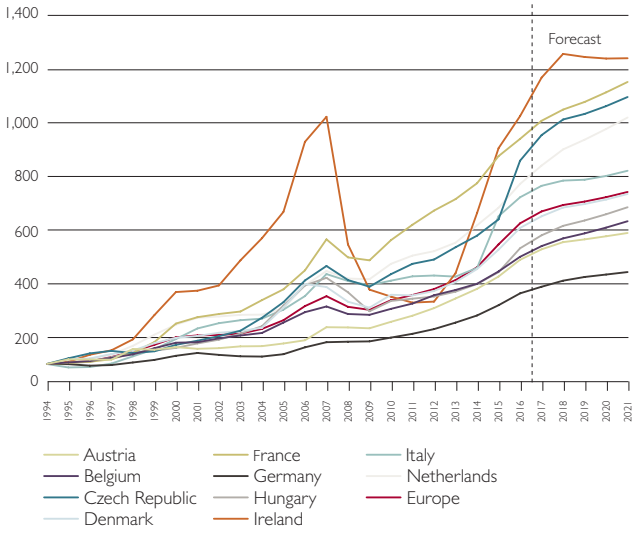
Commercial Real Estate Investments in Europe – Risk Evaluation in Times of Boom and Uncertainty

The risk behind risk

WIn a real estate-specific context, the primary focus is on yields, while risks are typically neglected. A tendency to dismiss risks may be a workable risk prevention strategy, but it cannot be called an effective one. And yet this approach is deeply ingrained in human nature. We ignore risks that are wholly evident simply because we have become used to their existence – until things spiral out of control.

In the real estate fund industry, at least, the guiding principle is often "don't put all your eggs in one basket". Volatility is increasingly also being used as a key indicator when evaluating the risk involved in an investment, although by no means across the board. In any case, a more detailed analysis of the distribution parameters is often disregarded as unnecessary. With last year's Market Tracker on the subject of yield and risk analysis (November 2016), we sought to increase awareness of unlikely events and concentrated on distribution analysis for total returns. In particular, we established that traditional normal distribution assumptions only rarely allow an adequate description of the empirical yield distribution for real estate investments. This analysis adopts a more pronounced focus on key indicators. We will also calculate model yields and endeavour to check the derived risk premiums for plausibility.

FIG. 1: TOTAL RETURN INDEX DEVELOPMENT (AGGREGATED COUNTRY LEVEL; 1994-2021)



Source: Property Market Analysis (PMA)
Calculation & Description: Catella Research 2017

From a model to key figures

Catella Research has developed a European commercial real estate portfolio based on 28 major European cities and the use types of office and retail.

In a global context, there is no doubt that the European commercial market currently offers an extremely good basis for long-term yield generation, as clearly illustrated by the total return indices for the individual markets and the total return index for the portfolio as a whole. At a national level, office and retail are equally weighted. The size of the respective sub-markets was taken into account in constructing the European index.

A model-based European real estate portfolio of this nature delivers an average total return – the central first moment of the yield distribution – of 7.95 %. Historically speaking, the most notable outperformers are Dublin (12.1 %), Lyon (10.4 %), Stockholm (10.2 %), Paris (9.9 %), Barcelona (9.8 %) and Marseilles (9.8 %).

The bottom six performers include five German cities: Frankfurt (5.6 %), Hamburg (5.6 %), Cologne (5.7 %), Berlin (5.8 %) and Munich (6.5 %). The sextet is completed by Helsinki with a historical annual total return of 5.9 %.

However, anyone without the staying power to ride out downturns in the market could easily end up disappointed. When analysing average volatility or standard deviation – the second central moment of the distribution – it becomes clear that yield and risk are two sides of the same coin and that they mirror each other. The lowest levels of relative volatility are recorded by the aforementioned underperformers, namely the German cities (Cologne: 5.0 %, Hamburg: 5.7 %, Frankfurt: 6.8 %, Munich: 7.1 %) and Helsinki (6.2 %).

Logically enough, three of the five riskiest cities are found among the top five outperformers, these being Dublin (21.2 %) and the metropolises of Barcelona (12.9 %) and Paris (12.1 %).

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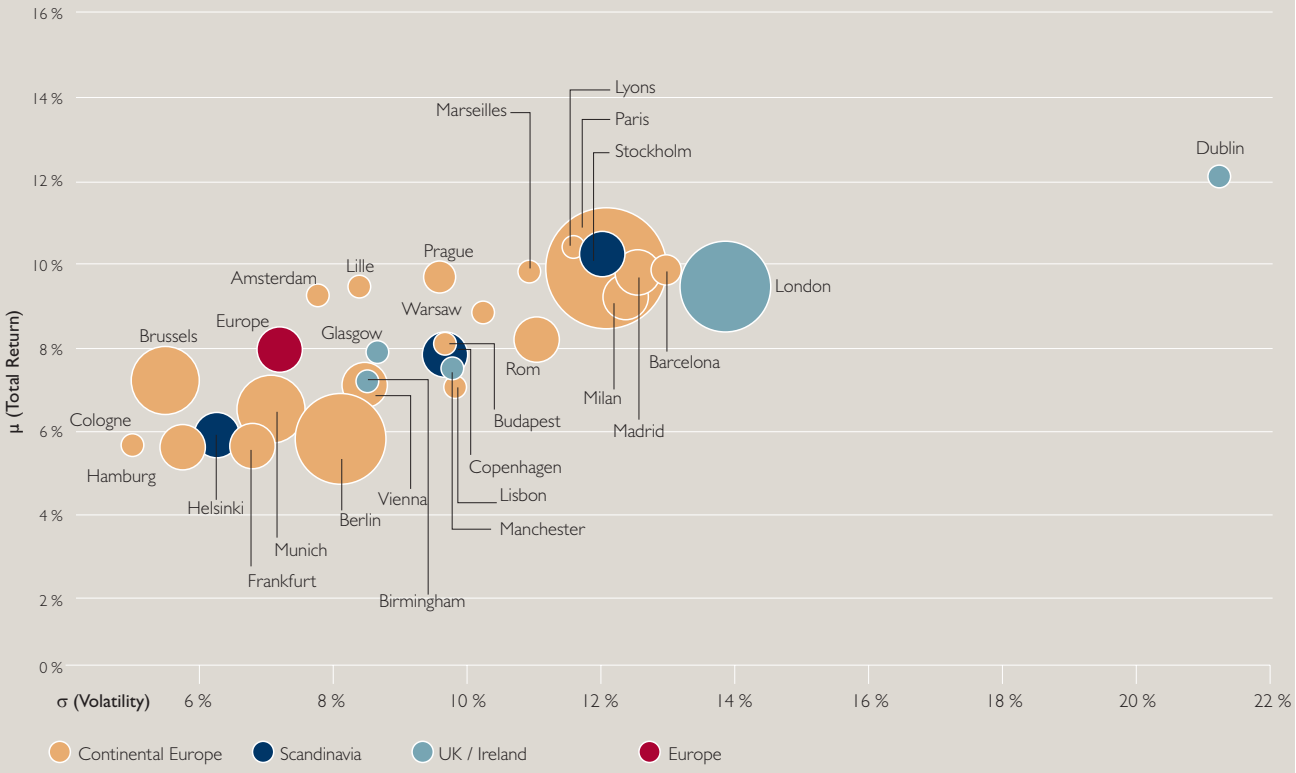
FIG. 2: RETURN-RISK-PROFILE OF COMMERCIAL PROPERTY INVESTMENT MARKETS

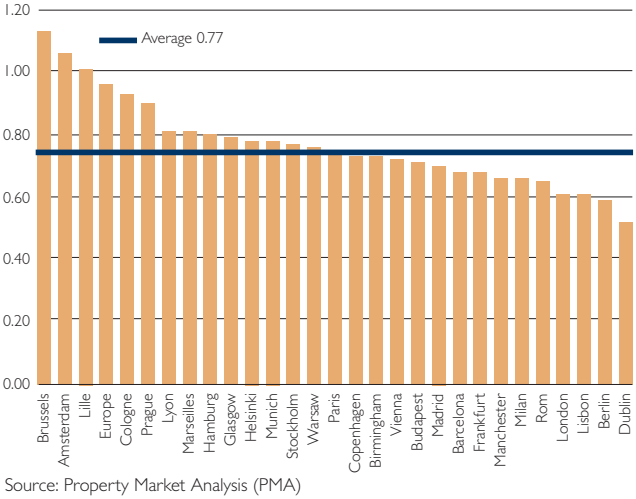


The size of each bubble symbolizes the volume of each market.

Source: Catella Research 2017

As a result, it comes as no great surprise that the **Sharpe ratio** – a measure developed by Nobel Prize winner William F. Sharpe (1966) that takes into account both value development and the intensity of volatility – generates a different attractiveness ranking for the cities analysed. The supposed outperformer, Dublin (0.52), is joined by Berlin (0.59) and Lisbon (0.61) in the lowest three positions, while the strongest values are attributable to Brussels (1.13), Amsterdam (1.06) and Lille (1.01). Most notably, a mixed-risk real estate portfolio also proves to be an extremely strong performer (Sharpe ratio of 0.96).

FIG. 3: SHARPE RATIO OF EUROPEAN PROPERTY INVESTMENT MARKETS



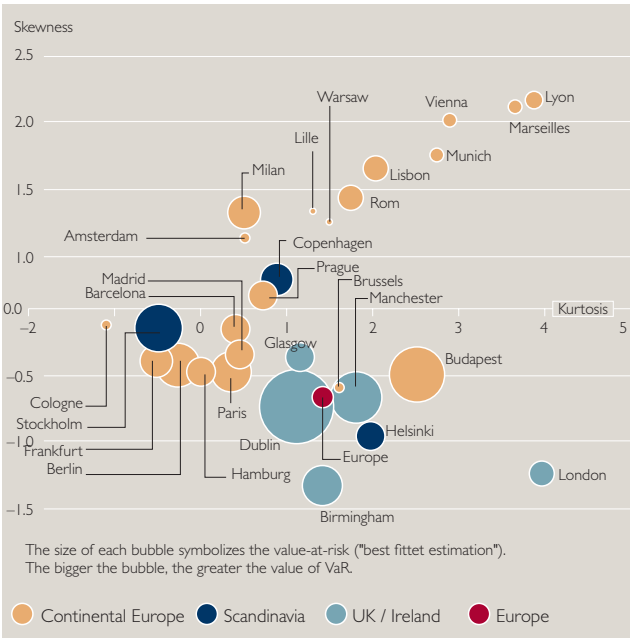
Source: Property Market Analysis (PMA)
Calculation & Description: Catella Research 2017

Risk is the possibility or probability of an undesirable occurrence, such as damage or loss, taking place. According to the capital market theorist Frank Knight (1921), risks can be measured using empirical methods that focus on the probability distribution for the occurrence of a specific phenomenon. However, using volatility – the second moment of distribution – is no longer an adequate means of describing a risk. The third and fourth moments and risk parameters such as VaR (value at risk), which utilise explicit distribution assumptions, must also be included in any analysis.

In most risk models, constructing **VaR** is based on the normal distribution, which in turn is characterised by the fact that the values for skewness (third central moment) and excess (fourth central moment) are both zero. Excess in particular is subject to considerable variation. This component serves to quantify the extent of the fat tails.

The average location for commercial real estate investments has a kurtosis of 1.4 and hence an excess of –1.6. This kind of negative excess is typical of a (platykurtic) distribution with smaller fat tails than the normal distribution. However, this is not true for every real estate location. The cities of London (1.05), Lyon (0.96) and Marseilles (0.74) in particular have a positive excess, meaning they have more pronounced fat tails than the normal distribution. At –3.99, Cologne has the lowest excess and the most slender tails.

FIG.4: ALLOCATION OF TOTAL-RETURN TIME SERIES (SKEWNESS, KURTOSIS AND VALUE-AT-RISK WITH "BEST FITTET ESTIMATION")

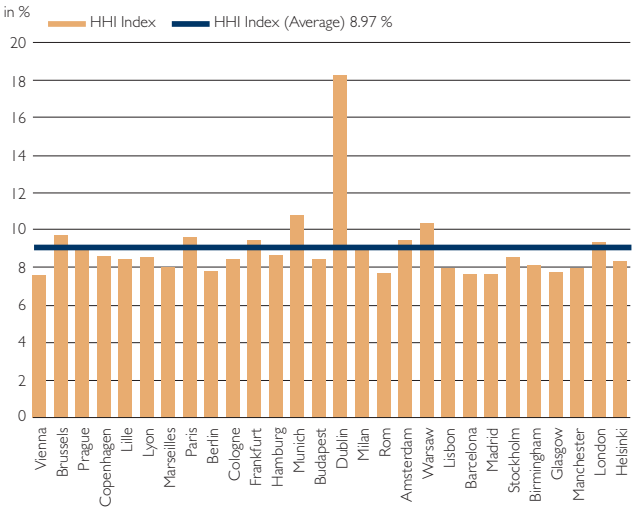


Source: Property Market Analysis (PMA)
Calculation & Description: Catella Research 2017

Catella Research estimated VaR for the 28 investment locations in question based on the normal distribution as well as the "best fitted estimation". The results show that, in 65 % of cases, the estimates using the normal distribution exaggerated the real VaR by an average of 390 basis points in absolute terms. Real estate tails are evidently a great deal more slender than corporate equity tails.

The biggest risks of loss in the context of distribution-free VaR are recorded by Dublin (–31 % total return), Budapest (–13 %), London (–12 %), Stockholm (–11 %) and Berlin (–10 %). At the other end of the scale, Lille (0.0 %), Brussels (–1 %), Cologne (–1%) and Amsterdam (–1 %) have an extremely low risk of loss.

FIG. 5: HERFINDAHL-HIRSCHMAN-INDEX

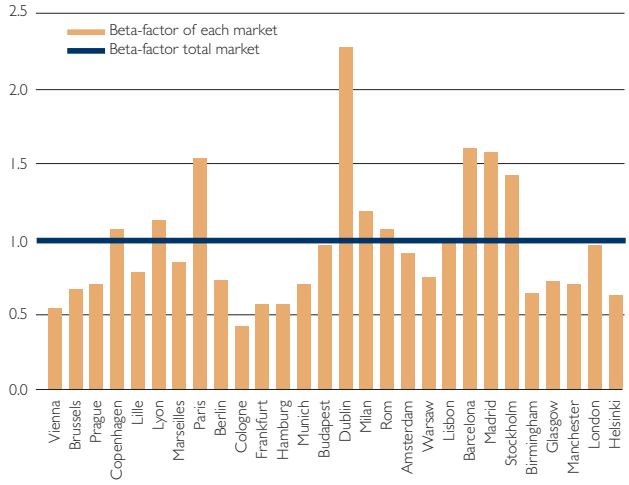


Source: Oxford Economics
Calculation & Description: Catella Research 2017

The **Herfindahl-Hirschman index** (HHI) – a measure of market concentration that is a relic of industrial economics – can also be applied in unconventional risk qualification. The lower the HHI, the higher the sector diversification of a location. This kind of diversification is important as it makes a location more robust. The size of the locations analysed means that most of them enjoy sufficient diversification. Only Dublin has a significantly higher concentration with an HHI of 18.26 %. This is because the manufacturing industry accounts for 35.9 % of the total sector distribution – the highest figure for a single sector within all of the cities analysed. For comparison, Munich is the city with the next-largest manufacturing industry in terms of market share.

In portfolio theory, the beta factor is the central parameter for comparing real estate locations. The **beta factor** measures the intensity of volatility in an individual market compared with the market as a whole. A beta factor of over "1" indicates that the risk of an investment is greater than the risk of the market. A beta factor of below "1" implies that the risk of an investment is lower than the risk of the market. Logically enough, a beta factor of "1" means the investment risk and market risk are identical.

FIG. 6: COMPARISON OF BETA-FACTORS FOR THE INVESTMENT UNIVERSE



Source: Property Market Analysis (PMA)
Calculation & Description: Catella Research 2017

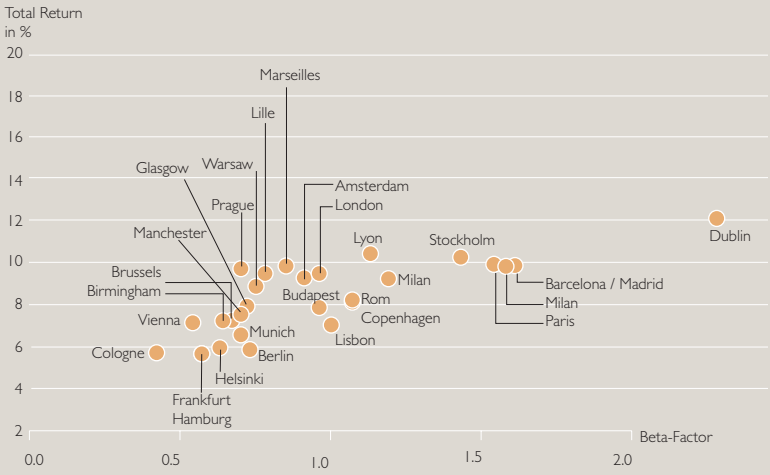
In terms of the locations analysed, Dublin (2.28), Barcelona (1.61), Paris (1.54), Milan (1.19), Rome (1.07) and Copenhagen (1.07) have a significantly higher risk than the market as a whole. The figures for the five German markets are relatively low, coming in at an average of 0.6, which makes them a stable investment at least in terms of their beta factor.

A higher risk than the market as a whole is no reason not to invest in a market per se, as long as the increased risk is accompanied by a higher yield. This inevitably means that the correct pricing of a market becomes a key factor.

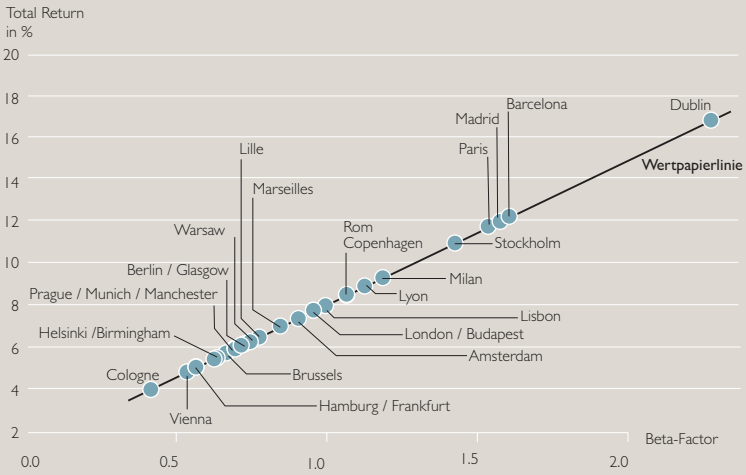
FIG 7: RETURN-RISK-PROFILE – MODEL-BASED DESIGN (BLUE) WITHOUT THE REAL ESTATE RELEVANT RISK PREMIUM* VS EMPIRICAL YIELDS (ORANGE)

*The risk premium constitutes an up- and downstroke for the trasparency and liquidity of each market. Currency risk is also taken into account for the risk premium.

Empirical results



Model-based results



Source: Catella Research 2017

Correct, i.e. fair, pricing can be determined with the help of the **capital asset pricing model** (CAPM). The central element of the CAPM is the security market line, which is a linear function of the individual beta factor. This line plots all of the model yields constructed using the CAPM valuation formula. Catella Research compares these model yields with the actual yields achievable on the market.

Looking at the total return analysis, it is relatively easy to see that the empirical yields are mostly higher than the model-based total returns. This is the case for almost 65% of the cities in our analysis. This comes as no great surprise, since the positive deviations represent an additional risk premium that reflects the liquidity and transparency of a market. These premiums are the real estate-specific components that must be taken into account alongside volatility when calculating yields. In addition, we adopt the perspective of an investor domiciled in a eurozone country, so the potential foreign currency risk must also be taken into consideration.

Catella Research endeavours to continuously check the plausibility of these risk premiums in order to establish whether the pricing for a specific market is correct or not in a European context. **Jensen's Performance Index** – also known as Jensen's alpha – measures the difference between the actual yield and the theoretical expected yield based on the CAPM assuming identical risk, meaning it represents the de facto risk premium. The median for Jensen's alpha is 64 basis points, thus postulating a positive risk premium. The highest level is recorded by Prague at 380 basis points. This means an investment in the Prague commercial real estate market should have generated a total return of 5.89 % on account of the intensity of volatility. However, the actual annual return was 9.69 %. Meanwhile, a small number of cities have a negative Jensen's alpha, including Dublin (–4.7 %), Barcelona (–2.36 %), Madrid (–2.16 %) and Paris (1.82 %).

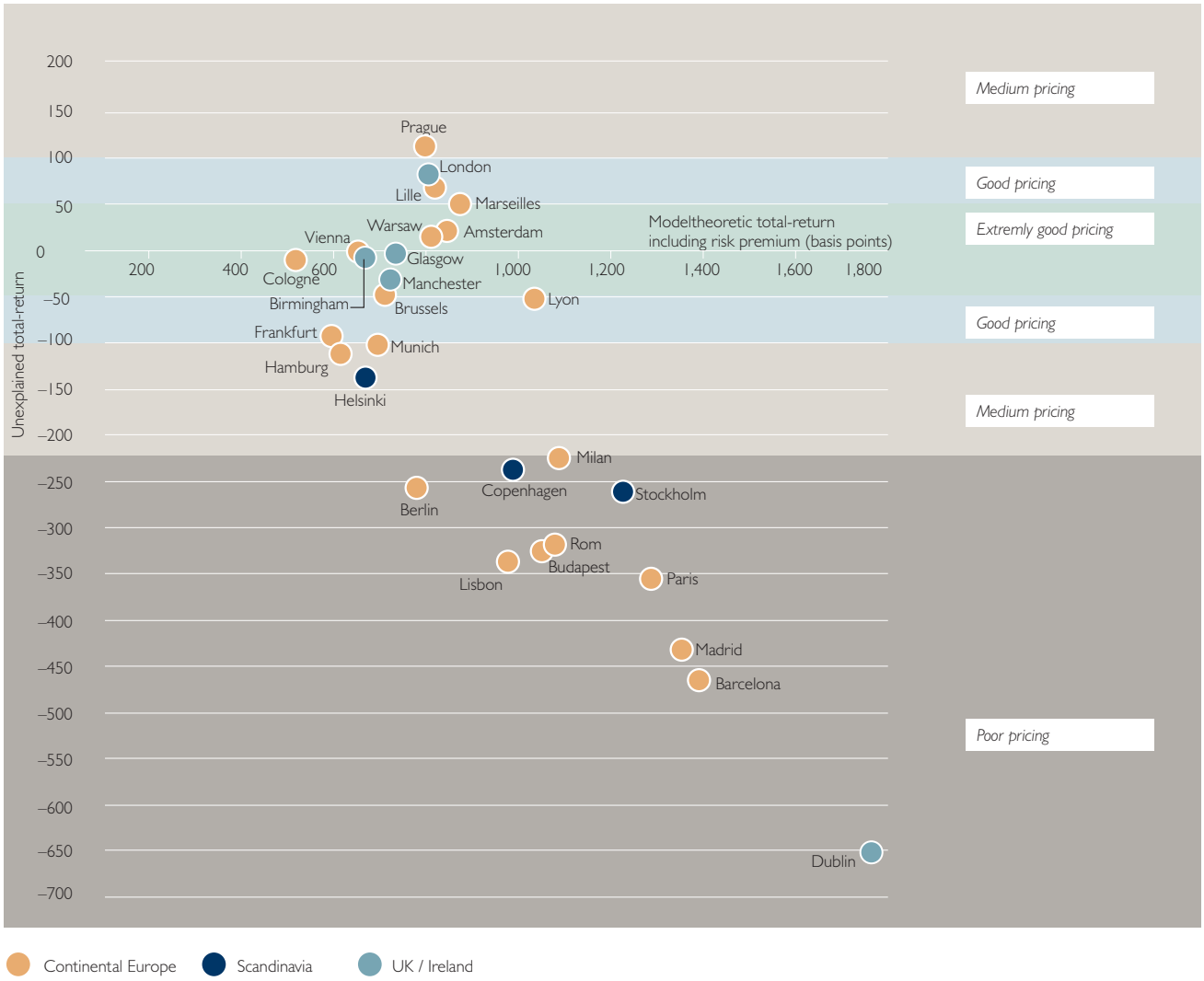
From key figures to an investment recommendation

In terms of risk premiums, Catella Research estimates that a liquidity premium of 132 basis points is required to be paid on average, while the premium for market transparency comes in at 71 basis points. The foreign currency premium can be as much as 100 basis points. Catella Research calculates this risk premium for each location and compares it with the empirical risk premium achievable on the market (Jensen's Performance Index). The difference between the empirical risk premium and the model-based risk premium is the unexplained return.

Catella Research applies four different categories when interpreting unexplained returns:

- "**Extremely good pricing**": Unexplained return of up to 50 basis points (bp) for the total return
- "**Good pricing**": Unexplained return of up to 100 basis points for the total return
- "**Medium pricing**": Unexplained return of up to 200 basis points for the total return
- "**Poor pricing**": Unexplained return of over 200 basis points for the total return

FIG. 8: CLASSIFICATION OF UNEXPLAINED TOTAL-RETURNS



Source: Property Market Analysis (PMA)
Calculation & Description: Catella Research 2017

Nine investment locations are allocated to the "**extremely good pricing**" category. The lowest unexplained returns, i.e. the lowest deviations between the empirical yield and the model yield (including all model-based risk premiums), are recorded by the investment locations of Vienna (–1.3 basis points), Glasgow (–3.5), Birmingham (–7.9), Cologne (–10.4) and Amsterdam (+21.1).

Lyon (–52.3), Lille (+68.0) and Frankfurt (–92.7) fall within the "**good pricing**" category. All in all, this means 13 locations are well or extremely well priced, corresponding to almost 47 % of the cities analysed. The German cities of Hamburg and Munich fall within the "**medium pricing**" category with an average deviation, i.e. unexplained return, of –107.1 basis points.

Model-based pricing proves to be ineffective for 39 % of the locations included in our analysis. These eleven cities have a clearly negative average risk premium of –351.4 basis points and hence are allocated to the "poor pricing" category.

Looking at the efficient market theory and the three-level concept of informational efficiency developed by the American economist Eugene F. Fama, which describes the generation of above-market returns in behavioural finance theory using information evaluation as a tool, it is clear that not even the first level of weak information efficiency is satisfied in full. Accordingly, the evaluation of historical time series can be used to generate excess yields because this information is not applied in market pricing, or at least is not applied in full. Above all, investors should be aware that major European cities in particular often offer low or even negative excess yields that are not sufficient to cover the risks in the form of model-based risk premiums.

For example, an investment in the Paris commercial real estate market promises a historical empirical total return of 9.9 %. The CAPM promises a total return of 11.72 %. An additional 174 basis points are estimated for liquidity and transparency risk. The inves-

tor selects the 9.9 % total return even though the risk of investing in the Paris market should actually be reflected in a total return of 13.45 %. In other words, the risk premium (= unexplained return) for Paris amounts to –355 basis points. We define this as "poor pricing". In addition to Paris, it affects other major locations such as Berlin (–257), Rome (–318), Barcelona (–465) and Madrid (–432 bp). This phenomenon can be explained by reference to risk theory. The risk premium corresponds to the expected sum of (CAPM yield + risk premium for market liquidity and transparency) less the individual certainty equivalent. In simplified terms, the individual certainty equivalent can be defined as the utility to an investor of investing in an asset. To result in a negative risk premium, the individual utility would have to exceed the model-based risk premium. This would mean risk affinity and a concvex utility function for the investor. However, this contradicts our premise of a risk-averse investor, making an investment in the market irrational.

Summary

Large-scale investors still believe that major cities in particular are a "must-have" investment that ought to account for a substantial proportion of their portfolio. With a view to traditional risk theory and the current conditions on the market, however, this maxim should be viewed with a certain degree of scepticism. Such investment decisions are often more about prestige than risk-efficient investing.

EXPLANATIONS

TOTAL RETURN
The overall yield generated by an investment. The total return includes increases in value and rental income and distributions over a specific period of time. The total return as an expected value is the first central moment of a distribution. It is presented net of leverage.

VOLATILITY
Volatility is defined as the standard deviation of the changes (including yields/returns) in the parameter being analysed and is frequently used as a risk measure.

SHARPE RATIO
The Sharpe ratio is a risk-reward indicator that reflects the excess yield, i.e. the return on an investment above the risk-free interest rate, depending on the respective risk.

SKEWNESS
Skewness measures the symmetry of a distribution. As the normal distribution is symmetrical, the Gaussian bell curve has a skewness of zero.

KURTOSIS & EXCESS
Kurtosis indicates how much a distribution deviates from the shape of a normal distribution. It shows how pointed a curve is. Excess is one of the central moments of a distribution and is used to define the shape of the curve. An excess of zero results in a curve with a normal peak (mesokurtic).

VALUE AT RISK (VAR)
The value at risk is the absolute loss in value of a risk position defined by a company that will not be exceeded at a previously defined probability (confidence level). The loss can be represented as an absolute figure in a specific currency or as a yield.

Catella Research's methodology for estimating VaR:
Catella Research uses two different methods for estimating VaR, both of which are based on a 95% confidence interval. The first approach models the yields of a VaR estimation sample based exclusively on the normal distribution. The second approach ("best fitted estimation") uses the normal distribution as well as five other distributions (Laplace, log-normal, exponential, inverse Gaussian and Weibull) for modelling yields.

Source: Catella Research 2017

HERFINDAHL-HIRSCHMAN INDEX (HHI)
The Herfindahl-Hirschman index, also known as the Hirschman index or HHI, is a key indicator that is frequently used to measure concentration. It is named after Orris Clemens Herfindahl (1918 – 1972) and Albert O. Hirschman (1915 – 2012). The Herfindahl-Hirschman index is calculated by allocating objects across several groups. The Herfindahl-Hirschman index is the total of the squared market share of each object. The normalised HHI can attain values of up to "1".

BETA FACTOR
The beta factor (ß) is a key indicator for the systematic risk assumed along with an investment or financing measure (also known as market risk). Mathematically speaking, the ß factor expresses the division of covariance between the expected yield from an individual investment and the expected market portfolio yield and the variance of the market portfolio. This benchmark assessment model is a central element of the capital asset pricing model (CAPM), an augmentation of Markowitz's portfolio theory that explains how the risk associated with market investment options can be evaluated.

CAPITAL ASSET PRICING MODEL (CAPM)
The CAPM is a capital market equilibrium model that expands portfolio theory to include the question of what portion of the total risk of an investment location cannot be diversified and explains how the risk associated with investment options on the capital markets can be evaluated.
The core of the CAPM, the security market line model, describes the linear dependency between the expected yield on an investment and a single risk parameter (single-factor model).