Real Estate profitability in three European cities

A quantitative study of risk adjusted returns from real estate investments

Authors: Johan Hagängen, Yashar Najafzadeh

Supervisor: Tor Brunzell
Abstract

This is a study of the profitability of three European real estate markets. The returns from real estate investments in Stockholm, London and Paris are compared on a risk-adjusted basis. The study takes the perspective of a corporate real estate investor, an investment bank, insurance company or other actor who wishes to invest in real estate.

Real estate consists of land and any buildings or improvements located on the land. The real estate market has a few characteristics that differentiate it from other markets. The planning and construction of buildings is a time consuming process. This makes the supply of real estate slow moving and unable to quickly adjust to changes in demand. Because of real estate’s importance for the economy at large and for society, the real estate markets of most nations are highly regulated by governments. Real estate investments are mostly long term and extensive use of debt is common. The real estate market has a business cycle of its own. These characteristics give rise to numerous investment opportunities for the well-informed investor.

The time frame of this study is 20 years in order to cover several business cycles. The source of data is the Investment Property Databank (IPD). The results show that Stockholm is the high-risk alternative and Paris is the low-risk alternative of the three markets in the study. The total return consists of income return and capital growth. The average annual returns ranged from 7.5% in Paris to 11.2% in Stockholm. By including debt the returns of Stockholm and London could be leveraged to approximately 20% per year. Use of debt can also destroy value when the cost of capital exceeds the return on the investment, as would be the case for Paris. No significant correlation between the returns of London and Paris was found, while the returns of Stockholm and London was highly correlated. The risk adjusted returns of the three markets as measured by the Sharpe ratio show that Stockholm is the most profitable market, closely followed by London and Paris being the least profitable market.
Table of contents

1. Introduction ..................................................................................................................4
  1.1 Background...............................................................................................................4
  1.2 Research Question ....................................................................................................4
  1.3 Purpose .....................................................................................................................5
  1.4 Constraints ................................................................................................................5
  1.5 Structure of the thesis ..............................................................................................5

2. Methodology ..............................................................................................................6
  2.1 Scientific view ..........................................................................................................6
  2.2 Choice of method ......................................................................................................6
  2.3 Time frame ...............................................................................................................7
  2.4 Data ....................................................................................................................... 7

3. Theory ...........................................................................................................................9
  3.1 Characteristics of land ...............................................................................................9
  3.2 Characteristics of buildings and improvements .......................................................9
  3.3 Characteristics of real estate ....................................................................................9
  3.4 The real estate market .............................................................................................11
  3.5 Efficient Market Hypothesis ...................................................................................12
  3.6 Effect of property value changes .............................................................................14
  3.7 The Swedish real estate market .............................................................................15
  3.8 The UK real estate market .....................................................................................17
  3.9 The French real estate market ..............................................................................18
  3.10 Where to do business in Europe ...........................................................................19
  3.11 Related research ...................................................................................................20

4. Empirical results .....................................................................................................26

5. Conclusions ..............................................................................................................31
  5.1 Suggestions for further research ............................................................................34
  5.2 Reliability and validity ............................................................................................34

6. References .................................................................................................................35

Appendix 1 .....................................................................................................................39
1. Introduction

1.1 Background

The real estate market is not an efficient market according to the efficient market hypothesis (Fama 1970) since not all actors have access to all the information. This makes it hard for investors to get a good view of the entire market. Another characteristic of the real estate market is that investments are largely financed by debt (Jaffe et al. 2001). These two aspects create a need for accurate real estate valuation. In most countries law defines real estate as both land and any buildings located on the land.

Real estate is an important resource to the community and it has both social and economical aspects. Several different actors are therefore interested and involved in the real estate market, including governments, companies and individuals. In many countries the governments have imposed extensive regulations and laws to control the market. The result of this is that the price of real estate is not determined solely by supply and demand (Lundquist 1985).

Another aspect of the real estate market is that there is slowness in the supply of the market. It takes time to plan and build new properties so the supply cannot easily adjust to an increasing demand. This results in a high volatility of the market price of real estate (Delin 1991).

The specific properties of the real estate market give rise to numerous investment opportunities for the well-informed investor. The complexities of the market call for more research. Previously there has not been a great deal of papers that compare the profitability of different regional real estate markets. This paper has the ambition of contributing to that area of research.

1.2 Research Question

This thesis sets out to answer the question of whether there are any differences of profitability in the real estate markets of three European cities, Stockholm, London and Paris. Profitability is defined as risk adjusted return, as measured by the Sharpe ratio. The return is based on net income from the investments.
1.3 Purpose
The purpose of the paper is to find out whether it is more profitable to invest in any one of three European real estate markets. The essay takes the perspective of a real estate investor, an investment bank, insurance company or other actor who wishes to invest in real estate. In order to do this, the analysis must consider both risk and financing in order to determine the profitability.

1.4 Constraints
The paper is constrained to three European markets, Stockholm, London and Paris. The time frame is 20 years, 1984 to 2004. The choice of cities is based on two main reasons. London and Paris are two of the three largest real estate markets in Europe. Interestingly, the returns of the real estate in London and Paris are not significantly correlated. Stockholm was chosen since it is the local market of the authors, and because it is part of a different region of Europe than the other two cities. The period chosen was 20 years since it is long enough to contain several real estate business cycles and since it was the longest series of data available.

1.5 Structure of the thesis
The first part of the thesis explains the research question and the purpose of the study. In the second part, the methodology is stated. The third part contains the theoretical framework that is the basis of the study, including previous research. In the fourth part, the empirical study and the results are presented. Part five covers the analysis and conclusions of the study. In part 6 the references are listed.
2. Methodology

The scientific view of the paper is positivistic since a positivistic view allows for use of objective data and drawing of general conclusions. The paper is a case study and it is using both qualitative and quantitative methods.

2.1 Scientific view

Positivism has its origin in the natural sciences and it stands for a striving for positive or certain knowledge (Thurén 1991). There are only two sources that can give such knowledge, namely our senses and our logic. With our five senses we make observations, that is, we get empirical knowledge. Logic knowledge, including mathematics, is based on our intellect and on the right use of language. Theses that are unable to be tested through logic or through observations are seen as cognitively meaningless according to positivism (Gilje et al. 1992).

An alternative view is phenomenology, which is fundamentally different from positivism. Phenomenology does not focus on generalizing results, but on reaching deep conclusions and uncovering underlying phenomena. The reality is seen as to complex to generalize into simple laws and connections (Saunders et al. 2000).

As scientists we wish to be independent of our object of study. The study should therefore have a clear structure and methodology in order for other scientists to be able to replicate it. As much as possible, it should be possible to generalize the results of the study to other time periods and other objects. This study thus has a positivistic view.

2.2 Choice of method

The choice of research method is a question of whether an inductive or deductive method should be used. The aim of induction is to draw general conclusions based on empirical facts (Thurén 1991). These conclusions are rarely completely certain since the empirical data is only a sample of observation from a greater population (ibid.).

Deduction is based on logic and it says that a conclusion is true if it is logically true. In practice, deductive research is based on theories and compares these theories against empirical data (Saunders et al. 2000). These tests can show that the theory is correct, or that the theory needs to be modified, or they can give rise to new theories. Deductive research uses
a structured methodology to make replication possible. This study is mainly inductive but can also have implications for existing theories and is thus to some part deductive.

This study falls under the category case study. A case study is often made with the purpose of reaching extensive knowledge about a specific case. Case studies focus on questions such as “how”, “what”, and “where” (ibid.). Both quantitative and qualitative data gathering methods can be used in case studies. These methods are not mutually exclusive, but they can be combined. There is a basic difference between these methods. In quantitative studies information is transformed into numbers, which make up the base for a statistical analysis (Holme et al. 1997). Qualitative method focuses on the interpretation of gathered information. Since interpretation includes several different disciplines it cannot readily be transformed to numbers. This study will use both quantitative and qualitative methodology.

2.3 Time frame

The study is longitudinal and the period is 20 years, from 1984 to 2004. The reason for this choice of period is that real estate business cycles are enduring and have a major impact on the value and returns of properties. A shorter period would be very much effected by what phase of the cycle that was in effect at the time. By covering 20 years, several cycles are covered so that the results are not determined by a single cycle. Unless constrained by the availability of data, an even longer period would be preferred.

2.4 Data

The source of data is Investment Property Databank (IPD), a UK based company that specializes in measuring and analyzing property. IPD has subsidiaries in a number of European countries and closely monitors the development of real estate in many European cities. The data includes total return, income return and capital growth for IPD-covered real estate in Stockholm, London and Paris. The period is 20 years, 1984-2004, but for Paris there was no available data for 1984-1985. The income return and capital growth does not equal total return. Income return is calculated with net income. The IPD total return calculation is as follows:

Step 1: Calculate a return for a single month
Step 2: Compound the individual 12 monthly returns to an annual total return

\[
TR_i = \frac{CV_i - CV_{i-1} - C_{exp} + C_{rec} + NI_i}{CV_{i-1} + C_{exp}}
\]

\[
[(1 + TR_1/100)\times(1 + TR_2/100)\times...\times(1 + TR_{12}/100) - 1] \times 100
\]

- \(TR_i\) = Total return in month \(t\)
- \(NI_{it}\) = Net Rental Income or NOI
- \(CV_t\) = Market Value, end of month \(t\)
- \(CV_{t-1}\) = Market Value, beginning of month \(t\)
- \(C_{exp_{it}}\) = Capital expenditure during month \(t\), including all purchase, development and other capital expenditure
- \(C_{rec_{it}}\) = Capital receipts during month \(t\), including all sale receipts and other capital receipts

In 2004 the total value of the real estate covered by IPD was 28 BSEK in Stockholm, 203 BSEK in London and 166 BSEK in Paris. The number of properties were 83, 1032 and 874 respectively. The data is shown in Appendix 1.
3. Theory

3.1 Characteristics of land

Real estate consists of land and its improvements. It is therefore important to discuss here the different characteristics of land as a commodity. The difference between land and most other commodities is that the supply of land is fixed. The life of the land is also infinite, as long as it is not misused in a way that will permanently damage it. The value of a piece of land depends among other things on its quality, its location and its attractiveness (Lundquist 1985). The location of the land is fixed.

3.2 Characteristics of buildings and improvements

There are a wide number of different types of buildings, structures and improvements, with a number of different uses. Some structures are income producing and some are not. Some buildings have a special purpose that cannot be changed or modified whereas others can be adjusted to fit changes in demand. The income producing structures have an obvious value that can be measured with relative ease. Buildings that do not produce income also have a value but this is sometimes hard to estimate. A number of different techniques for assessing the value of such buildings exist (Jaffe et al. 2001). Even so, there seems to be a general undervaluation of buildings and properties on the stock market (Brueggeman et al. 1990). Investors tend to value companies’ properties at a discount. This comes partly because of the difficulties with making good estimations of property values.

3.3 Characteristics of real estate

Since properties differ from other commodities in a number of ways, real estate investments have certain characteristics that are important to consider for any investor. Real estate is characterized by diversity and fixed location. This refers to the fact that properties have a wide number of different features and purposes. The fixed location means that the value of a property is greatly affected by the region of location and thus by adjacent properties and their management (Lundquist 1985). If the adjacent property is a factory that pollutes the surroundings this might have a negative impact on the value of the investor’s property.

Another aspect of real estate is its high unit value. Unlike stocks and other instruments that an investor can buy in small quantities or shares, the value of a unit of real estate is much larger
and cannot always be divided into shares. Because of its high unit value, real estate is largely limited to corporate investors and wealthy individuals.

Borrowing is a very common aspect of real estate investments (Jaffe et al. 2001). The nature of real estate makes it advantageous to borrow. Real estate is a tangible asset with a relatively obvious value, and this value has traditionally been thought of as very solid (Delin 1991). This assumed stable value of real estate has made possible extensive use of borrowed funds, secured by the property. At times in the past the value of real estate has proven not to be stable and this has left lenders and real estate investors with huge losses, especially when the loans have amounted to a large part of the assessed property value.

The third characteristic of real estate investments is the long-term nature of the investment. A property can be held for decades or more. This means that property is mostly not a short-term investment. The economic life of the land of the property is infinite in the legal sense. US regulations set the life of the buildings either to 27.5 or 39 years (Jaffe et al. 2001). This does however not mean that the buildings have no value after this time, but only that for accounting purposes the, values of the buildings have been fully depreciated.

Management of the property is an important consideration for real estate investors. The properties can be managed directly by the investor but a managing firm can also be hired to provide this service. This is to some extent the distinction between real estate as an active or passive investment. The passive investor sees the property as an investment much like a financial instrument while the active investor sees the possibilities to affect the value of the investment by taking part in the management.

The fifth aspect of real estate is the development cycle and supply and demand conditions. Real estate is not like any other investment in the sense that it is a major part of society, and a part of every industry. Real estate has a cycle of its own that is not fully correlated with other economic developments (Björklund 1999). Part of this is because of the supply conditions. The supply of real estate is slow moving and it does not adjust quickly to changes in demand. It takes years to plan and construct a new property. The result of this is that excess demand can emerge which will put upward pressure on rents and property prices. The increase in supply will come later and this lag results in a higher volatility of returns from real estate investments.
Since real estate is such an important part of our society it is not surprising that the governments play a large part in this area. Rules and regulations for real estate exist in almost every country. This introduces a political risk that needs to be considered when making real estate investments. The government can alter the rules and thereby affect the profitability of the investment. Laws that regulate zoning and construction are highly important, but also regulations concerning the taxation of properties and tax advantages of debt financing.

Another aspect of the real estate market is the price determination. Prices are not set on a nationwide marketplace that all investors have access to. Instead prices are set by a seller and a limited number of prospective buyers. The market for real estate is scattered and because of the fixed location, it is very much divided into regions.

The market value of the real estate in any country is high compared to markets for other commodities, including the stock market. The difference between the stock market and the real estate market comes down to liquidity. The real estate market is relatively illiquid and only a small part of the total real estate value is transacted each year. This creates a problem of valuation, since it is not certain that appraised values are correct, only actual transaction prices can be fully trusted. This has been shown during periods of real estate crisis, most notably in the early 1990’s, when appraised values were far higher than what would actually prevail if the properties were traded (Delin 1991).

3.4 The real estate market

The real estate market is not a perfect market since not all actors have access to all information and thus cannot get a good overview of the market situation. Real estate purchases are often financed by debt. These two characteristics of the real estate market create a need for real estate valuation.

The definition of real estate is according to the law the division of the land and its improvements, such as buildings and structures. This definition is different from what is commonly thought of as real estate, namely only the buildings. The value of real estate includes the value of the land and the value of the buildings (Lundquist 1985).
The land and its improvements is an important resource to the community and it has both social and economical functions. Several different actors thus are interested in real estate, i.e. governments, organizations and individuals. In Sweden and in many other countries, the government has long had a leading role on the real estate market, mostly by setting the rules and regulations. This makes the prices on the market not only depend on supply and demand, but also on the regulations.

The real estate market has a few certain characteristics that make it different from other markets. Properties are unique when it comes to location. The surroundings thus are an important factor that has influence on the property price. Attractive locations can lead to intensive use of the land. The use of real estate is stretched out over a long period of time. Another factor of real estate is extensive use of outside capital, which can have impact on the yield and the economic values over time. Finally there is also a great slowness of the supply of the market, since it takes a long time to plan and construct a new building. This means that the market cannot quickly adapt to changes in demand (ibid.).

3.5 Efficient Market Hypothesis

The Efficient Market Hypothesis states that at any given time security prices fully reflect all available information (Fama 1970). If any new information is presented it will quickly be incorporated in the prices of the assets in a rational way (Arnold 2001). This means that no actor on the financial markets can earn an abnormally high rate of return, that is a return, which is higher than predicted by the risk premium for the asset in question. Thus all securities are priced according to the information that is available. To make certain this is the case there are thousands of investors all over the world who are ready to buy or sell securities in an instant if the prices differ from their true values.

There are three types of efficiency on the financial markets:
• Operational efficiency – the transaction costs are low enough not to prevent transactions from taking place
• Allocational efficiency – the businesses that have the highest marginal return will attract most capital, that is, the capital will go to its most productive use.
• Informational efficiency – all available information will be incorporated in the prices of securities.
There are three levels of informational efficiency (Fama 1970):

- **Weak efficiency** – the prices of securities reflect all historic information, which implicates that it is not possible to earn an abnormal rate of return by using such information.
- **Semi strong efficiency** – the prices of securities reflect all available public information, which implicates that no abnormal return can be achieved by analyzing such information.
- **Strong efficiency** – all relevant information, including private information are incorporated in security prices. This means that not even insiders with access to private information can achieve abnormal rates of return.

The most common method to show that the market achieves the weak form of efficiency is to buy a broad and well-diversified portfolio of securities and then compare the return of this portfolio to returns of portfolios based on technical analysis. The basis of technical analysis is to study stock’s development and based on patterns be able to find winning stocks. Common formations is head-shoulder, wedges etc. The problem with this method is that the patterns are only visible after they have occurred. It is therefore hard to act quickly enough and many investors try to buy even before the pattern is completed. This in turn is leading to the trends disappearing before they even appear, and the stock prices will therefore include all historical information and the market is said to be efficient in the weak form. Empirical studies show that well-diversified portfolios perform just as good as portfolios based on technical analysis. There are a few exceptions or anomalies that have been shown in several studies. One such anomaly is that winning stocks beat loosing stocks during 12 months, and thereafter this is reversed (Jegadeesh et al. 2001). This has been explained by saying that the market has a tendency to overreact. The fact that this pattern is now known might have made it disappear already according to the theory of efficient markets.

The level of efficiency that has been studied the most is the semi strong form, that is, if it is profitable to gather and analyze public information. If the semi strong form were achieved, it would imply that there is no profit from investing based on fundamental analysis. During the 1960’s and 1970’s the research seemed to support this theory and it seemed that the markets were efficient in the semi strong form. It should be noted that the transaction costs were significantly greater during that period than today, but it was harder for small investors to gather information. There are arguments both for and against the markets being efficient in the semi strong form. Most facts are in support of this but since there are numerous studies
that have been made, it is bound to appear a few exceptions that seem to be contrary to the majority of results. Some studies may prove that the semi strong is not in effect, but this may only be true for a short period, and after that the market is semi strong once again. However there seem to exist a few investors that can beat the market year after year, including Peter Lynch and Warren Buffet (Arnold 2001).

If the strong form of efficiency is to be achieved there should be no way of earning abnormal returns, even with access to private information. This means that in a strong market, insiders cannot beat the market. Evidence show that insiders do make abnormal returns (Jeng et al. 1999), and because of this most governments have introduced laws that regulate insider trading. It is vital that the insider trading is regulated so that investors can have confidence in the efficiency of the markets.

3.6 Effect of property value changes

Changes in property values can have important macroeconomic effects. There are various mechanisms that have been suggested in the literature. They can be considered under four headings. First, there are factors that might increase the amplitude of property cycles by emphasizing the role of fixed supply in the short run and swings in investor optimism (Carey 1990 and Herring 1999).

Second, there are approaches that highlight the cyclical role of credit availability. Stiglitz (1992) links the property market to credit markets, arguing that information asymmetries in financial markets, and shifts in lenders’ trade-offs between risk and return during the business cycle, lead to pro-cyclical changes in the availability of credit.

Third, a strand of the literature focuses on the effect of property prices on lending. For example, Kiyotaki (1997) stress the collateral aspect of property. With greater collateral, lenders might be prepared to lend more for any given level of risk, and hence increase their willingness to lend to real estate projects. To the extent that this induces an over-supply of both credit and available property, it can lead to a fall in property prices, whether from the market adjustment itself or from a macroeconomic shock. The fall in the value of the collateral may cause lenders subsequently to tighten or withdraw credit.
Finally, changes in the supply of finance might lead to the financial failure of property companies and of other companies who have financed borrowing on the basis of collateral against property. Such failure may then impinge on the financial health of the banking sector itself, possibly leading to systematic financial loss (Hendershott 1997).

3.7 The Swedish real estate market

According to a report by Newsec, the Swedish real estate market is heading for a new record year 2005 (Newsec 2005). The transactions amount to approximately 50 BSEK for the first six months of the year (ibid.). The international actors are increasing their activity on the market. In the year 2003, international investors made 77% of the real estate transactions. This figure decreased to 32% during 2004, due to increases in domestic investor activity. In 2005 the foreign investors again contributed to more than half of the transactions (ibid.). Investors were mainly buying housing property during 2004, but in 2005 other types of properties were also attractive. Commercial properties are on the rise while industrial properties are less attractive. The Swedish real estate market is the second most liquid in Europe, after the UK. The reason for this is that the market is transparent, cost efficient and uses a simple system for real estate transactions (Newsec 2005). The strong demand for Swedish real estate comes from a low building level during a number of years in combination with very low rents (Warberg 1998).

In the end of the 1980’s, the Swedish real estate prices climbed dramatically. The reasons for this could be that the demanded yield decreased (Delin 1991). If the required yield had decreased from 4% to 3%, this would have resulted in an increase of the real estate value of 30%. In the beginning of the 1990’s many investors had lowered their yield demands, in order to be able to mark up the value of their properties. This could be motivated if there was an active market with many transactions taking place at such a low yield, but that was not the case (ibid.). There was no actual demand for properties at the exaggerated price level at that time. The real estate owners were busy gathering valuation certificates that motivated the high value of the real estate. These valuation reports could be shown to banks and investors in order to get extended mortgages. Previously the debt market had been strictly regulated and banks could not loan as much as they preferred. In 1985 the regulation was changed and the debt markets were deregulated (ibid.). The banks then started to compete for volumes and therefore lowered their borrower requirements. The loans could soon amount to 85% of the real estate values. Real estate was considered safe investments, real values that did not need to
be analyzed (ibid.). Other actors also entered the real estate market and further pushed up the prices. Companies in different areas, such as industry, trade and services started investing in properties. Properties were visible in the accounting, unlike research investments, and this made real estate preferable in order to please investors and creditors. Many real estate owners got new mortgages to finance the repayments of their old mortgages.

The turning on the real estate market started 1990 when banks and other financing companies went into a crisis. The banks then were unable to make new loans for the real estate owners. The owners then had to sell properties in order to pay rents and amortizations on their loans. When transactions started taking place on the markets, it was not at the exaggerated price level, since no buyer would accept the theoretical yields that the previous prices were based on. This led to a sharp decline in real estate prices. In 1990 there was change of the rules for companies involved in real estate trading. The basis for the property tax was raised from 55% to 65% of the adjusted basis. In Stockholm and Uppsala the basis was set to 100%. One year later the tax rate was also raised from 2.5% to 3.5% (ibid.). These changes were made in order to stop the price increase of real estate, but the changes were put into effect too late, when the prices had already started to decline and in that way they made the fall even sharper.

The losses that were made by the banks during the real estate crisis are estimated to be approximately 150 BSEK. The losses also include the decrease in value of the existing Swedish real estate, amounting to approximately 1000 BSEK (ibid.). Large losses were made at a societal level since production resources and capital were flowing to a sector where they were not really needed. The production of new real estate increased because of the high real estate prices and this raised wages and profits for the construction and construction materials industry. The number of people employed in the construction sector increased from 260.000 to 330.000 during the end of the 1980’s (ibid.). After the crisis the employment was only 240.000.

The causes of the Swedish real estate crisis have largely been mentioned above. The deregulation of the debt market gave rise to an escalation of the loans being given and the constraining changes to the regulations came into effect to late. At the same time there was an international economic downturn.
3.8 The UK real estate market

After years of a more or less stable upward trend, the residential real estate market in London is expected soon to experience again a soft landing. The interest rate’s gradual increase since last year has to cool down the markets, to consolidate the gains and to prepare ground for another period of growth. The economic and financial foundations of Britain remain strong and despite the high price levels nobody expects market crash in the months to come.

During last two years the price movement has been upward with brief exception of early 2003, when mainly political reasons like the Gulf War II made both investors and residents very cautious. Looking back to the general picture of the last 6-7 years, we find that yearlong periods of booms are followed by much shorter phases of price stagnation and in the case of early 2003 of deflation. The strong economy in the recent years has helped UK to avoid the general economic stagnation that took place in many other European countries. Right now the market in UK is at the peak of its 5th period of growth since 1997 and if the market keeps following its usual pace, we can expect soon a brief market consolidation before the next phase of growth.

Some time ago OECD has warned that unless some special financial measures are taken, the booming UK residential market may pose a risk in long-term to the British economy. In order to put off such risks the Bank of England has gradually begun increasing the interest rates from 3,5% to 4,75%. It's considered enough to cool down the markets and to prepare the housing sector for soft landing within near future (Bank of England, 2005).

In 2004 the price of an average residential property in London has grown by between 5 and 10%, reaching $520,000. With short stagnation at the beginning of the year, the growth has been more pronounced during the second half of the period. To compare, the prices in England and Wales have grown in 2004 by 15-20%, with average properties sold for $340,000. The strongest increase was observed in Northern England (30%) where the prices have started from lower positions (ibid.).

During 2005 the market has delivered little surprises beyond the soft market landing, set in motion by higher interest rates (4,75%). London, where the prices are the highest, has slowed down the pace of growth below 5%. Northern England, where the investors' interest now is significant because of the existing price gap, keeps growing at more than 10% (ibid.).
The boom, which the real estate market in London experiences, is in fact the third major development since WWII. The first and second were followed by substantial market crashes in early 1970's and late 1980's. With inflation more or less under control and with record employment, this boom looks more sustainable than its predecessors. So far London turns to be among the big winners of the globalisation in the capital flows. Having begun earlier with the structural economic reforms than many of its EU partners in continental Europe, UK now reaps earlier the fruits of its efforts.

United Kingdom country profile:

- Area: 244,820 sq. km
- Population: 60 million (July 2005 est.)
- Population growth rate: 0.64%
- GDP per capita: Purchasing power parity £19,823 (2004 est.)
- Population below poverty line: 17%.
- Current inflation (CPI): 2.1% (November 2005)
- Current interest rate: 4.5% (December 2005)
- Main trading partners: US, EU countries
- Internet users: 38.5 million (2004)

Source: Economist Intelligence Unit Country Briefings; UK figures

3.9 The French real estate market

In France property taxation was introduced in 1790 during the French revolution (Vlassenko 2001). The tax system is characterised by many taxes, local rates and subsidiary levies based on property. When first introduced, taxation was handled centrally but in 1949 it became the entire responsibility of local authorities (ibid.). The present system includes a land tax on unimproved land, a property tax on improved land, and a housing tax.

The most common types of property debt used in France are bank lending, bonds and credit bail (Maguire et al. 1994). Credit bail is a tax enhanced finance lease targeted at owner-occupiers with duration of usually 12-20 years. It allows small and medium sized companies
to purchase property offsetting lease payments against tax liabilities. Both banks, insurance companies and state and interstate institutions act as lenders, developers and equity stakeholders in property development.

**France country profile:**

- Area: 547,030 sq. km
- Population: 60,424,213 (July 2004 est.)
- Population growth rate: 0.39% (2004 est.)
- GDP per capita: purchasing power parity $27,600 (2003 est.)
- Unemployment rate: 10.0% (2005 est.)
- Main trading partners: other EU countries, United States,

(Source: CIA - The World Factbook 2005)

**3.10 Where to do business in Europe**

The consulting company Cushman & Wakefield has released its 2005 European Cities Monitor report. This ranking intends to give the international companies a useful guide to the European market and to the cities best suitable for doing business. The outcome of the study represents a cumulative index where different elements are taken as relevant. These 12 elements are the following: access to the market, qualified personnel, urban transportation network, telecommunications systems, cost of labour, relationship of the state to business, cost of office space, territorial access of office space, language, long-distance transportation network, air quality and general quality of life.

As we can see, some of these variables, e.g. the cost of labour or the cost of office space, can be precisely measured. Others, e.g. the relations of the state to business, require more complex method of analysis and don't produce data with same kind of precision. The variable “qualified personnel” usually takes into account professional and educational background, two variables that cannot be easily compared across national borders.

Best business cities in Europe

1. London
2. Paris
3. Frankfurt
4. Brussels
5. Barcelona
17. Stockholm

3.11 Related research
A paper written by William N. Goetzmann & Ravi Dhar (2005) at Yale University examines the role of risk and uncertainty of real estate investment. In this study the authors have collected information about the real estate allocation choices, beliefs and viewpoints of a set of the nation’s leading investment managers. The result of this questionnaire provides a rare glimpse into the framework used to evaluate the relative attractiveness of real estate as an asset class. First, they identified significant institutional differences in the sample – endowments and foundations have a relatively short history of real estate investing and are more likely to be shifting towards the asset class.

Goetzmann & Dhar’s investigation of the asset allocation process gave interesting results. There is strong evidence to suggest that modern portfolio theory forms the general basis for the asset allocation decision – statistical risk and return estimates and long term performance are the major determinates of the allocation decision (Goetzmann & Dhar 2005). The respondents located real estate between stocks and bonds in both dimensions. They regarded the costs associated with real estate investing as relatively high compared to stock and bond portfolios. One of the main goals of this study was to explore the potential role of a broader range of risk and uncertainty measures in the investment decision-making process – particularly with regard to real estate in the institutional portfolio. By focusing on investors’ perceptions about what they do not know, they sought to test some hypotheses about the influence uncertainty and multi-dimensional risk.

The results of their tests are suggestive of the relevance of both uncertainty and efficiency. They found positive but insignificant association between efficiency measures and allocation, positive and significant association between historical extrapolation confidence and allocation, and marginal (but significant) evidence of a negative relation between crash risk and allocation to real estate (ibid.). While the results in Goetzmann & Dhar’s paper reveal factors
influencing the allocation to real estate, the overall logic of portfolio allocation to assets other than stocks and bonds remains somewhat of a mystery. Although they find that investors rely heavily on statistical inputs for the allocation decision, they are least comfortable with using past returns to extrapolate performance of hedge funds, venture capital and commodities. This evidence is clearly in conflict with the dramatic increase in hedge fund and venture capital allocations by institutional investors over the last market cycle. Alternative motives such as return chasing and following the industry leader must be considered as alternative explanations for the data.

Another paper written by William Goetzmann & K. Geert Rouwenhorst (1999) focuses on the cycles and fundamentals of the global real estate market by analysing the relationship between changes in GDP and international property returns. This paper suggests that the cross-border correlations of real estate are due in part to common exposure to fluctuations in the global economy, as measured by an equal-weighted index of international GDP changes. Country-specific GDP changes help explain more of the variation in real estate returns. Indeed, in some countries local factors explain considerably more, in percentage terms, than do global factors. Their study suggests that, while real estate is fundamentally local, demand for space apparently responds to contemporaneous changes in the global economy. Goetzmann & Rouwenhorst’s analysis of international diversification suggests that portfolio volatility is reduced by cross-border property investment, but that only one asset class, Industrial properties, actually yields greater diversification benefits than international equity market diversification.

There is a study done by Shaun A. Bond & G. Andrew Karolyi (2003) where they have examined the risk and return attributes of securitized international real estate shares. The authors find that there is evidence of a strong global market risk component in the real estate sectors of most countries. However, even after controlling for the effects of global market risk, an orthogonalized country-specific market risk factor is highly significant, especially for real estate indexes in Asia-Pacific markets. They find that a country-specific value risk factor has some explanatory power in addition to the country-specific market factor, but U.S.-based market, value and size risk factors do not provide any additional explanatory power. Further more the authors discuss that a country-specific value risk factor provides significant explanatory power for real estate securities leads to another key implication of the study. They show that this country-specific value risk factor is unique and not subsumed by global or local
market risks or by U.S.-based value risk factors. This is according to Bond & Karolyi an important finding for the current debate about the relative importance of an international value risk factor in international equity markets.

Adair et al. (1997) analyzed property investments in several European cities through an examination of diversification strategies, namely sector versus geographical. The analysis tests include the impact of GDP and employment related factors on property performance relative to more specific market influences. The results indicate that the main factor accounting for the variation in rental values is the size of the office market in any city (Adair et al. 1997). This suggests that macroeconomic variables only provide part of the explanation and that markets are essentially locally driven and influenced by stock related characteristics, which affect demand-supply relationships. Thus a potential investor should consider the interplay between market characteristics and economic based variables in order to find out how the market will perform and whether it offers diversification. The study also suggests that the ongoing European integration will lead to reduced diversification benefits in the future.

Cheng et al. (1999) analyzed foreign real estate investments by introducing uncertainty into a mixed-asset portfolio. By incorporating uncertainty it is possible to quantify the likelihood that greater amounts of foreign real estate may be optimal given an uncertain economic outlook. The method used is the bootstrap simulation and four asset classes are included, stocks, bonds, bills and real estate. The analysis spans three countries, the United States, the United Kingdom and Japan and the period is from 1973-1994. Both portfolio performance and optimum portfolio composition were examined. The results were in line with previous research in that there was little justification for continuously holding foreign real estate in mixed-asset portfolios. However, the optimum portfolio composition analysis indicates that under certain circumstances large amounts or foreign real estate can be optimal (Cheng et al. 1999). This was true for investors of all three countries, but theses circumstances are likely to be infrequent. Investors with a high-risk tolerance should not hold more than 10% of their assets in foreign real estate most of the time. Investors with a low risk tolerance should not hold more than 5% (ibid.).

Liow (1997) investigated the long-term performance of Singapore property stocks from 1975 to 1995. The purpose of the study was to reveal whether property stocks performed differently from the market portfolio on return only, and on risk adjusted basis, over the entire period.
For the risk-adjusted analysis, the Sharpe Ratio was used. The second issue of the study was whether property stocks were consistent in their investment performance. The third issue was whether property stock performance is more reflective of stock market performance than the underlying physical property performance. The last issue investigated was whether property stocks provided a hedge against inflation. The results show that over the 21-year period property companies performed no better than the market (Liow 1997). On a risk-adjusted basis, property firms performed poorer than the market (ibid.). The third conclusion is that there is no consistency in performance ranking of the companies over time. Fourth, property stocks are highly correlated with the stock market. Fifth, property firms’ performance is tied to the property market, and sixth, property firms failed to provide an inflation hedge (ibid.).

Petersen et al. (2003) examined the performance of five real estate sub sectors (office, retail, industrial, apartment and hotel), covering a 20 year period. The purpose was to assess the impact the hotel sub sector would have when constructing a multi-property investment portfolio. The study is based on modern portfolio theory and the data was analyzed using correlation analysis, Sharpe ratio and a portfolio optimizer. The results of the study show evidence of periodic cycles of growth, decline, stagnation and recovery. The individual risks and returns for each property sector were different during the period, with the apartment sub sector recording the highest returns and the hotel sub sector having the most volatile returns. There existed diversification benefits from including hotels in a multi-property real estate portfolio, which was demonstrated by construction an efficient frontier using ex-post data (ibid.).

Goetzmann & Fisher (2005) analysed the performance of real estate portfolios. The approach in this paper is to simulate the experience of an institutional investor active over the period between 1997 Q4 and 2004 Q2. Instead of using appraisal data, they use transactions and intermediate cash flows to compute the returns to property portfolios that are subsets of the actual invest able universe, and which, taken together, effectively cover the range of realistically achievable performance. In simple terms, these simulations allow them to look at the realized returns that real estate generated during this time period, without the potentially confounding effects of appraised values and time-weighted return calculations.
In this study they find that the realized IRR of commercial property investment was about 7.5% in this period – lower than the time-weighted rate of return of 9.4% due to issues of investment timing. This is not surprising given the strong positive returns of property investment at the beginning and the end of the sample period, and changes in the realized rates of inflation. To address the obvious macro-economic regime change, Goetzmann & Fisher developed a methodology that accounts for shifts in inflation. Their estimate of the inflation-adjusted rate of return for real estate investment over the period was 3.99%. Goetzmann & Fisher find the range of variation in IRR attributable to investing in properties as opposed to an index interesting. For small portfolios holding ten properties, there were non-trivial probabilities of a negative IRR. For portfolios with 100 properties the variation decreased significantly but still ranged from 5% to 10%, with an IRR over 10% being an exceptional benchmark. This is important because it suggests that individual portfolio experiences with real estate investing will vary due to the effects of individual property differences and the timing of investment. These differences are largest when the real estate portfolio holdings are small but they are significant even for large portfolios. The practical implications of this finding are that large pools of properties are required to achieve returns similar to the returns of the population of commercial properties – i.e. scale is required for effective diversification (ibid.).

Holland et al. (1999) used commercial real estate data, to conduct an empirical test of the neoclassical versus option-based models of investment. Because price is implicit in the right-hand side variables of a reduced-form investment equation, a specification of that type cannot fully isolate demand versus supply effects of uncertainty on investment and hence cannot generate a definitive test of competing investment models. The authors use up to 20 years of aggregate time series data to estimate the model, and find that change in total uncertainty exerts a negative, price independent, effect on investment in seven of the eight supply equations they estimate. Primarily based on the strength of the findings with respect to total uncertainty, they conclude that the evidence favours the option-based model over the neoclassical model. This in turn suggests that irreversibility and delay are important aspects to investment decision-making.

According to Holland et al., their most puzzling result is the consistent finding of short-run supply inelasticity with respect to changes in asset price (traditionally considered to be a first-order effect), but highly elastic supply responses to changes in price uncertainty (traditionally
considered to be a second-order effect). It may be that, in real asset markets, changes in price volatility more quickly summarize information that is useful to investors than do changes in price levels. The authors mean that asset price uncertainty is positively related to changes in tax, regulatory and monetary policy, and that causality may run from policy change to uncertainty and then to investment. This in turn suggests that, relative transparency and stability may be important factors in encouraging investment and sustaining macroeconomic growth (ibid.).

Hamelink et al. (2002) believe that the benefits of international real estate diversification have been documented in the literature, even though to a lesser extent than for common stocks. They argue that while it is important to recognize the advantages of cross-country diversification, it would be at least equally important to isolate the effect of various factors on international real estate security returns. A low cross-country correlation coefficient between real estate securities in two countries, for instance, could be due to the fact that real estate stocks in both countries differ with respect to size, to their exposure to growth or value, or to any remaining effects such as their tax status or their investment focus. The authors used constrained cross-section regressions to disentangle a common factor, and “pure” country, size, and value/growth effects. It is found that the value/growth factor is an important determinant of real estate security returns, and that the importance of this factor is growing (ibid.). Country factors are also important, while the effect of size remains marginal. Statistical analysis of the residuals indicates that additional “hidden” factors most likely exist (ibid.).

An important practical implication of the method used in this paper is that an investor can decide according to what factors he or she wants to make bets. For instance, a bet can be made to overweight countries with high expected returns and low cross-country correlation coefficients, without simultaneously making neither a growth/value bet nor a size bet. For that purpose, an optimizer can be used to gain exposure to the selected countries, while minimizing at the same time the difference between the exposure of the portfolio to other factors and the exposure of the benchmark to these factors.
4. Empirical results

The results of the study are presented in tables 1.1-1.4. Table 1.1 shows the average annual return for each city during the whole period. Stockholm had the highest average total return, amounting to 11.17%. The highest average income return was achieved in London and it was 6.83%. Stockholm had the highest average annual capital growth, which was 5.85%.

Table 1.1 Average annual returns 1984-2004 (%)

<table>
<thead>
<tr>
<th></th>
<th>Stockholm</th>
<th>London</th>
<th>Paris</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Return</td>
<td>11.17</td>
<td>10.12</td>
<td>7.50</td>
</tr>
<tr>
<td>Income Return</td>
<td>5.88</td>
<td>6.83</td>
<td>5.25</td>
</tr>
<tr>
<td>Capital Growth</td>
<td>5.85</td>
<td>3.16</td>
<td>2.17</td>
</tr>
</tbody>
</table>

Table 1.2 shows the correlations between the total returns of the three cities for the whole period. The correlation between Stockholm and London were significant at the 1% level. The correlation between Stockholm and Paris was significant at the 5% level. There was no significant correlation between London and Paris. The correlation between Stockholm and London was the highest, 0.81, which gives a $R^2$ of 65.6%. The correlation between Stockholm and Paris was somewhat smaller, 0.48, giving a $R^2$ of 23.0%.

Table 1.2 Correlations of total returns 1984-2004

<table>
<thead>
<tr>
<th></th>
<th>Stockholm</th>
<th>London</th>
<th>Paris</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stockholm</td>
<td>1.00</td>
<td>0.81</td>
<td>0.48</td>
</tr>
<tr>
<td>London</td>
<td>0.81</td>
<td>1.00</td>
<td>0.18</td>
</tr>
<tr>
<td>Paris</td>
<td>0.48</td>
<td>0.18</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Table 1.3 shows the average standard deviation during the whole period for the different types of returns and for all cities. The highest standard deviation of the total return was in Stockholm, 17.3%. The lowest was in Paris, 10.5%. London had the highest standard
deviation of the income return, amounting to 1.27% and Paris had the lowest, 0.86%. The standard deviation of the capital growth was lowest in Paris, 10.28% and highest in Stockholm, 15.46%.

Table 1.3 Average standard deviations 1984-2004 (%)

<table>
<thead>
<tr>
<th></th>
<th>Stockholm</th>
<th>London</th>
<th>Paris</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total return</strong></td>
<td>17.3</td>
<td>13.3</td>
<td>10.5</td>
</tr>
<tr>
<td><strong>Income return</strong></td>
<td>1.07</td>
<td>1.27</td>
<td>0.86</td>
</tr>
<tr>
<td><strong>Capital growth</strong></td>
<td>15.46</td>
<td>13.04</td>
<td>10.28</td>
</tr>
</tbody>
</table>

Table 1.4 shows the results of the risk adjusted return calculation. The calculation is done using the Sharpe ratio. This measurement is common in studies of real estate profitability (e.g. Liow 1997, Petersen et al. 2003). It gives a risk-adjusted ratio that also considers the cost of financing by including the local risk-free rate of interest. The Sharpe ratio is defined as follows:

\[ S_x = \frac{R_x - R_f}{\sigma_x} \]

\( S_x = \) Sharpe ratio of investment \( x \)  
\( R_x = \) Return of investment \( x \)  
\( R_f = \) Risk free rate of interest  
\( \sigma_x = \) Standard deviation of returns of investment \( x \)

To do the calculation the risk free rate of interest in respective country is subtracted from the total returns for every given year. The resulting number is then divided by the respective standard deviation for each city, which gives the Sharpe ratio. The risk free rate of interest is defined as government Treasury bills with a maturity up to 3 months. The average risk free rate of interest was highest in Sweden, 8.04% and lowest in France, 7.38%. The Sharpe ratio was 0.1927 for Stockholm, 0.1918 for London and 0.0637 for Paris. Thus the highest risk-adjusted total return was achieved in Stockholm.
Table 1.4 Risk adjusted returns calculation

<table>
<thead>
<tr>
<th></th>
<th>Stockholm</th>
<th>London</th>
<th>Paris</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total return (%)</strong></td>
<td>11.17</td>
<td>10.12</td>
<td>7.50</td>
</tr>
<tr>
<td><strong>Average Risk-free rate of interest (%)</strong></td>
<td>7.85</td>
<td>7.57</td>
<td>7.38</td>
</tr>
<tr>
<td><strong>Average Standard deviation (%)</strong></td>
<td>17.3</td>
<td>13.3</td>
<td>10.5</td>
</tr>
<tr>
<td><strong>Average Sharpe ratio</strong></td>
<td>0.1927</td>
<td>0.1918</td>
<td>0.0637</td>
</tr>
</tbody>
</table>

Diagrams 1.1-1.4 give an overview of the results for each year in the period of study. Diagram 1.1 shows the total return for each city during the whole period. The returns are consistently high during the first years of the study, peaking at more than 30%. In the beginning of the 1990’s there was a sharp decline in the returns of Stockholm and London. In 1991 the total return was –27% for Stockholm and –18% for London. The returns of Paris declined gradually during the 1990’s but started to rise again after 1996. In the beginning of the 21st century the returns of all cities declined somewhat but then started to rise again in 2004.

Diagram 1.1 Total return (%) 1984-2004

Diagram 1.2 shows the income return for each city during the period. The income return for Stockholm and London declined during the last years of the 1980’s but then increased sharply and peaked around 8-10%. The income return of Paris declined in the beginning of the 1990’s
and then gradually climbed to a level of 6% per year. The returns of Stockholm and London declined during the later part of the period and stabilized at 6-7% in the final years.

**Diagram 1.2 Income return (%) 1984-2004**

Diagram 1.3 shows the capital growth during 1984-2004 for the three cities. The capital returns initially rose sharply, peaking at 20-40%. During the first years of the 1990’s there was a major decline of the capital values, especially in Stockholm and London were losses amounted to more than 20% in 1991. The capital growth rose in all cities during the end of the 1990’s and ended up around 0% in 2004.
Diagram 1.3 Capital growth (%) 1984-2004
5. Conclusions

The Sharpe ratio of Stockholm is the highest and therefore the risk-adjusted return was highest there. Thus Stockholm is the most profitable city for real estate investments when risk is taken into consideration. The real estate in London has a marginally lower Sharpe ratio, making it an almost equal investment to Stockholm. The Sharpe ratio of Paris is much lower, making investment here less attractive. When not considering the risk, Stockholm had a slightly higher annual return than London, 11.17% and 10.12% respectively. Both the average risk free rate of interest and the standard deviation of the returns were higher in Stockholm than in London. Stockholm was the high-risk alternative of these three cities and Paris was the low-risk alternative. Paris had the lowest variation of returns and also the lowest rate of interest.

Real estate investments mostly include leverage, often with a loan to value ratio of approximately 75%. By using the formula for financial leverage, it is possible to see the resulting return on equity for real estate investments with leverage. The formula is as follows:

\[
Re = R_{tot} + (R_{tot} - R_{d}) \frac{L}{E}
\]

Re = Return on equity
R\text{tot} = \text{Total return on investment}
R\text{d} = \text{Return on debt}
L = \text{Value of debt}
E = \text{Value of equity}

By using a loan-to-value ratio of 75%, average returns for the whole period, and the risk-free rate as debt return, the formula gives the following returns on equity for the three cities in this study:

Stockholm: 20.57%
London: 17.79%
Paris: 7.85%
The leveraged returns on equity above show that the inclusion of leverage can dramatically increase the return of an investment. For Stockholm and London the returns on equity are almost 10% higher than they would be without debt. For Paris the leveraged returns are only marginally larger than the unleveraged returns, since there is only a marginal gap between the total return and the required return on debt. In reality it is hardly possible to loan at the risk-free rate of interest. For solid investors there would probably be a 1% add-on or more to the risk-free rate. Calculating with the risk-free rate plus 1% results in the following returns:

Stockholm: 17.57%
London: 14.79%
Paris: 4.85%

For Stockholm and London the returns on equity are still higher than the unleveraged returns, but for Paris the return with debt is now lower than the unleveraged return. This shows that the inclusion of debt can destroy value when the return on debt is higher than the total return of the investment.

According to Kristian Håkansson of Handelsbanken, the risk and return of the stock market has been higher in Stockholm than in London and Paris during the last 20 years. The risk and return of the Paris stock market was the lowest. The results of this study is thus in line with the results from the stock markets of these three cities.

An interesting result of this study is the high correlation between the returns of Stockholm and London, and the zero correlation between London and Paris. According to Fabian Wallen of the Confederation of Swedish Enterprise, the business cycles of Sweden and the UK have been highly correlated during the last 20 years. This means that the demand for real estate have fluctuated in the same way in both countries, which to some extent explains the high correlation of real estate returns between Stockholm and London that was found in this study. Fabian Wallen also states the lower interest rates in France as a factor that has differentiated the French real estate market from the Swedish and British markets during the last decades. The lower interest rates come partly because of the French entry into the European Monetary Union (EMU).
An interesting analysis is to split the 20-year period of this study into a pre-EMU period and a post-EMU period with purpose of finding any effects that the French entry into EMU might have had on the real estate market. The pre-EMU period is assumed to be 1984-1993 and the post-EMU period is 1994-2004, since stage two of EMU was launched in January 1st 1994, which implicated a strengthening of economic convergence between the member countries (European Central Bank 2006). The results of the analysis are as follows:

Table 5.1 shows the results of splitting the period into a Pre-EMU and a Post EMU period. In the Pre-EMU period Stockholm had the highest total return and London had the lowest total return. In the post-EMU period London had the highest total return and Paris had the lowest total return. The interest rates were lowest in Paris in the first period and lowest in Stockholm in the last period. In all cities, both total returns and interest rates were lower in the last period than in the first period. For the period 1984-1993, the highest Sharpe ratio is found in Paris, 0.28 and the lowest is found in London, 0.01. For the period 1994-2004, the highest Sharpe ratio is found in London, 0.36 and the lowest is found in Paris, -0.09. The standard deviations of the total returns were higher in the first period than in the last period for all cities.

Table 5.1 Pre-EMU, Post-EMU analysis

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stockholm</td>
<td>London</td>
</tr>
<tr>
<td>Total return</td>
<td>13.92</td>
<td>10.21</td>
</tr>
<tr>
<td>Income return</td>
<td>5.56</td>
<td>6.55</td>
</tr>
<tr>
<td>Capital growth</td>
<td>7.98</td>
<td>3.57</td>
</tr>
<tr>
<td>Rf</td>
<td>11.41</td>
<td>10.07</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>0.1455</td>
<td>0.0105</td>
</tr>
<tr>
<td>Std Total return</td>
<td>23.58</td>
<td>18.84</td>
</tr>
</tbody>
</table>

What can be concluded from this analysis is that the profitability of the French real estate market has decreased since the start of stage two of EMU. The real estate market in London went from being the least profitable in the first period to being the most profitable market in the last period. The correlation of the returns of Stockholm and London decreased in the last period compared to the first. The correlation between Stockholm and Paris also decreased, while the correlation between London and Paris increased.
5.1 Suggestions for further research

This study used 20 years of data for three Western-European cities. If the data can be made available it would be of great interest to do a similar analysis in Eastern-European cities. Such a study should probably have to give more room for legal and political aspects, since investing in these markets include other than purely financial risks. Another suggestion for further research is to use a longer time series than in this study and include more cities. Again the critical element is availability of data.

5.2 Reliability and validity

It is desirable that a study is free from random errors and thus has a high degree of reliability. The reliability can be estimated by posting the question of whether other researchers would get the same results, or if the results would be the same at other occasions (Saunders et al. 2000). In this thesis data for three cities has been used. The data comes from local subsidiaries of IPD. IPD uses statistical experts in calculating the returns, and their methods are very refined, which is confirmed by their success in being the leading property measurement institute. We thus have great confidence in the quality of the data from IPD and consider it to have a high level of reliability. When it comes to our own calculations, we have also used great care, and a procedure for verifying the calculations. This should result in a high reliability of the study.

Validity concerns the question of whether a study is actually measuring what it is supposed to measure (ibid.). If a study contains systematic errors that distort the results, it is said to have a low validity. It is vital that the variables used are a relevant measure of the characteristics in question. The purpose of this study is to measure the risk-adjusted returns of real estate investments, taking consideration of financing the investments. Our measurement is the Sharpe ratio, which includes the total return of the investment, the variability of return and the local risk-free rate of interest. By using this measurement the purpose of the study is thus met and we can have confidence in the validity of the study.
6. References


**Interviews**

Christina Gustafsson, Svenskt Fastighetsindex and IPD Nordic.

Henrik Meeths, London Regional Properties.

Fabian Wallen, Svenskt Näringsliv.

Kristian Håkansson, Handelsbanken.

**Internet**

www.riksbanken.se

www.fastighetsindex.se

www.ipdindex.co.uk
### Appendix 1

Total return, income return, capital growth, Treasury bill rate and Sharpe ratio, 1984-2004.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stockholm</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Return (% pa)</td>
<td>19.2</td>
<td>21.9</td>
<td>30.7</td>
<td>46.9</td>
<td>32.9</td>
<td>28.4</td>
<td>5.7</td>
<td>-27.0</td>
<td>-17.2</td>
<td>-2.4</td>
<td>5.6</td>
</tr>
<tr>
<td>Income Return (% pa)</td>
<td>7.1</td>
<td>7.0</td>
<td>6.4</td>
<td>5.4</td>
<td>4.3</td>
<td>4.0</td>
<td>3.7</td>
<td>4.5</td>
<td>6.1</td>
<td>7.0</td>
<td>7.7</td>
</tr>
<tr>
<td>Capital Growth (% pa)</td>
<td>11.3</td>
<td>14.0</td>
<td>22.9</td>
<td>39.5</td>
<td>27.6</td>
<td>23.5</td>
<td>2.0</td>
<td>-30.2</td>
<td>-22.1</td>
<td>-8.8</td>
<td>-1.9</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.42</td>
<td>0.44</td>
<td>1.20</td>
<td>2.17</td>
<td>1.32</td>
<td>0.98</td>
<td>-0.46</td>
<td>-2.23</td>
<td>-1.76</td>
<td>-0.62</td>
<td>-0.11</td>
</tr>
<tr>
<td><strong>London</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Return (% pa)</td>
<td>8.1</td>
<td>10.8</td>
<td>18.6</td>
<td>39.7</td>
<td>31.3</td>
<td>13.3</td>
<td>-12.1</td>
<td>-17.8</td>
<td>-10.1</td>
<td>20.3</td>
<td>11.9</td>
</tr>
<tr>
<td>Income Return (% pa)</td>
<td>6.1</td>
<td>6.2</td>
<td>6.0</td>
<td>5.4</td>
<td>4.8</td>
<td>4.7</td>
<td>5.6</td>
<td>7.5</td>
<td>9.4</td>
<td>9.8</td>
<td>7.9</td>
</tr>
<tr>
<td>Capital Growth (% pa)</td>
<td>1.9</td>
<td>4.3</td>
<td>12.0</td>
<td>32.7</td>
<td>25.3</td>
<td>8.2</td>
<td>-16.9</td>
<td>-23.7</td>
<td>-17.9</td>
<td>9.7</td>
<td>3.8</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>-0.08</td>
<td>-0.03</td>
<td>0.60</td>
<td>2.37</td>
<td>1.41</td>
<td>-0.09</td>
<td>-1.89</td>
<td>-2.10</td>
<td>-1.23</td>
<td>1.16</td>
<td>0.45</td>
</tr>
<tr>
<td><strong>Paris</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Return (% pa)</td>
<td>13.1</td>
<td>13.7</td>
<td>19.5</td>
<td>28.1</td>
<td>19.4</td>
<td>6.8</td>
<td>1.9</td>
<td>-5.7</td>
<td>-5.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income Return (% pa)</td>
<td>4.9</td>
<td>5.1</td>
<td>5.5</td>
<td>5.5</td>
<td>4.0</td>
<td>3.7</td>
<td>4.1</td>
<td>4.1</td>
<td>4.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital Growth (% pa)</td>
<td>8.2</td>
<td>8.6</td>
<td>14.0</td>
<td>22.6</td>
<td>15.4</td>
<td>3.1</td>
<td>-2.2</td>
<td>-9.8</td>
<td>-10.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.38</td>
<td>0.33</td>
<td>0.98</td>
<td>1.80</td>
<td>0.85</td>
<td>-0.25</td>
<td>-0.67</td>
<td>-1.21</td>
<td>-1.27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stockholm</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Return (% pa)</td>
<td>7.6</td>
<td>9.3</td>
<td>11.0</td>
<td>16.7</td>
<td>18.8</td>
<td>26.3</td>
<td>1.3</td>
<td>-1.9</td>
<td>-3.2</td>
<td>3.9</td>
</tr>
<tr>
<td>Income Return (% pa)</td>
<td>6.7</td>
<td>6.6</td>
<td>6.4</td>
<td>6.1</td>
<td>5.6</td>
<td>5.1</td>
<td>5.5</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Capital Growth (% pa)</td>
<td>0.8</td>
<td>2.5</td>
<td>5.8</td>
<td>5.8</td>
<td>6.3</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
<td>6.2</td>
<td>-1.9</td>
</tr>
<tr>
<td>SSVX3M</td>
<td>8.78</td>
<td>5.84</td>
<td>4.13</td>
<td>4.22</td>
<td>3.12</td>
<td>3.96</td>
<td>4.00</td>
<td>4.07</td>
<td>3.03</td>
<td>2.11</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>-0.07</td>
<td>0.20</td>
<td>0.40</td>
<td>0.72</td>
<td>0.91</td>
<td>1.29</td>
<td>-0.16</td>
<td>-0.34</td>
<td>-0.36</td>
<td>0.11</td>
</tr>
<tr>
<td><strong>London</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Return (% pa)</td>
<td>4.8</td>
<td>7.7</td>
<td>16.2</td>
<td>11.3</td>
<td>13.7</td>
<td>17.8</td>
<td>9.4</td>
<td>0.7</td>
<td>1.0</td>
<td>16.0</td>
</tr>
<tr>
<td>Income Return (% pa)</td>
<td>7.6</td>
<td>7.7</td>
<td>7.3</td>
<td>6.9</td>
<td>6.8</td>
<td>6.7</td>
<td>6.4</td>
<td>6.7</td>
<td>7.3</td>
<td>6.7</td>
</tr>
<tr>
<td>Capital Growth (% pa)</td>
<td>-2.6</td>
<td>0.0</td>
<td>8.3</td>
<td>4.1</td>
<td>6.6</td>
<td>10.4</td>
<td>2.9</td>
<td>-5.6</td>
<td>-5.9</td>
<td>8.7</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>3MTBILLS</td>
<td>6.22</td>
<td>6.16</td>
<td>7.11</td>
<td>5.56</td>
<td>5.62</td>
<td>5.61</td>
<td>3.83</td>
<td>3.84</td>
<td>3.74</td>
<td>4.69</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>-0.10</td>
<td>0.12</td>
<td>0.68</td>
<td>0.43</td>
<td>0.61</td>
<td>0.92</td>
<td>0.42</td>
<td>-0.24</td>
<td>-0.21</td>
<td>0.85</td>
</tr>
<tr>
<td>Paris</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Return (% pa)</td>
<td>-12.9</td>
<td>-6.4</td>
<td>1.1</td>
<td>5.1</td>
<td>16.1</td>
<td>17.2</td>
<td>9.7</td>
<td>7.7</td>
<td>6.2</td>
<td>7.7</td>
</tr>
<tr>
<td>Income Return (% pa)</td>
<td>4.5</td>
<td>5.3</td>
<td>6.3</td>
<td>5.9</td>
<td>6.1</td>
<td>6.0</td>
<td>5.9</td>
<td>6.1</td>
<td>6.2</td>
<td>6.0</td>
</tr>
<tr>
<td>Capital Growth (% pa)</td>
<td>-17.4</td>
<td>-11.7</td>
<td>-5.2</td>
<td>-0.7</td>
<td>9.4</td>
<td>10.7</td>
<td>3.5</td>
<td>1.5</td>
<td>-0.1</td>
<td>1.6</td>
</tr>
<tr>
<td>TBILLS</td>
<td>7.65</td>
<td>6.51</td>
<td>5.67</td>
<td>4.81</td>
<td>3.95</td>
<td>5.04</td>
<td>4.94</td>
<td>3.75</td>
<td>3.25</td>
<td>3.00</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>-1.95</td>
<td>-1.23</td>
<td>-0.43</td>
<td>0.03</td>
<td>1.15</td>
<td>1.16</td>
<td>0.45</td>
<td>0.38</td>
<td>0.28</td>
<td>0.44</td>
</tr>
</tbody>
</table>