Smaller diversified asset managers are greatly drawn to derivatives of all-property indices, express some but not much interest in property-type derivatives, and express no interest at all in sub-sector derivatives. These findings are in keeping with views of derivatives as vehicles for exposure to real estate.

Exhibit 71: **Usefulness of various types of sector derivatives for investment and risk management**



4. Survey Results

Exhibit 72 depicts investor preferences as to the geographic ambits of the indices underlying property derivatives. The bulk of demand is for derivatives at the country level, but there is also a significant interest in continental derivatives, an interest that is more marked among investors with larger real estate portfolios.[77] The findings are consistent with those that identify the risk factors and modes of diversification as reported by investors (exhibits 47-48 and 54-55). Specialists reject the idea of a global real estate derivative, have neutral attitudes towards international index derivatives, and are somewhat more interested in derivatives based on domestic indices, though less so in derivatives of an index covering single regions within countries. Other investors have no interest in a global derivative but are somewhat drawn to derivatives of domestic or continental indices.

Exhibit 72: **Appropriate geographic focus of index used as underlier for property derivatives**

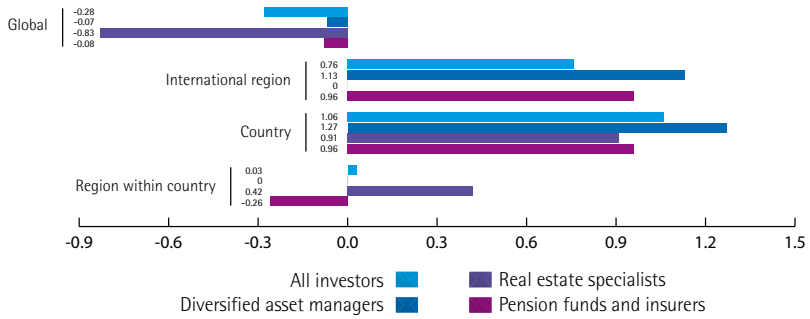
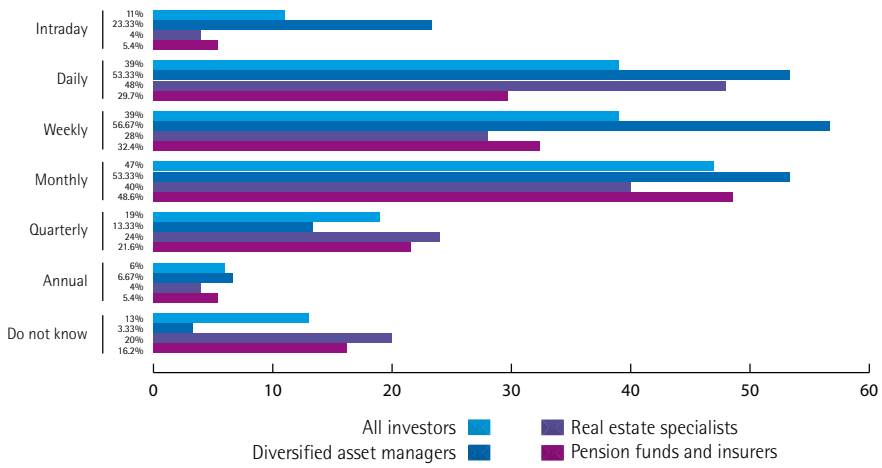


Exhibit 73 shows the three periodicities of liquidity most frequently needed by investors. Naturally, it is diversified asset managers who have the highest liquidity requirements. For their modes and horizons of investment, real estate specialists, pension funds, and insurance companies have surprisingly high liquidity requirements. When these requirements are analysed by the amount of assets under management, it turns out that there is a positive (and counter-intuitive) association between liquidity requirements and the size of real estate portfolios.

77 - The results are based on 80 to 87 responses. Average scores are awarded on the four-gradation scale described above.

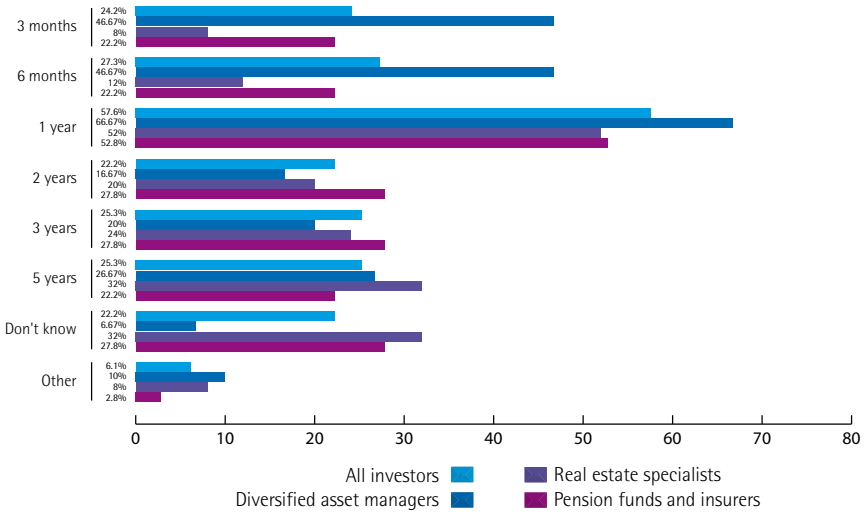
Exhibit 73: **Liquidity required of property derivatives—three choices allowed**



4. Survey Results

Exhibit 74 shows investor preferences as to the maturity of the property derivatives used for investment and risk management.

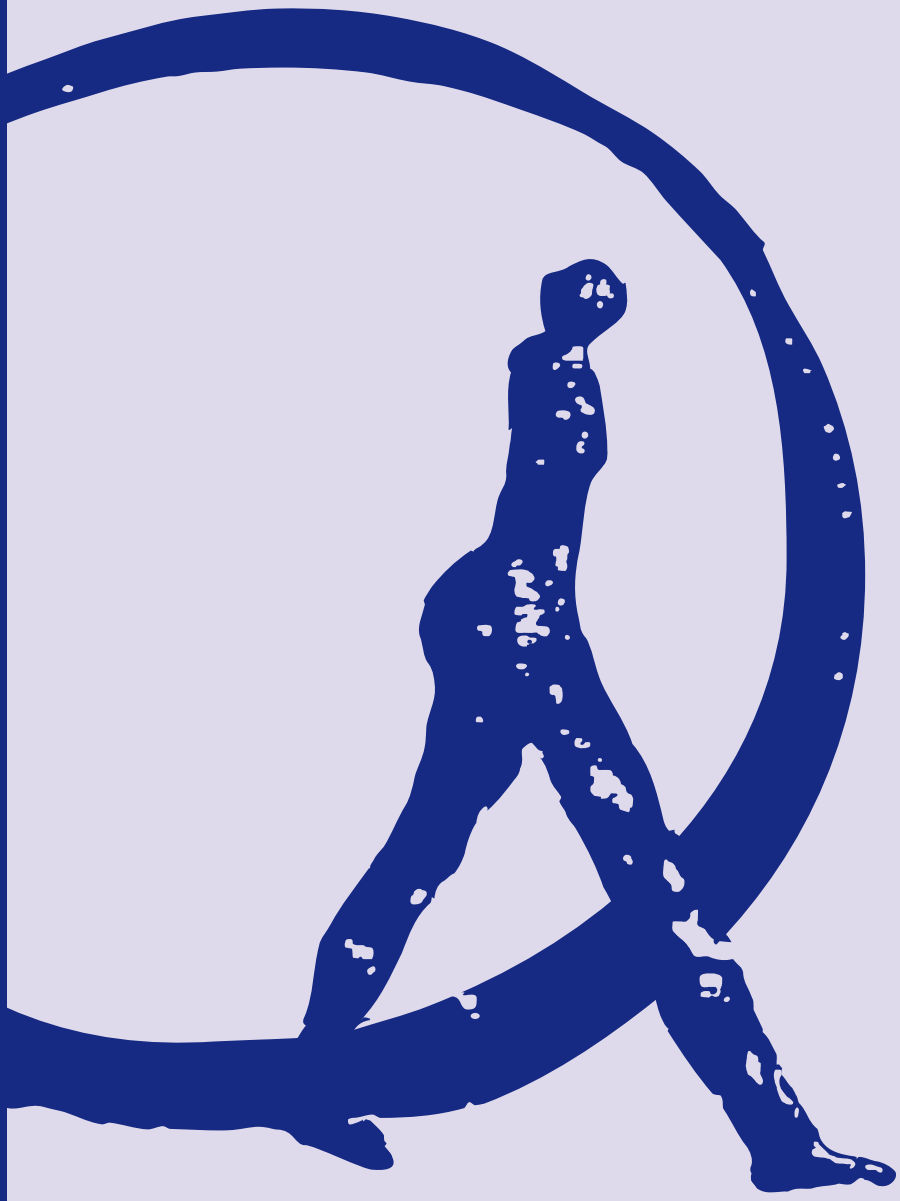
Exhibit 74: **Maturity required of property derivatives—three choices allowed**



It is the one-year maturity that is preferred most often by each type of investor—as few countries can boast direct property indices with higher frequencies, this result hardly comes as a surprise. For real estate specialists, the next two most frequently mentioned are the five-year maturity and the three-year maturity. For pension funds and insurance companies, it is the two- and three-year maturities. Diversified asset managers have a short-term outlook, as their maturities of choice extend to at most one year.[78] These findings are consistent with the assumption that investors put these products to varying uses—that is, that real estate specialists use derivatives for risk management and for the synthetic management of a long-term portfolio of direct holdings, that diversified asset managers use them to enable dynamic investment strategies, and that pension funds and insurance companies would be less discriminate in their use of derivatives.

78 - The average maturity (all investors) preferred by those who responded "other", as well as the most frequently mentioned, was ten years.

Conclusion



Conclusion

Real estate equity investments are an asset class and investors are open to product innovation

Real estate is considered an asset class of its own by both academics and investors. For most, the real estate asset class is made up solely of equity vehicles: direct investment in the underlying asset, stakes in non-listed vehicles, shares in listed property firms. Fewer than one in five of those who respond to our survey exclude listed property firms from the asset class, and more than two-thirds include structured products, index-linked products, and derivatives as part of the class. More than 60% of the real estate specialists surveyed—as opposed to less than 30% of other investors—view real estate debt products as part of the asset class.

Reasons for allocation to real estate: diversification, performance, and hedging

The advantages usually mentioned by those who would invest in real estate are its low volatility, its high adjusted returns, its superiority as a hedge against inflation, its high and stable rent component, and its excellent decorrelation characteristics; only the two latter advantages have been clearly documented by academic research, whereas the usefulness of real estate for hedging inflation risk has been confirmed in the specific context of long-term studies and residential real estate. Diversification of the overall portfolio is, for the investors surveyed, by far the major reason for allocation to the asset class. The draw of high adjusted returns is likewise a common reason for investment. A third reason, much less important, is for use as a shield from inflation. Overall, investors not specialised in real estate express a secondary interest in alpha, but it is likely that in less favourable market conditions this interest would increase substantially.

At 10%, strategic allocations are significant but below those recommended by academic studies

Three-quarters of those responding (not counting real estate specialists) take an approach to real estate investments that views real estate as an asset class of its own; for them, strategic allocation comes to 9.9% of all assets. Mean-variance asset management models recommend allocations of between 15% and 25%. Improved modelling of the distinctive features of the class and of investor constraints, as well as the development of vehicles enabling diversified, liquid, and fine-grained exposure, will help to narrow the gap between the allocations recommended and those actually in use.

The conventional pecking order is maintained; listed and non-listed vehicles for indirect exposure are heavily used

Analysis of vehicles for allocation to real estate confirms the marginal role of debt products, the use of vehicles for equity exposure in accordance with longstanding conventions, and the still limited importance of recent offers for structured products, index-linked products, and derivatives.

Real estate specialists invest three-quarters of their funds directly in the underlying physical asset—double what other investors do. Pension funds and insurance companies follow longstanding conventions in their equity allocations, making these allocations first to direct real estate, then to non-listed vehicles, and finally to listed property firms. Because of the problems of lumpiness and diversification affecting the underlying assets, direct allocation is positively linked to portfolio size. The role of non-listed vehicles as the closest proxies for direct investments is confirmed by the inverse relationship between portfolio size and allocation to non-listed vehicles. Diversified asset managers invest more in listed property companies and in new vehicles than they do in non-listed funds; these preferences are compatible with

Conclusion

dynamic management of real estate exposure founded on liquid, flexible, and low-cost vehicles.

Investors seek absolute returns but use relative return measures as well

When it comes to gauging the performance of real estate investments, four-fifths of real estate specialists and one-half of other investors report that they first set a nominal or real absolute return objective. Nonetheless, more than two-thirds of respondents use relative return approaches as a primary or secondary measure of the performance of their real estate investments.

Specific factors are the primary sources of risk and return in real estate, but property type and geography also play a role

The performance of a real estate investment is linked to factors specific to the property and to the terms under which it is leased as well as to systematic factors that affect yields with a swiftness and intensity that vary depending on property type and on local conditions.

The sources of systematic risk identified in the literature are real growth, employment, interest rates, and inflation rates. The investors surveyed believe that there is a clear positive correlation of real estate returns and GDP growth, a positive correlation with employment and inflation, and—less clearly—a negative correlation with interest rates.

As has been shown by academic studies, the importance of specific risk is greater in real estate than in other asset classes. The investors responding to the survey view idiosyncratic risks as the main forces behind the returns on real estate investments. Non-specialists identify property-type and geographic exposure as significant dimensions of risk as well.

Diversification is deemed the best approach to risk management; it implies intermediation

Diversification appears to be the sole risk management approach appropriate for real estate specialists; for other investors, it is the most useful, ahead of allocation limitations. Risk management with the help of structured products or derivatives is deemed largely irrelevant.

For investors as well as academics, the two major types of diversification are by property type and by geography.

95% diversification of specific risk is most likely impossible through direct investment, as it would require, on average, investing in several hundred properties. This finding supports a vision of direct investment centred on the selection and management of a portfolio of relatively few properties or, for strategies involving diversification, heavy reliance on intermediation.

Index-based solutions show potential as vehicles for investment and diversification

In essence, the major reasons for investment in real estate reveal demand for beta that index-linked products are in a good position to meet. Likewise, the risks identified lend themselves to diversification that index-based solutions would deliver in optimal conditions. For direct real estate, in particular, access to indices would facilitate diversification that would be impossible in the physical market. As passive vehicles, representative of property-type and geographic risks, index-based solutions would be unrivalled strategic allocation vehicles; if these pure beta products were also liquid and had low transaction costs, they would allow the deployment of alpha-generating tactical and arbitrage allocation strategies.

Conclusion

The relative return measures of real estate investments used in the first instance by a third of investors and in the second by two-thirds, as well as the fact that two-thirds of investors believe that an investable European real estate index (or derivative thereof) is the best means of diversifying the portfolio of an institutional investor with a strong home bias, attest to the market potential of these solutions.

Investors are aware of the possible uses of property derivatives, but only one in five has short-term plans to use them

Derivatives of real estate indices allow investors to take or modify positions with potentially greater efficiency—in terms of liquidity, cost, granularity, swiftness, or flexibility—than in the underlying physical market; for direct real estate, then, where benchmark indices are neither investable nor easily replicable, they are particularly interesting. Real estate derivatives can be used for investment and diversification, to take advantage of price differentials between markets and segments, to bet on falling markets, for leverage, and, possibly, for hedging and synthetic portfolio management. Three potential uses are clearly recognised by investors: hedging, synthetic portfolio rebalancing, and synthetic investment. Unfortunately, with direct real estate, hedging and synthetic portfolio rebalancing are only partly efficient, as portfolios, for want of diversification, are but slightly correlated with indices.

81% of the investors responding to the survey have no plans to use real estate derivatives in the near future. Interest in derivatives is less pronounced among real estate specialists, but is greater among those with larger portfolios. The major obstacles to the use of derivatives are a lack of familiarity with the products, the unsuitability of the products, and the investment policies in the respondent organisations.

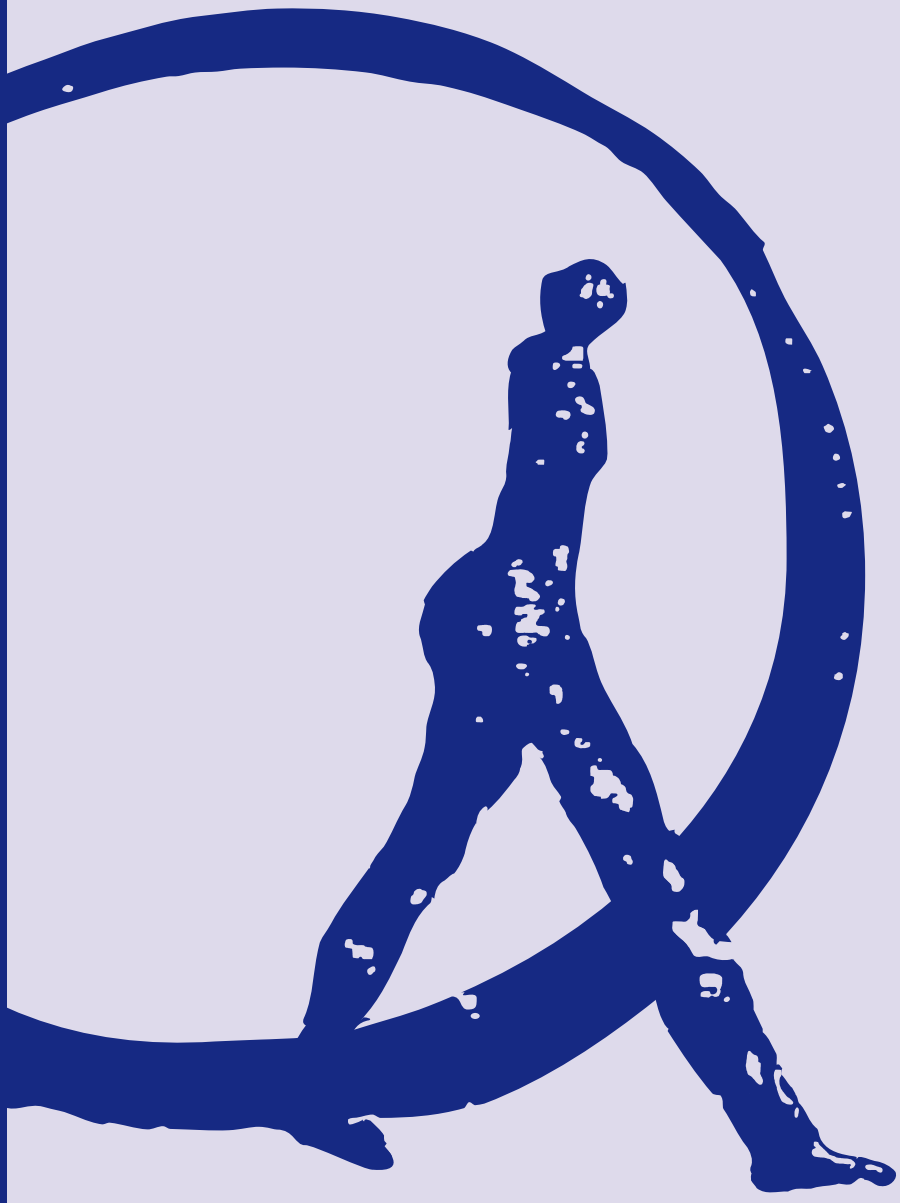
The key success factors of real estate derivatives are index quality and contract liquidity

For investors, the primary demand is for the transparency of the index used as an underlier for derivatives contracts. They also believe that its representativity is very important, somewhat more so than its breadth. They are unanimous in their outright rejection of indices based on surveys of real estate agents and, overall, they express a preference for constant-quality transactions-based indices.

Their primary demand of the market, far ahead of demand for effective hedges, cost reductions, and the presence of a central counterparty to reduce risk, is for contract liquidity.

The ideal real estate derivative is a medium-term and highly liquid forward contract on the total return of a national or international commercial real estate index of all property or of a single property type.

Appendices



Appendices

Appendix 1: **Values of European properties tracked by IPD/KTI**

Country	Number of Assets	Total Capital Value (Million Euros)	Unit Value	Estimated Coverage of IPD Index
Austria	908	7 798	9	36%
Belgium (consultative)	257	5 342	21	18%
Denmark	1 222	12 056	10	40%
Finland (KTI)	2 830	17 116	6	61%
France	7 518	99 558	13	62%
Germany	2 938	53 847	18	21%
Ireland	331	5 820	18	82%
Italy	840	13 763	16	24%
Netherlands	5 369	45 174	8	62%
Norway	497	10 817	22	44%
Portugal	587	7 795	13	53%
Spain	549	15 569	28	53%
Sweden	1 027	21 880	21	34%
Switzerland	3 478	29 350	8	38%
United Kingdom	12 137	284 622	23	55%
Total	40 488	630 507	16	
IPD Eurozone	21 870	266 440	12	
All IPD Europe	40 231	625 165	16	46%

Data for Belgium is not included in these indices.
Figures as of December 2006. Source: IPD (2007a, 2007b)

Appendix 2: **Property type breakdown of IPD/KTI indices – Europe**

Country	Industrial	Retail	Office	Residential	Other Commercial	Other Primary Uses	Mixed Use	Mixed Use: Retail & Office	Other
Austria	0.0%	30.3%	39.1%	10.1%	0.0%	0.0%	0.0%	0.0%	20.5%
Belgium	3.0%	19.1%	71.5%	0.0%	0.0%	0.0%	0.0%	0.0%	6.4%
Denmark	0.0%	14.6%	58.6%	22.9%	3.9%	0.0%	0.0%	0.0%	0.0%
Finland (KTI)	6.5%	17.6%	44.8%	14.9%	0.0%	0.0%	0.0%	0.0%	16.3%
France	7.2%	19.1%	54.1%	15.9%	0.0%	0.0%	0.0%	0.0%	3.7%
Germany	0.0%	14.5%	54.5%	8.3%	0.0%	5.8%	4.5%	11.1%	1.3%
Ireland	8.8%	42.0%	49.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Italy	9.0%	26.4%	54.2%	0.0%	0.0%	0.0%	0.0%	0.0%	10.4%
Netherlands	2.5%	27.9%	23.8%	43.3%	0.0%	0.0%	2.5%	0.0%	0.0%
Norway	0.0%	28.1%	55.8%	1.1%	15.0%	0.0%	0.0%	0.0%	0.0%
Portugal	9.4%	51.3%	24.6%	0.0%	0.0%	0.0%	14.7%	0.0%	0.0%
Spain	5.6%	42.1%	40.9%	8.5%	0.0%	0.0%	0.0%	0.0%	2.9%
Sweden	1.6%	14.6%	70.1%	9.8%	0.0%	0.0%	0.0%	0.0%	3.9%
Switzerland	0.0%	12.4%	22.6%	42.5%	0.0%	0.0%	18.3%	0.0%	4.2%
United Kingdom	14.8%	47.2%	34.6%	0.0%	0.0%	0.0%	0.0%	0.0%	3.4%

Figures as of December 2006. Source: IPD (2007a)

Appendices

Appendix 3: **Estimated size of institutional real estate investment market in countries tracked by IPD/KTI indices – Europe**

Country	EUR bn	Share of total
Austria	22	1.60%
Belgium	30	2.10%
Denmark	30	2.10%
Finland	28	2.00%
France	160	11.50%
Germany	251	18.10%
Ireland	7	0.50%
Italy	58	4.20%
Netherlands	73	5.20%
Norway	24	1.80%
Portugal	15	1.10%
Spain	29	2.10%
Sweden	64	4.60%
Switzerland	78	5.60%
United Kingdom	521	37.50%
	1 389	

Market sizes estimated at end of 2006, Source: IPD (2007a, 2007b)

Appendix 4: **Typology of European private property vehicles – overriding legal structures and characteristics**

	Open or closed	Listed or non-listed	Retail or institutional	Vehicle types
Corporate	Both	Both	Both	Investment companies e.g. Luxembourg SICAFs/SICAVs. Regular companies e.g. Dutch BVs/NVs.
Partnership	Closed	Non-listed	Institutional	Limited partnerships e.g. LP (UK), SC (France), CV (Netherlands).
Contractual	Both	Both	Both	Luxembourg FCPs, Dutch FGRs, UK Managed Funds, German Spezialfonds
Trust	Both	Non-listed	Both	UK Property Unit Trusts

After OPC (2004)

Appendices

Appendix 5: **Distribution and average size of private property vehicles in Europe**

Country	Number of funds	Share	Gross Asset Value (EUR bn)	Share	Average Size (EUR million)
Austria	6	1.2%	1.6	0.5%	267
Denmark	4	0.8%	1.3	0.4%	325
Finland	4	0.8%	0.4	0.1%	100
France	21	4.3%	4.5	1.4%	214
Germany	81	16.7%	114.2	34.8%	1410
Ireland	5	1.0%	3.2	1.0%	640
Italy	25	5.1%	8.1	2.5%	324
Luxembourg	35	7.2%	13.1	4.0%	374
Netherlands	42	8.6%	23.9	7.3%	569
Others	34	7.0%	24.4	7.4%	718
Portugal	24	4.9%	5	1.5%	208
Spain	2	0.4%	2.9	0.9%	1450
Sweden	2	0.4%	0.1	0.0%	50
Switzerland	27	5.6%	16.5	5.0%	611
United Kingdom	174	35.8%	109.5	33.3%	629
	486		328.5		676

Source: INREV database as cited by Brounen, Op't Veld and Raitio (2007)

Appendix 6: **The crisis in the German open funds**

With gross assets of more than €105 billion, the thirty or so open-end real estate funds in Germany make up a very large segment of the non-listed funds in Europe as well as of all open-end funds in Germany (around 20% in 2006 according to BVI).

Public funds *(Publikumsfonds)* have no limits on the number of institutional or individual investors, while special funds *(Spezialfonds)* are only for legal entities and are limited by law to thirty investors.

These funds are contractual—they are not legal entities; the assets and liabilities of the fund are strictly separated from the manager's as well as from those of other funds—a depository institution keeps the fund's assets and manages subscriptions and redemptions. These funds must be managed by an investment management company *(Kapitalanlegegesellschaft* or KaG) accredited by the BaFIN *(Bundesanstalt für Finanzdienstleistungsaufsicht)* which must be a joint-stock or limited-liability company and is typically set up by a bank.

Real estate special funds in Germany have experienced rapid growth since 1995, growth accelerated by the introduction of the Euro, the fall of the stock markets, and regulatory changes that authorised them to invest outside the European Economic Area (as well as in indirect real estate). They are the primary collective investment vehicles for institutional investors and are for these investors alone. The creation, advertising, and management (not subject to BaFIN rules) of these funds benefit from light regulation. They are highly flexible and through their investment committees investors have some rights to control and participation. Special funds are not required to publish a daily NAV or to offer liquidity, so they can be entirely invested in real estate and make full use of leverage. Insurance companies are by far the largest investors in these funds.

Public funds are strictly regulated by the German Investment Companies Act (InvG); they must abide by diversification criteria (15% maximum in one property) and invest 51% of their assets in real estate. What makes them unique is that they offer daily liquidity at NAV, a system that, despite

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the eminently illiquid character of the underlying assets, worked without a major hitch[1] from 1959 until late 2005.[2] To prevent crises, the law requires that public funds hold at least 5% of their assets in cash and that leverage not exceed 50% of the value of real estate assets held. In practice, open funds hold high percentages of their assets in cash, rising from slightly more than 20% to nearly 50%, depending on the year. The law also allows suspension of redemptions for up to two years in the event of a liquidity crisis.

Subscription fees may play a role in limiting arbitrage opportunities. Another stabilising element is the requirement for an independent appraisal of each property on the anniversary of the date of acquisition rather than at a single set date: the impact of changes in the value of the underlying assets is thus spread out over the year, reducing spikes—which may precipitate a rush for the door, if the consensus is that they will be negative—without entirely eliminating arbitrage opportunities. It should be noted that the mere expectation of large numbers of redemptions can set off a crisis, as investors may wonder about the ability of the fund to meet liquidity requirements.

Bannier, Fecht, and Tyrell (2006) note that public funds drew institutional investors en masse after the stock market crash at the start of the decade and that—in an environment of low short-term interest rates—these funds were used as an alternative to money-market funds, as institutional investors were exempted from the subscription fees. This change afforded greater opportunities for arbitrage and led to a reduction in the average length of time for which shares in the fund were held, the consumption of its cash cushion, complications with liquidity transformation, and, finally, a greater likelihood of crisis.

The low returns on German real estate in 2004/2005 caused large capital outflows that forced the banks associated with investment management companies to step in as liquidity providers (DekaBank, HvB, Commerzbank). The crisis was sparked by Deutsche Bank's December 2005 announcement of an unscheduled re-evaluation—downward, in all probability—of its *Grundbesitz Invest* fund. The ensuing flow of withdrawals absorbed most of the fund's liquidity reserves and forced the bank—which did not want to provide liquidity—to suspend transactions until further notice. This announcement triggered a crisis of confidence of unprecedented severity that from December 2005 to February 2006 resulted in the redemption of 10% of the assets under management in the real estate funds sector. Several banks, unlike Deutsche Bank, announced that they would provide liquidity. KanAM, an independent, had no such patrons and had to close its two funds after heavy withdrawals triggered by the publication of a negative (and contested) research note. The Deutsche Bank fund reopened on 1 March at only 2.4% below its last published value; the main KanAM fund reopened on 31 March only to suspend issues of new shares in May as a result of excessive demand.

Redemptions are not the only problems posed by open-end real estate funds: high subscription volumes cause capacity problems—cash reserves may serve as a cushion, but investment restrictions can then force managers to acquire assets with limited potential for value creation; it is likely that the problems in Germany were caused in part by the massive inflows of capital as of 2001. In this respect, KanAM's May 2006 decision was certainly the right one.

1 - In 1993 the AGI no. 1 fund had to be closed and then merged with another fund as a result of excessive redemptions.
2 - According to Bannier, Fecht, and Tyrell (2006), the limits of the system were seen in the Netherlands with the Rodamco crisis in 1990 (the bank was forced to close the fund, then list it on the stock market), in Australia the same year (the government imposed a twelve-month suspension of redemptions on the entire industry and made all funds list on the stock exchange), and in Switzerland in 1991 (rule modification that required twelve-month notice for redemption).

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Appendix 7: **History of REITs in the United States**

REIT precursors

The Massachusetts Trust, the first American form of real estate investment trust, appeared in the nineteenth century. It was a limited liability trust with transferable shares allowing passive investment in real estate. The trust itself was exempt from corporate income tax as long as it distributed its profits; investors on the receiving end of these distributions were exempt from taxation of rents. These exemptions remained in force until 1935. Real estate trusts were then subject to double taxation until 1960, when the law that authorised real estate investment trusts (REITs) established their fiscal transparency.

The first boom and the first bust

In the late 1960's and the early 1970's, spurred by financial institutions, REITs grew uncontrollably and lent excessively to builders and developers—the building boom resulted in mass defaults after the first oil shock.[3] In two years (1973-1974), the capitalisation of REITs fell by 62% and many lending REITs disappeared, but equity REITs survived.[4] 1972 levels of capitalisation were not matched until 1980[5] and lending REITs never recovered their importance. Recovery was slow: in the early 1980's the assets held by REITs amounted to only a third of those that they held at their peak.

The impact of the tax reform act of 1986

For years, REITs limped along in the United States—the tax reform act of 1986 authorised REITs to operate their properties directly, whereas until then they had been confined to a passive role and had to use independent contractors to advise them and to operate their properties, an obligation that led to higher costs and conflicts of interest.

This reform accorded REITs greater autonomy and helped attract real estate developers, who quickly became the main investors in these trusts. That limited partnerships lost their preferential tax treatment, that the refinancing needs of these partnerships were high (many of the loans in the latter half of the 1980's were medium term, and for many partnerships the choice was simple: IPO or bankruptcy), and that the prices of assets were often lower than replacement costs (between 1989 and 1991 the country suffered its worst real estate crisis since the Great Depression) accounted for the development of REITs.

Institutionalisation of the REITs market in the 1990's—"the modern REIT era"

In 1991, the successful IPO of Kimco Realty Corporation (which drew some institutional investors and whose share price, unlike that of most REITs, did not fall below the introduction price) and the capitalisation of $1 billion achieved by New Plan mark the beginning of the return of REITs to the stock market (NAREIT (2005)). According to Rosen (1995), it is the dawn of the "modern REIT era" and the companies listed on the stock market in the first great wave of the 1990's are radically different from older REITs insofar as they have institutional-quality portfolios and large capitalisations (Rosen, Torres, Anderson (2002)).[6]

The new development of REITs was greatly facilitated by the Taubman Centers' 1992 invention of the UPREIT. UPREITs and DOWNREITs enable the owners of real estate to exchange their properties for shares in a partnership controlled by the REIT and to defer payment of capital-gains taxes until the shares in the partnership are transformed into REIT shares or until the assets are transferred.[7]

In 1993, an amendment was made to the rule for the counting of investors (the 5/50 rule) that eliminated a major obstacle to pension fund investment in REITs.[8] The participation of institutional investors in REIT stock market listings grew over the 1990's.[9]

3 - Long-term loans were financed with cheap short-term debt—cheap until the oil shock, that is.
4 - According to Nossiter (1982) cited in Chan, Erickson, and Wang (2002), the total number of REITs fell by half between 1972 and 1982.
5 - Source: NAREIT at http://www.nareit.com/library/industry/marketcap.cfm
6 - Wang, Chan, and Gau (1992) document the negative performance of REIT listings in the 1970's and 1980's. Ling and Ryngaert (1997), by contrast, show that listings in the early 1990's generated positive returns in the short term. These findings are consistent with those of Buttimer, Hyland, and Sanders (2005), who study three waves of stock market listings in the 1980's and 1990's: 1985, 1993-1994, and 1997-1998. In the 1980's, or in 1985, the IPO return is negative but not significant. For the two waves in the 1990's, returns are positive and significant—the annual results for the decade, with the exceptions of 1993, 1994, and 1997, are positive but not significant.
7 - An umbrella partnership REIT has two components: the REIT and the operating partnership. The owners of properties exchange their assets for shares in the operating partnership—this exchange is deemed not subject to taxation under the tax deferral rules spelled out in section 731 of the internal revenue code. The REIT sells its shares and uses the product of the sale to gain control of the operating partnership—it is then called an UPREIT. In an UPREIT, all transactions take place within the operating partnership, but a DOWNREIT, a joint venture between the REIT and the contributing owners, can own shares in several operating partnerships. The number of UPREITs grew rapidly; by late 1999 more than half of listed REITs were UPREITs.

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Chan, Erickson, and Wang (2002) note that another significant change in the early 1990's was the increase in the number of REITs specialised in a particular property type; they believe that specialisation should allow greater management efficiency and profitability.

The real estate investment trust simplification act of 1997 (REITSA) allowed REITs to provide some ancillary services to tenants without running the risk of income re-qualification and it did away with the limit on the share of profits that can be generated by short-term capital gains (previously 30%). It also authorised timber REITs. That same year, the treasury department modified its stance on fiscal agreements and allowed most non-resident investors to qualify for the reduced rate of 15% on REIT ordinary dividends—bilateral agreements had eliminated these withholdings by 2003.

A new wave of REIT listings took place in 1997-1998; institutional investors were active participants.

Recent changes

The REIT modernisation act of 1999 (REITMA) allowed REITs to create taxable REIT subsidiaries (TRS) that could provide tenant services without risking the loss of the tax benefits accorded rents received by REITs—the law does include some limits to ensure that REITs remain focused on owning and managing real estate, but—with respect to the advances of 1997—it also allows a considerable expansion in the array of services REITs can offer.

The REIT improvement act of 2003 (RIA) brought the previously discriminatory treatment of foreign shareholders in line with the treatment of foreign shareholders in other publicly traded U.S. companies and it allowed trusts in violation of REIT rules to correct their mistakes and to pay fines rather than lose their REIT status.

These reforms authorised REITs to have small shares of non-qualifying assets and income (services to tenants, property development, and so on) through taxable subsidiaries. These changes give REITs more flexibility and allow them to meet some of their needs without having to resort to independent contractors.

In 2003, several large 401(k) and 403(b) plans (employer-sponsored individual retirement plans) announced that they would offer the possibility to invest in REITs—for retirement plans, the real estate option has since grown very quickly.

Since the beginning of the decade, the number of listed REITs has been relatively stable,[10] with new IPOs compensating for mergers and acquisitions. As a result of concentration and rising markets, the average capitalisation of REITs has grown significantly, growth that adds to economies of scale (and thus to performance), increases liquidity, and makes REITs more visible to the community of analysts—these factors have contributed to the growing institutionalisation of the market. In mid-2007, there were fourteen REITs in the S&P500 (large caps), fourteen in the S&P400 (mid caps), and sixteen in the S&P600 (small caps).

Recently, going private transactions have accounted for the bulk of mergers and acquisitions activity involving listed REITs —the arguments for these delistings are the same as for those in other industries, but the perception that in the United States REITs are traded at a discount to the value of their assets has played a key role. Arbitrage naturally led to higher share prices for REITs and a reduction of the discount. The pace of mergers and acquisitions and of delisting picked up in 2006, causing the number of listed REITs to fall by nearly 10%.

8 - The rule made it illegal for a majority of the shares (50%) to be in the hands of fewer than five investors. For the purposes of the 5/50 rule, pension funds are counted not as a single investor, but by the number of investors in the pension fund—this major amendment was part of the Omnibus Budget Reconciliation Act.
9 - Ling and Ryngaert (1997) as well as Wang, Erickson, Gau, and Chan (1995) show that the participation of institutional investors and the short-term profitability of REIT listings are correlated. Downs (1998) shows that the change to the 5/50 rule has added value to the industry and that the REITs that attract more institutional investment have better stock market records. Crain, Cudd, and Brown (2000) note that the non-systematic risk listed REITs are subject to decreases—with respect to other forms of risk—as institutional investments increase.
10 - 189 in late 2000 as opposed to 183 in late 2006. In late 2003 there was a low of 173 and in late 2005 a high of 197—source: NAREIT, http://www.nareit.com/library/industry/marketcap.cfm

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Appendix 8: **Main features of REIT regimes in Europe**

	German REIT	French SIIC	Dutch FBI	UK REIT	Italian SIIQ
Legal form	AG (stock corporation) with seat and management in Germany and obligatory listing within EU/EEA.	Any company with a share capital divided into shares. Additional restrictions (not applying to SIIC sub of a SIIC): i) listing in France and ii) minimum share capital of €15 million.	NV, BV (limited liability company) or FGR (mutual fund) or a comparable entity within the EU.	Closed ended company, listed on a "recognised" exchange.	Joint Stock Company (Società per Azioni), listed on Italian stock exchange. Company's name must include the words "Società d'Investimento Immobiliare Quotata". Minimum share capital of €40 million.
Investors' requirements	No investor must hold more than 10% of voting rights. At least 15% of shares must be held by investors who own less than 3% of voting rights.	No investor or affiliated group of investors may own more than 60%. Upon election for SIIC regime 15% of the shares owned by investors with max 2% interest.	Various shareholders' restrictions apply for tax purposes. Simplified restriction apply for listed FBIs.	Must not be a "close" company.	No investor must hold more than 51% of voting rights. At least 35% of shares must be held by investors owning not more than 1% of voting and dividends rights.
Activity test	At least 75% of the assets must comprise real estate which meets the qualifying criteria and at least 75% of gross income must come from letting such real state assets. Prohibition of real estate trading (= turnover of more than 50% of average real estate holdings within a 5 year period).	(French) real estate; non qualifying activities are allowed to a certain extent, however subject to standard CIT rate.	Only passive investments; project development for own portfolio within a taxable FBI subsidiary.	Must have at least 75% of its income and assets in qualifying profit rental business ('PRB'). Development is permitted for investment purposes. Owner occupied property does not count as PRB.	At least 80% of assets and income must be comprised of real estate.
Leverage limits	55% of real estate value.	No specific leverage restrictions (however, regular thin capitalisation restrictions impact level of distribution obligations).	60% of fiscal book value properties; 20% for all other investments.	No restriction, but tax charge if finance cover is less than a ratio of 1.25.	No specific restrictions yet (however limitations may be introduced by regulatory provisions).
Distribution obligation	At least 90% of net annual income. 50% of capital gains included.	85% of the net rental income, 50% of capital gains and 100% of dividends from lower-tier SIIC subsidiaries.	Applicable to full profit; however, capital gains neutralised in tax free reserves.	90% of income profits of PRB (after deducting finance costs and capital allowances). No obligation to distribute capital gains.	At least 85% of income of real estate. Tax exemption for capital gain not (yet) implemented.

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	German REIT	French SIIC	Dutch FBI	UK REIT	Italian SIIQ
Tax treatment fund	Full exemption from corporate income tax as well as local trade tax.	Exempt from CIT with respect to qualifying income; regular CIT treatment with respect to non-qualifying income. Additional 20% levy on distributions to 10% or more exempt/low taxed shareholders.	Corporate income tax at a rate of 0%. Capital gains may be added to a tax free reinvestment reserve.	Qualifying income and gains of PRB (UK and indirectly held non-UK) are tax exempt. Charge on development if sold within a 3 year period. Residual business taxed in usual way. Tax charge in REIT if distribution made to corporate shareholder holding 10% or more.	Exempt from CIT with respect to income derived from rental or leasing activities. Regular CIT treatment with respect to capital gains.
Treaty application	As the G-REIT is subject to corporate income tax (although at a rate of 0%), in general, the G-REIT can make use of bilateral tax treaties.	In general a SIIC can make use of bilateral tax treaties.	As the FBI is subject to corporate income tax (although at a rate of 0%), in general, the FBI can make use of bilateral tax treaties.	Treaties should apply in the usual way, as REIT is taxable.	Whether the treaty relief and the Parent Subsidiary Directive apply is not clear.
Withholding tax treatment	Dividend distributions are subject to 25% withholding tax (reduced to 15 or 10% under tax treaties).	25% to non-resident shareholders and 0% to resident shareholders (see also extra levy above).	Dividend distributions are subject to 15% withholding tax. Distributions from the reinvestment reserve can be made free from dividend withholding tax.	22% withholding, subject to treaty relief.	20% withholding tax on tax-exempt income, can be reduced to 15% at dividends originating from residential building leases. A credit for corporate and business shareholders.
Conversion charge regime	Until December 31, 2009 only 50% of capital gains which are realised through conversion into G-REIT or a transfer of real estate to a G-REIT are taxable ('exit tax privilege'), subject to restrictions.	Latent capital gains are taxed at 16.5% upon election for the regime. Same rate applies to capital gains on sales of properties by standard corporations to SIICs (holding period of 5 years). Reduced rate to sellers extended to December 2008.	No special favourable regime.	Charge of 2% on market value (to allow a step-up in base).	Latent capital gains are taxed at a 20% rate upon selection for the regime. Same rate applies to capital gains realised by corporate shareholders contributing property to SIIQs (three years holding period).

Source: Loyens & Loeff (2007)

Appendix 9: **Unsmoothing appraisal-based indices**

Unsmoothing procedures are rooted in the assumption that appraisals represent moving averages of contemporaneous and lagged information. The extent to which contemporaneous information is impounded into appraisals and the level of seasonality are either posited or estimated empirically, which then allows extraction of the unsmoothed contemporaneous component from reported index values.

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Fisher (2003) presents the Geltner (1993) model as follows. The appraisal value is modelled as a moving average of current and prior information:

$$V_t^* = \alpha V_t + \alpha(1-\alpha)V_{t-1} + \alpha(1-\alpha)^2 V_{t-2} \ldots$$

where V_t^* is the appraised value in period t and V_t is the true value in period t.

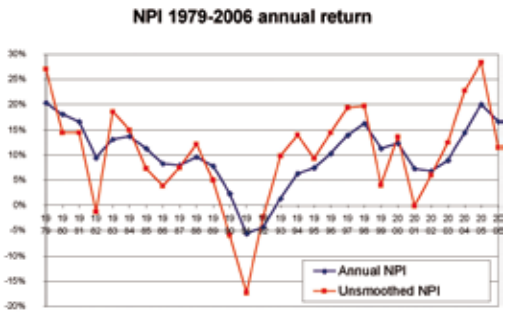
This reduces to $V_t^* = \alpha V_t + (1-\alpha)V_{t-1}^*$ or equivalently, if the objective is to extract the underlying unsmoothed series:

$$V_t = V_t^* / \alpha - (1-\alpha)/\alpha V_{t-1}^*$$

When α = 0.4, as suggested by Geltner, $V_t = 2.5V_t^* - 1.5V_{t-1}^*$

The Geltner model elegantly links the appraisal behaviour at the disaggregate level with its impact at the index level; the above formulae are oversimplifications whose aim is to show how the smoothed data is reverse-engineered.

The figure below illustrates the differences between the annual return on the NCREIF Property Index (NPI) and an unsmoothed series which we generated using the model and estimate suggested by Geltner. The unsmoothed and de-seaonalised indicator appears to lead the NPI and exhibit higher volatility. Over the 1979-2006 period, the annual return is 10.1% and unsmoothing causes volatility to rise from 6.4% to 10%.



Appendix 10: **US transactions-based indices vying to serve as underlying for commercial real estate derivatives**

S&P/GRA SPCREX™ CME derivatives	1. National composite index 2. Four national sector indices 3. Five regional indices Capital return	1-3. Monthly Jan. 1994	Three month **moving average of per square foot transaction prices** (an equally weighted average price is computed for each market; reference year commercial stock-based weightings are used to derive the indices.) GRA collects over 2,500 transactions/month. Index published monthly for preceding three months (rolling window) - estimated three-month lag between transaction and reporting.
Moody's/REAL (formerly MIT/RCA) OTC	1. National composite index 2. Four national sector indices 3. Four sector indices for group of the 10 most active cities 4. Twelve regional sector indices 5. Eight metropolitan composite indices Capital return	1. Monthly 2. Quarterly 3. Quarterly 4. Annual 5. Annual Jan. 2001	**Repeat sales regression**: the index is extracted from price changes across properties for which two or more transactions are observed. RCA endeavours to track all transactions over $2.5m. First index estimate released two months after the closing of the period, final number reported two months later (so as to capture lag between transaction and reporting).
Rexx OTC and ISE derivatives	1. National office index 2. Fifteen metropolitan office indices Total return, rent return, capital return	1-2. Quarterly Q1-1994	**Proprietary model** based on observations of macro (including interest rates and inflation) and micro (including rents, vacancy, and leasing activity) economic market conditions. Rexx uses CBRE Torto Wheaton Research information and proprietary data from minority shareholders Cushman & Wakefield and Newmark Knight Frank. Published in the second month following the end of each quarter.

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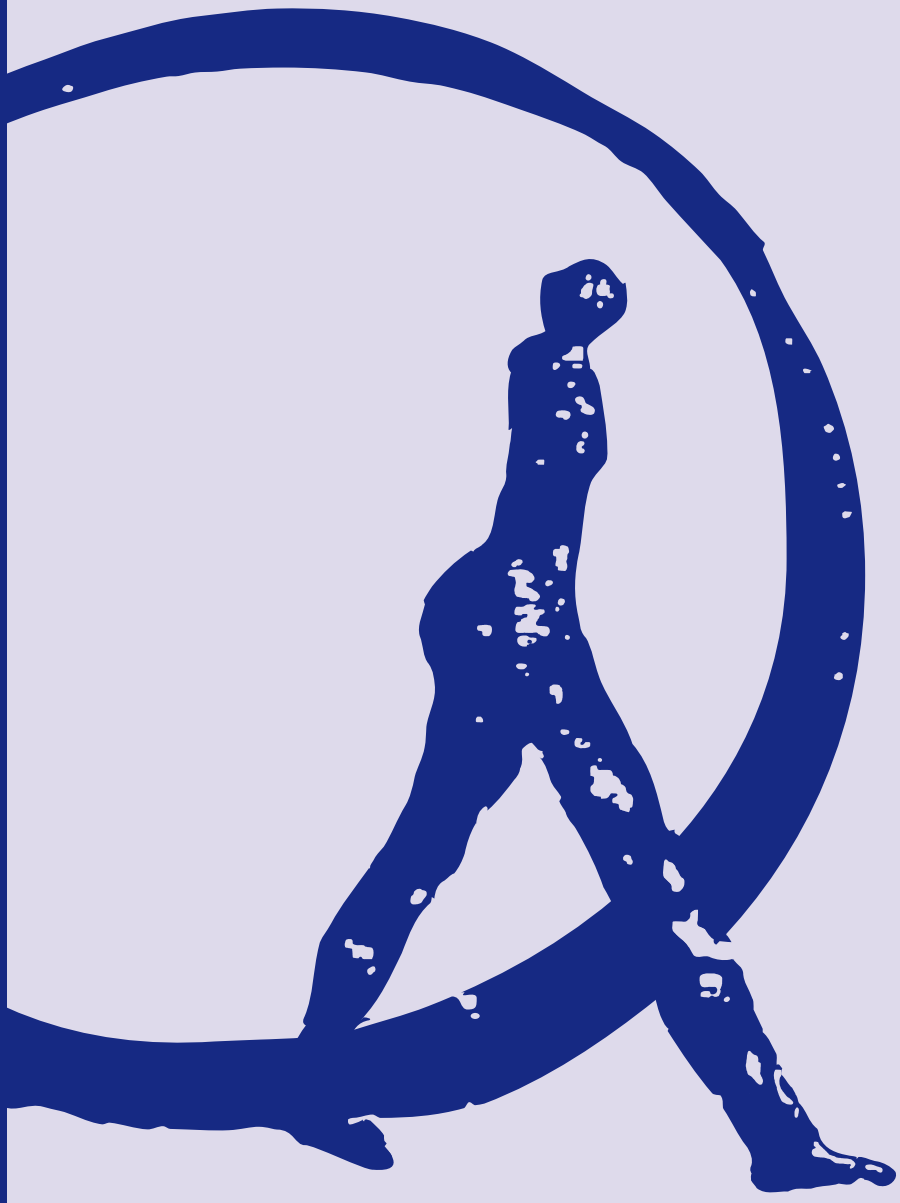

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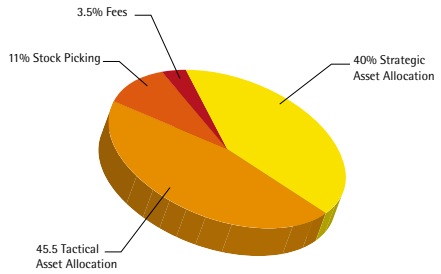
About the EDHEC Risk and Asset Management Research Centre

EDHEC is one of the top five business schools in France and was ranked 7th in the Financial Times Masters in Management Rankings 2006 owing to the high quality of its academic staff (over 100 permanent lecturers from France and abroad) and its privileged relationship with professionals that the school has been developing since it was established in 1906. EDHEC Business School has decided to draw on its extensive knowledge of the professional environment and has therefore concentrated its research on themes that satisfy the needs of professionals. EDHEC is one of the few business schools in Europe to have received the triple international accreditation: AACSB (US-Global), Equis (Europe-Global) and AMBA (UK-Global). EDHEC pursues an active research policy in the field of finance. Its "Risk and Asset Management Research Centre" carries out numerous research programmes in the areas of asset allocation and risk management in both the traditional and alternative investment universes.

The choice of asset allocation

The EDHEC Risk and Asset Management Research Centre structures all of its research work around asset allocation. This issue corresponds to a genuine expectation from the market. On the one hand, the prevailing stock market situation in recent years has shown the limitations of active management based solely on stock picking as a source of performance.

Percentage of variation between funds



Source: EDHEC (2002) and Ibbotson, Kaplan (2000)

On the other, the appearance of new asset classes (hedge funds, private equity), with risk profiles that are very different from those of the traditional investment universe, constitutes a new opportunity in both conceptual and operational terms. This strategic choice is applied to all of the centre's research programmes, whether they involve proposing new methods of strategic allocation, which integrate the alternative class; measuring the performance of funds while taking the tactical allocation dimension of the alphas into account; taking extreme risks into account in the allocation; or studying the usefulness of derivatives in constructing the portfolio.

An applied research approach

In a desire to ensure that the research it carries out is truly applicable in practice, EDHEC has implemented a dual validation system for the work of the EDHEC Risk and Asset Management Research Centre. All research work must be part of a research programme, the relevance and goals of which have been validated from both an academic and a business viewpoint by the centre's advisory board. This board is made up of both internationally recognised researchers and the centre's business partners. The management of the research programmes respects a rigorous validation process, which guarantees both the scientific quality and the operational usefulness of the programmes.

To date, the centre has implemented six research programmes:

Multi-style/multi-class allocation

This research programme has received the support of Misys Asset Management Systems, SG Asset Management and FIMAT. The research carried out focuses on the benefits, risks and integration methods of the alternative class in asset allocation. From that perspective, EDHEC is making a significant contribution to the research conducted in the area of multi-style/multi-class portfolio construction.

Performance and style analysis

The scientific goal of the research is to adapt the portfolio performance and style analysis models and methods to tactical allocation. The results of the research carried out by EDHEC thereby allow portfolio alphas to be measured not only for stock picking but also for style timing. This programme is part of a business partnership with the firm EuroPerformance (part of the Fininfo group).

Indices and benchmarking

EDHEC carries out analyses of the quality of indices and the criteria for choosing indices for institutional investors. EDHEC also proposes an original proprietary style index construction methodology for both the traditional and alternative universes. These indices are intended to be a response to the critiques relating to the lack of representativity of the style indices that are available on the market. EDHEC was the first to launch composite hedge fund strategy indices as early as 2003. The indices and

About the EDHEC Risk and Asset Management Research Centre

benchmarking research programme is supported by AF2I, Euronext, BGI, BNP Paribas Asset Management and UBS Global Asset Management.

Best Execution and Operational Performance
This research programme deals with two topics: best execution and, more generally, the issue of operational risk. The goal of the research programme is to develop a complete framework for measuring transaction costs: EBEX ("Estimated Best Execution") but also to develop the existing framework for specific situations (constrained orders, listed derivatives, etc.). Research will also focus on risk-adjusted performance measurement of execution strategies, analysis of market impact and opportunity costs on listed derivatives order books, impact of explicit and implicit transaction costs on portfolio performances and the impact of market fragmentation resulting from MiFID on the quality of execution in European listed securities markets.

Asset allocation and derivative instruments
This research programme focuses on the usefulness of employing derivative instruments in the area of portfolio construction, whether it involves implementing active portfolio allocation or replicating indices. "Passive" replication of "active" hedge fund indices through portfolios of derivative instruments is a key area in the research carried out by EDHEC. This programme is supported by Eurex and Lyxor.

ALM and asset management
This programme concentrates on the application of recent research in the area of asset-liability management for pension plans and insurance companies. The research centre is working on the idea that improving asset management techniques and particularly strategic allocation techniques has a positive impact on the performance of Asset-Liability Management programmes. The programme includes research on the benefits of alternative investments, such as hedge funds, in long-term portfolio management. Particular attention is given to the institutional context of ALM and notably the integration of the impact of the IFRS standards and the Solvency II directive project. This programme is sponsored by AXA IM.

Research for business

To optimise exchanges between the academic and business worlds, the EDHEC Risk and Asset Management Research Centre maintains a website devoted to asset management research for the industry: www.edhec-risk.com, circulates a monthly newsletter to over 125,000 practitioners, conducts regular industry surveys and consultations, and organises annual conferences for the benefit of institutional investors and asset managers. The centre's activities have also given rise to the business offshoots EDHEC Investment Research and EDHEC Asset Management Education.

EDHEC Investment Research supports institutional investors and asset managers in the implementation of the centre's research results and proposes asset allocation services in the context of a 'core-satellite' approach encompassing alternative investments.

EDHEC Asset Management Education helps investment professionals to upgrade their skills with advanced risk and asset management training across traditional and alternative classes.

About the EDHEC Risk and Asset Management Research Centre

Industry surveys: comparing research advances with industry best practices

EDHEC regularly conducts surveys on the state of the European asset management industry. These specifically look at the application of recent research advances within investment management companies and at best practices in the industry. Survey results receive considerable attention from professionals and are extensively reported by the international financial media.



Recent industry surveys conducted by the EDHEC Risk and Asset Management Research Centre

1/ The EDHEC European ETF Survey 2006 sponsored by iShares

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The business partnership between France's leading fund rating agency and the EDHEC Risk and Asset Management Research Centre led to the 2004 launch of the EuroPerformance-EDHEC Style Ratings, a free rating service for funds distributed in Europe which addresses market demand by delivering a true picture of the alphas, accounting for potential extreme loss, and measuring performance persistence.
The risk-adjusted performance of individual funds is used to build the Alpha League Table, the first ranking of European asset management companies based on their ability to deliver value on their equity management.
www.stylerating.com

EDHEC-Risk website

The EDHEC Risk and Asset Management Research Centre's website puts EDHEC's analyses and expertise in the field of asset management and ALM at the disposal of professionals. The site examines the latest academic research from a business perspective, and provides a critical look at the most recent industry news.
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