COMMERCIAL REAL ESTATE VALUATION
IN THE FINNISH MARKET

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# Table of Contents

Introduction .......................................................................................................................................... 1

1  Investment classes ........................................................................................................................ 2
2  Characteristics of real estate investments..................................................................................... 4
3  Classification of real estate........................................................................................................... 7
4  Measurement of profitability and performance............................................................................ 7
5  Historical performance of real estate............................................................................................ 9
6  Valuing real estate...................................................................................................................... 11
   6.1  Supply and demand ............................................................................................................ 11
   6.2  The sales approach ............................................................................................................. 12
   6.3  The cost approach ............................................................................................................... 13
   6.4  The income approach ......................................................................................................... 13
7  Model.......................................................................................................................................... 16
8  Case study................................................................................................................................... 18
9  Conclusions ................................................................................................................................ 22

References .......................................................................................................................................... 23

Appendix I The Model ....................................................................................................................... 25
Introduction

The importance of real estate as an investment alternative in the portfolios of many funds and institutions has grown. When the yields of real estate investments in many European capitals have decreased, international investors are looking for new profitable targets more and more from new markets where they have not been established before. Therefore, there are today many new international investors who are interested in investing in Finland where there still is very attractive yields. At the same time Finnish institutional investors have been looking for investment possibilities outside of Finland with better diversification in mind. One reason for this trend is changing legislation towards less restrictive investment policy. While the Finnish investors can move more freely and invest more funds abroad, consequently there will be targets left over for international investors in Finland.

The purpose of this study is to look at real estate, also called property, as an investment alternative, to discuss the characteristics of real estate and to compare different real estate valuation methods. The main focus will be in the Finnish market.

The study will be made together with a real estate consultancy bureau which operates worldwide. Their clients are owners, tenants and investors and with their services they assist their customers at every stage of the real estate process; buying, selling, financing, leasing, managing and valuing of assets. Among other things they also help their clients with strategic planning and research, portfolio analysis, site selection and space location.

The set up

Valuation is finding the correct price to an investment which on the other hand reflects the return obtained from the investment. Here, the focus is on the valuation of a single property. To introduce the reader to different ways of investing in real estate, also portfolio management will be to some extent introduced. The key objective is to identify the most important parameters that contribute to the value of a real estate. Different valuing models will be discussed, and one will be built and used to value an example case. The results obtained from the model will be compared with the actual price paid for that particular property. Finally, we discuss why the value might have differed and some proposals for further research are given.
Objectives

- Analyse real estate as an investment alternative
- How real estate can be valued
- The genuine case study

1 Investment classes

Different investment classes can be divided in dept, equity and derivatives (Bodie, 2000). This separation considers how fixed the future incomes are. In this section the characteristics of these investment classes will be exposed and it will be considered where real estate investments fit in. While derivatives derive from the underlying security which is either a dept instrument or equity they will not be considered.

1.1 Dept

Dept instruments are also called fixed-income securities while the issuer promises to pay fixed cash flows at specified times in the future to the buyer of the security. Short-term dept instruments, whose maturity is less than a year, are usually called the money market. When considering real estate, the money market is not interesting since a real estate investment is usually a long term investment. Thus, we have to consider dept instruments whose maturity is longer. These are called the bond market and their maturity is typically under 30 years. The issuer of a bond is usually a government with almost no default risk or a corporation with some default risk. The issuers are continuously rated according to their credit worthiness by different credit rating agencies and these ratings imply how high the demanded yield should be for a specific issuer. The dept instruments are very liquid with sophisticated secondary markets. The yields are well documented over time for different bonds which helps in determining their historical performance as an investment.

1.2 Equity

An equity investment is called a share. It represents an ownership claim on the assets and the earnings of a company as well as on the management of the company. After the bond holders have been paid, the earnings can be paid out to shareholders as dividend or they can be retained for reinvestments. The difference with dept instruments and equity is that dept is a fixed-income security while shareholders then again have no guarantee on their income. On the other hand, a dept instrument has a known cash-flow while the upside of a share investment is unlimited.
Shares have been traded on stock exchanges for centuries and there is precise historical data that reaches to the beginning of last century. Thanks to the long time series, it is easy to analyse the performance of equity investments.

1.3 Real estate

Real estate is a significant investment class, even if dept instruments and common shares are better known to the public. This is probably due to the fact that these are more frequently traded and even private individuals can easily trade them. When measured by the market value, for example US real estate is almost double the size of the whole of US stock market as can be seen in Figure 1 (Goldman Sachs, 2004).

![Figure 1 Stocks vs. Real Estate in market value (GS, 2004)]

When considered the ownership of real estate, they are like common shares. By investing in a real estate, the investor will have control of the property and alone manage the property. Thus, the increase or decrease in value is the investor’s payoff or loss. On the other hand, real estate is less risky than stocks on average, and they generate a more or less known periodic future cash flow. In this way real estate can be seen as fixed-income security. Because of the lower yields, less risk and long maturities real estate is often compare to dept investments. Real estate investments are often also considered inflation-protected, while the lease contracts are revised usually once a year according to the cost of living index which is affected by the inflation pace.

Direct / indirect investments

In this study, real estate investments are considered as direct investments. This means that the investor invests directly in a property by purchasing it. He is the sole investor in that property and also manages the real estate.

There are also many ways to invest indirectly in real estate. Usually, it is done trough different kinds of real estate funds. For example, a real estate investment trust (REIT) is a way for smaller investors
in the US to participate in the commercial real estate world without direct investments. A REIT is a corporation or trust that owns, manages, acquires, develops and finances a portfolio of real estate. REITs are traded publicly and therefore allow smaller investors to invest in commercial real estate simply by purchasing shares of the REIT on a stock exchange. The uniqueness of REITs is that the corporation does not have to pay any income tax and thus is a tax efficient way of investing in real estate (Salomon Smith Barney, 2000:4).

The reason that there are no REITs in Finland lies in legislation. At the moment there is no possibility to explore the tax benefit of REITs and thus makes commercial real estate investments impossible for smaller investors. Future REIT structures are however under consideration of Finnish legislation (KTI, 2004) and it will be interesting to see how this will change the real estate investments. At the moment direct investments are the most attractive way to invest.

In this study real estates are not directly valued with the use of REITs because they operate in the US market. However, they will be used for benchmarking purposes and they will be applied as representatives of real estate investments when compared with other investment possibilities, that is shares and bonds.

2 Characteristics of real estate investments

No data

Real estate differs from the dept and equity investments in some significant points. First, there is no historical data available on the yields of real estates. Even if some data exists, it is not public in the same way as the data is for traditional dept and equity investments. REITs on the other hand, are publicly traded since the 1960s and these give a good benchmark for real estate investments.

Uniqueness

The main difference in real estate as an investment objective compared to the two other investment classes, is that a real estate is unique. All the common shares of a company are identical as well as all bonds issued by the same organization. The real estate, on contrary has a fixed location, it can only be used to some purpose, the building itself is unique, the construction, architecture, planning and age as well as the current tenant.

Although each real estate is different there are some common factors that influence the value of all real estates. Shopping centres are affected by consumer expenditure and logistics centres and office houses are affected by the success of some major companies.
Fixed location
The importance of location in the value of a real estate is obvious because of its immobility. In fact it is one of the key value drivers of a property. The purpose of use decides where a property should locate. Real estates are usually divided in districts depending on their location. With regard to their location only some type of activity is realistic. Traditionally most office buildings are located in the Central Business District, but now moving out to business parks outside of the city centre. A logistics centre should be located strategically near biggest cities, close to a harbour or an airport with good transportation network. A shopping centre on the other hand can locate either in the city centre or in the suburban with good road network. The location determines a lot of the value of a property. For example the value of an office building in the Central Business District is less fluctuating than a corresponding in a business park outside of the biggest cities.

Large principal investment
The principal investment in a real estate is much larger than in other asset classes. This limits the number of investors significantly. While on the stock market and bond market there are plenty of small private investors, on the real estate market, all the players are professional investors such as institutions or treasurers. According to Hoesli (Hoesli, 2000) the unit value also makes it harder to conduct diversified property portfolios even for significant investors. Borrowing is also an important aspect in real estate investments. Because of large principal investments it is common to finance some of the investments with dept. This results in interest rates being one of the key risks in real estate investments.

Long-term and illiquidity
Because of the nature of real estates, they are typically long-term investments. They are illiquid investments that are traded less frequently whereas dept and equity instrument are very liquid with sophisticated secondary markets. These markets do not exist for real estates. The lack of liquidity means that it will take more time to sell an asset at its market value and, if a very rapid deal is wanted, the price has to be discounted. The liquidity is dependant on the supply and demand of real estates and when the demand is high, as it is at the moment, liquidity is a smaller problem.

Depreciation
There is physical deterioration caused by the wear and tear of the building. This will result in declining rental incomes over time compared to a completely new investment. Furthermore, there is also obsolescence that has to be taken into consideration. This is related to changes in building techniques and the flexibility and functionality of the building according to the modern standards. If
there are no investments made to better and modernize the building the value of the real estate will come down (Hoesli, 2000). The income and cost characteristics of real estate investments are shown in the figure below.

![Figure 2 Characteristics of real estate investments](image)

**Management**

When investing in dept instruments, the investor has no control of the investment except of deciding when to sell the instrument. Also in equity investments in a company the investor has only in some cases a bigger role in the decision making in the company. In real estate investments this is different. The investor is usually the sole owner of the property and thus has to have an active role in also managing the property. In practice however, this is often outsourced.

**No perfect competition**

In the other two asset classes, we can talk about an almost perfect competition. This is defined by Berglund as follows: There are many buyers and sellers and thus one single buyer or seller can not affect the price, all the assets are homogenous, an asset is infinitely divisible that is, it can be bought in whatever size and that all the players have the same information available (Berglund, 2005). When considering the definition with the real estate market and its characteristics it can be noticed that none of the above requirements are true. In a perfect market the prices always seek to equilibrium. Because there is no perfect competition in the real estate market, the closing price of a real estate can differ considerably from the price that perfect competition would imply.
3 Classification of real estate

Real estates can be divided into different classes in many ways. In this study, the classification will be done by two commonly used methods. The first one stresses the intended use of the property and also the location of the property, whereas the other emphasises only the expected yield seen from an investor’s point of view.

Sector and geographical region

Real estates can be divided into commercial real estate and residential real estate. Residential real estates are apartment houses, row houses or single family houses that are only meant for living. In this study, we do not consider these at all, because we concentrate on commercial real estate.

Commercial real estates can be divided according to their use into offices, industrial property, retail property and hotels. Offices are also often divided by their location into Central Business District (CBD) offices and suburban offices that nowadays are often situated in so called business parks. Properties meant for retail are shopping centres with many different usually smaller shops and retail parks with just a few different retail actors and bigger retail spaces. Shopping centres can be situated in the city centre as well as in the suburban area whereas retail parks are always suburban.

Yield expectation

Recognising the differences of real estate is essential for the valuation process. Different investment targets have different risks mainly according to their location and purpose of use, but also according to the condition of the property, the tenants and the leasing contracts. The risk levels affect directly the expected return and thus it is important to recognize all the different risks associated with the property. Real estate consultants usually classify real estates according to the level of risk and thus also their expected yield into core assets, value-added assets and opportunistic assets. According to Cushman & Wakefield Analytics, the expected yields for these classes are in the U.S. in 2006 7.5 % to over 10 % for core investments, 12-13 % for value-added investments and 14 % and over for opportunistic assets (Hutchings, 2006). The different aspects that affect the expected yield will be discussed in more detail in following sections.

4 Measurement of profitability and performance

The real estate markets have gone through a great change during the last years. From big inflation rates and negative real interest rates in the beginning of the 90s the world has changed to a world with lower inflation and positive real interest rates. When the inflation was higher, real estate was a
good investment compared to other investments while their nominal value grew together with the inflation rate. The increase of value of commercial real estate in recent years can mainly be explained by the low interest rates. Now that the interest rates are on the way up an investor must be more and more concerned of a solvent tenant that generates stable cash flows.

**Actual return**

The return a real estate investor receives can be divided into two different parts, the income return and the capital return. The income return is the net rental incomes from one year divided by the capital value of the property in the beginning of the year. The capital return is on the other hand the increase of the capital value over the initial capital value. Thus, the total return for one year is the sum of these:

\[
r_t = \frac{(CV_{t-1} - CV_t) + NI_t}{CV_{t-1}}
\]

where \( r_t \) is the total return in year \( t \), \( CV_t \) the capital value in year \( t \), \( NI_t \) the net income in year \( t \); that is income less costs (Hoesli, 2000: 33).

**Occupation rate**

The received net income is not only affected by the level of the rental prices but also very much by the occupation rate. Therefore, the occupation rate and the development of it must be taken into consideration when determining the value of a real estate. According to Land (Land, 1996:16) the occupation rate is very good in telling the state of the market. While the occupation rate tells directly of the supply and demand on the rental market, it is highly correlated with the rental price level. The occupation rate seldom reaches 100 % and according to Catella property for office buildings in Helsinki it is at the moment at about 92 %, whereas for shopping centres it is quite close to 100 % (Catella, 2006). This percentage however, depends on the particular market and property type. The occupation rate and in what direction the rate is moving in the future is crucial for determining the value of a property.

**Expected return and yield**

The term yield (also known as capitalization rate or cap rate) is commonly used in real estate terminology to express expected returns. When calculating the return described above, the parameters were realized incomes and capital values. On the contrary when calculating the yield the parameters must be estimated by the investor. Therefore, yields tell an investor’s expectations about the development of the rental prices and the increase of the capital value in the future. Commonly
the term “yield” is used as the expected net income for the first year to current value over the capital value of the property, thus the expected growth of the capital value of the property is not taken into consideration.

\[
yield_i = \frac{NI_{i+1}}{CV_i}
\]  

(4.2)

The yield is a commonly used term because it is easy to use and predict while the rent contracts usually cover entirely at least the next year. The yield also informs about the market expectations of risk, growth and depreciation.

**The effect of costs, yields and location**

In his Licentiate’s Thesis Juha Takala (Takala, 1999) surveys the economy of rental real estate according to service and maintenance costs, yields and location. The survey is based on 330 rental real estates in different parts of Finland and they all are residential buildings. Thus, it cannot be directly used as a reference to this study. However, as there is little academic research done in Finland in this area in recent years and some of the results can be generalized even to consider commercial real estate, the main results of the thesis will be presented.

For example the highest rental incomes and also the highest maintenance costs are in Helsinki, which is quite obvious. According to Takala’s thesis, the maintenance costs increased with the age of the property as assumed. On the contrary no economies of scale were discovered in the maintenance costs. In the material the net yield percent decreases when the acquisition value increases. This is explained by the fact that the highest market values are in the Helsinki region where also the investment risks are the lowest. When the net yield percent is explained by the age of the property the deviation is very large but there is a slight increase in the yield percent when the age of the property grows. The extension of the property, however, has no effect on the yield.

**5 Historical performance of real estate**

**5.1 Comparative analysis**

When comparing the returns and risks of real estate investments to other investment classes a major problem is to find reliable data on real estate investments. When comparing investments with each other, it is essential that a full economical cycle is considered while different investments might have different returns in boom and recession. Another point in comparative analysis is that the
returns and deviation of dept and equity investments are well documented, but this can not be said of real estate investments. Therefore appraisal based indexes and hedonic indexes must be used. According to Hoesli the return and risks on Finnish offices, stocks and bonds 1971-2004 is as follows:

<table>
<thead>
<tr>
<th></th>
<th>Mean annual return</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offices</td>
<td>17.4%</td>
<td>18.2%</td>
</tr>
<tr>
<td>Stocks</td>
<td>21.7%</td>
<td>41.4%</td>
</tr>
<tr>
<td>Bonds</td>
<td>8.7%</td>
<td>5.9%</td>
</tr>
</tbody>
</table>

According to the table and when looking at the figure below, real estate looks like a very interesting investment alternative. The mean annual return is not quite as high as it is with stocks but the deviation is also significantly lower. Therefore, according to this data at least Helsinki offices have been at least as good as an investment as stocks, if not better.

5.2 Correlation with other asset classes

Correlations of real estate investment yields with the yields of the two other asset classes are disputed on. When the economy is booming, the stock markets go up, as well as the yields of dept instruments. Intuition would say that when the economy prospers the return on real estate investments should go up as well. Companies are in need of more office space, logistics centres are occupied and people commerce in shopping centres which results in higher leases and thus higher returns. When the economy is in recession the contrary would happen.
The above example implies that the correlation should be close to one. However, there are studies that suggest that real estate investments are very good in diversifying risk in an investment portfolio because of their low correlation with the other asset classes. According to Pramerica Real Estate Investors the correlation of listed property investments with global government bonds is only 0.35 and with global stocks 0.69 (Pramerica Real Estate Investors, 2005:14). According to Salomon Smith Barney the correlation of REITs with other investment classes is very low, and for example the correlation with bonds is even said to be negative (Salomon Smith Barney, 2000, 37). The problem of these studies is that they have only looked at the historical data that reaches to the beginning of the 90s. On the contrary, a study done by Goldman Sachs suggests a correlation of REIT returns and GDP growth to be 0.94 (GS, 2004:34). This study reaches back to the year 1962. With the same time span and REIT returns compared to S&P 500 give a very high correlation until the mid 90s. Therefore, we can argue that the returns of real estate investment are in normal circumstances highly correlated with the overall development of the economy and also the stock and bond markets when looking at a long period of time.

6 Valuing real estate

Generally there are three different valuation models that can be used in determining the value of a property. These are the sales approach, the cost approach and the income approach (American Institute of Real Estate Appraisers 1987). Nevertheless, first we are going to discuss supply and demand and how they affect the value of a real estate.

6.1 Supply and demand

When talking about the real estate market we must consider the characteristics of the market’s supply and demand because this will help in understanding the realised prices in the market. Even if the market is not a market of perfect competition as described in section 2, the supply and demand still determines the final price. The theory of equilibrium of price says that the supply should increase together with the price and respectively the demand should decrease when the price goes up. Then the price observed on the market is where these two curves intersect. If the supply and demand increases and decreases linearly the situation looks like in Figure 4 to the left. (Berglund, 2005)

In the real estate market, however, the demand curve could look something like in the picture to the right. The shape of the curve can be explained as follows: Close to the price equilibrium the price elasticity is very high. There are many buyers in the real estate market and selling events occur only
occasionally. Generally, when the selling of an interesting property becomes public most of the investors are interested and also ready to discuss the price. When the prices go up a lot, some investors start to look for alternative investment possibilities, which reduces the demand. On the contrary when the real estates are under-priced, more and more investors enter the market and thus the demand goes up.

The supply curve is quite linear. The higher the prices the more properties are under construction and former property owners more willing to sell and when the prices are low, the contrary happens.

If the price is not where it should be according to this theory it is because all the investors do not have the same information. Moreover, some investors tend to prefer different things in a specific property, their personal views and preferences imply that the appraised value for a particular property differs quite a bit from one investor to another.

![Figure 4 Supply and demand](image)

When new international investors have entered the Finnish market, and the supply is rather a lot limited, the prices of real estates have gone up. Consequently, many of the Finnish institutional investors have sold off large portions of their real estate portfolios for a good price.

### 6.2 The sales approach

In the sales approach the market value is determined by comparing the subject property to other similar properties that have recently been sold. According to the qualities of the sold properties, such as location, size, purpose of use and the date of sale, the price of the property in question is determined. According to the differences in the qualities the price is adjusted either upward or downward. The best feature of the sales approach is that it exactly tells the contemporary market price according to supply and demand.

The main condition for being able to use the sales approach is that transactions of similar properties have recently been made. This is not always self-explanatory. Even if similar transactions have
lately been made, the transactions and their realised prices are not public in Finland. Without data it is hard to analyse what the main factors that contribute to the value of a property are. However, if there was a lot of data and if this data was within reach, regression analysis would be a good method to explain the value of a property. With less data and with data that is partly based on assumptions, different multiples can be used to give a rough estimate of the correct price. Some of the often used multiples are funds from operations (FFO) and EBITDA –multiples. These multiples can be counted based on recently sold similar properties and the price of the subject property is then obtained when FFO and/or EBITDA is known.

6.3 The cost approach
The cost approach begins from the assumption that the subject property does not exist and the land on which the property is built on is vacant and unimproved. The valuation process is approached by determining how much it would cost to build a similar property from scratch. The value of the property is the sum of the land and the depreciated reproduction cost of any improvements on the land (Kratzer, 2004). If the building that is valued is for example two years old, the approach would suggest buying vacant land and building a similar new building. The value of the property is then the sum of all costs minus the estimated depreciated value so that the new building is comparable with the two-year-old building.

The cost approach is applicable when valuing new or fairly new buildings, especially if they are located in the suburban area, where vacant land exists. In that case it is possible to know the price of land and also to build an equivalent building. However, this approach is limited when valuing old buildings in the city centre. It is impossible to today build an old building and thus value the construction costs. Furthermore, it is hard to determine the value of land somewhere where there is no vacant land for sale.

6.4 The income approach
The income approach is the most interesting one for a buyer who is purchasing the real estate as an investment. This is because an investor is mainly focusing on the ability of his investment to generate earnings. According to McKinsey & Company, the intrinsic value of a company, or in this case the value of a real estate, is ultimately driven by the long term ability to generate cash flow (McKinsey & Co., 2000). Therefore, the value of an asset should be measured by the discounted cash flow (DCF) method. According to this method the present value is the sum of all expected
future free cash flows discounted with an appropriate discount rate, also called the rate of return or yield:

\[
P V = \sum_{t=0}^{\infty} \frac{FCF_t}{(1 + r)^t},
\]  

(6.1)

where \( FCF_t \) is the free cash flow in year \( t \) and \( r \) is the expected rate of return.

In the figure below the features of the different valuing methods are summed.

### Table: The pros and cons of the different valuing approaches

<table>
<thead>
<tr>
<th>Approach</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sales</strong></td>
<td>- Reflects supply and demand</td>
<td>- Transactions and realised prices not public</td>
</tr>
<tr>
<td></td>
<td>- Realised prices</td>
<td>- Not suitable for rare or special buildings</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>- Suitable for new or fairly new buildings</td>
<td>- Not good for old city centres</td>
</tr>
<tr>
<td></td>
<td>- Especially in the suburban where land is vacant and for sale</td>
<td>- Sometimes impossible to build a similar building</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Value of land is hard to determine</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td>- Investors only interested of cash flow</td>
<td>- Have to make many assumptions and predictions on the future</td>
</tr>
<tr>
<td></td>
<td>- FCF determines value</td>
<td>- Determining the right discount rate is hard</td>
</tr>
</tbody>
</table>

Figure 5 The pros and cons of the different valuing approaches

### 6.4.1 Perpetuity

The formula (6.1) becomes simpler if some assumptions are made. If the cash flow is assumed to stay constant in perpetuity the present value of perpetuity \( PV \) is equal to the annual free cash flow \( FCF \), divided by the rate of return \( r \) (Brealey, 2000:40):

\[
P V = \frac{FCF}{r}
\]  

(6.2)

If the cash flow is expected to grow with a constant phase \( g \), which is smaller than \( r \) then the present value of growing perpetuity can be written as (Brealey, 2000:41):

\[
P V = \frac{FCF}{r - g},
\]  

(6.3)
where \( FCF \) is the cash flow for the first year. The perpetuity method is very easy to use and often still applicable all alone for real estate investments, while the cash flows that real estate investments generate grow together with the rest of the economy. Moreover lease contracts are revised annually according to the inflation rate and thus are expected to grow together with the inflation as well.

### 6.4.2 Discount rate

The major challenge in using the income approach is to determine the discount rate with which the cash flows are to be discounted. This also tells the investors required return or yield received from the investment. In this study it is assumed that the investor only uses equity and therefore the effects of financing structures are not considered.

The required return consists of two parts. They are the risk-free interest rate \( r_f \) and the risk premium \( r_M \): 

\[
r = r_f + r_M
\]

(6.4)

There are many ways to determine the risk free rate but McKinsey & Company suggest for example to use the rate of a 10-year US Treasury Bond summed with the inflation differential in the US and in the subject country where the investment would take place (McKinsey & Co., 2000). In practise if the investment is made in an OECD country the differential is close to zero and must be taken into consideration only if the investment is done elsewhere.

The risk premium, sometimes also called the yield gap, is determined by the investor according to his understanding of the amount of risk in the market as well as in the particular real estate. The different factors that affects the overall risk and thus also the discount rate are stated in the Figure 6 (Land P., 1996). Some risks are interrelated such as the location and the pitch of a particular property can affect a lot the illiquidity as well as the property’s risk for changes in value. Furthermore, some of the risks are measurable such as the inflation when others must be entirely subjectively estimated. The tenant risk is divided into covenant and lease agreement risk. For instance, many shorter lease agreements should reflect a higher discount rate compared to long lease agreements with companies having good covenant.
6.4.3 Free cash flow

In the discounted free cash flow model the valuation process begins by determining the annual free cash flows. Next we have to determine what is meant by free cash flow. Free cash flow represents the cash that a company is able to generate after laying out the money required to maintain or expand its asset base (Investopedia, 2006). According to McKinsey & Co. the free cash flow is the total after-tax operating cash flow generated by a company or in this case a property. Free cash flow is before financing costs and is therefore not affected by the financial structure. (McKinsey & Co., 2000) Free cash flow equals the net operating profit less net investments and change in working capital. With net investments we mean the total capital expenditure, less depreciation. Free cash flow is thus calculated as follows:

\[
\text{Funds from Operations} - \text{Operating costs} - \text{Taxes} - \text{Net investments} - \text{Change in working capital} = \text{Free Cash Flow}
\]

7 Model

According to section 6 there are some different ways to value a real estate. In this study, we have looked at real estate from an investor’s perspective and also compared them with other investment
possibilities. That is why in this study we are going to construct an income oriented model that is based on discounting the future free cash flows (DCF-model). The use of the model is divided in five steps:

1. Constructing and analysing historical performance
2. Making the future prospects for the next 10 years
3. Determining the growth of FCF in perpetuity
4. Decide the discount factor
5. Counting the value of the real estate

In the first step we have to get a sound understanding of the real estate’s historical performance. How have the funds from operations, the occupation rate and the operating costs developed over time? How much new investments have had to been made in the recent years and how much is to be depreciated annually? The different components of the free cash flow calculations and how they have developed over time can easily be analyzed when they are put into proportion with the gross income, for example.

In the next step, we build projections for the next ten years. Ten years is chosen because real estate investments are usually considered as long time investments and, in ten years, we can project what the effects of possible development of the property are. These projections are essential in the final value of the real estate and to back up these projections the future development of the micro and macro economics in the area must be considered.

When determining the value of perpetuity we use the formula 6.3 which is then further discounted. The FCF in the formula is equal with the last year’s projected free cash flow and the projected growth rate is close to the pace of inflation. If it is projected that no growth is possible then the formula transforms to the formula 6.2.

To help in deciding the discount factor, a model was constructed, where the respondent is asked his subjective opinions of the different factors that affect the risk of the market as well as the particular property. According to the respondent’s answers the discount factor is scaled between 7.5 % and 22.5 %, from core to value-added and opportunistic properties. This percentage consists of the sum of the risk free-rate and risk premium. The principle of the model is as follows: First a vector $t$ is
determined together with the respondent by asking questions about the property. The respondent is
to answer these questions on a scale from 1 to 7, where 1 is the best and 7 the worst. The respondent
has to speak out his conception of for example the location, the lease agreement the lessee and the
flexibility of the property. There can be as many factors as is needed but the only condition for the
possible factors is that they must be independent from each other. If there are, for example, five
questions we get a vertical 5x1 vector which consists of numbers ranging from 1 to 7. The numbers
can be integers as well as real numbers, according to what is wanted. Then the importance of
different factors are valued by the respondent and scaled with proper figures which are in a
horizontal 1x5 vector $s$.

The risk premium is thus computed as the scalar product of vectors $s$ and $t$.

$$ r_M = s \cdot t $$

The discount factor is then the sum of this and the risk-free rate $r_f$.

For an example look at the real case in next section.

Now we have all the needed parameters and the value of the real estate can be calculated.

# Case study

The real case that will be valued will be discussed in this section. The numbers used are however
manipulated that the actual case can not be recognized.

The property is an office building and is situated in the suburban area of Helsinki. There is only one
tenant in the building and it is fully occupied by this tenant. The property was built in the 80s but
completely renovated in the late 90s to reach the modern requirements. Not until recent years the
building has been separated from the rest of the company and therefore, the historical annual reports
are limited.

First the available history data from the annual reports is organized to a DCF model that can be
found in the appendix. Then, according to this data, as well as the future prospects of the property,
the rest of the sheet is filled.

**Determining the discount factor**

The discount factor is determined by the sum of the risk-free rate and the scalar product of two
vectors:
We have five factors: The location, the lease agreement, the lessee, obsolescence of the building and flexibility of the interior. These factors are independent and thus they all are applicable. The respondent is asked to rank how good these factors are in this particular property from a scale from 1 to 7, where 1 is better than average, 4 is average and 7 is worse than average. For instance, a property that has many smaller lease agreements and also only a couple of years forward leases has bigger risk than a property that is completely leased for the next fifteen years. Thus, the bigger risk must affect the discount factor. Furthermore, it must be emphasized that by average we mean an average building that is made for this purpose. For example the best location for an office building is very different from the best location for a logistics centre. According to the respondents answers the vector \( t \) is constructed:

\[
t = [3 \ 1 \ 1 \ 4 \ 1]'
\] (8.2)

Next the different factors are ranked from the most important one to the least important one according to the respondent’s preferences. In other words, the respondent must speak out his assumptions on which of the factors affect the most the overall risk of the property. In this case the “Swing”-method was used but others can also be as good:

The respondent is asked to assign 100 points to the most important factor. Then he must give points that are less than 100 to the next most important factor so that the factor’s importance is relative to the most important one. This is also done to the remaining three factors. These are scaled suitably so that we get the vector \( s \):

\[
s = [0.81 \ 0.32 \ 0.32 \ 0.56 \ 0.48]
\] (8.3)

The scalar product of these give \( r_M \):

\[
r_M = s \cdot t = 5.8 \%
\] (8.4)

As the risk free rate is used a 10-year US-treasury bond that today is at 4.9 %. Thus, as the discount factor we get:

\[
DF = r_f + r_M = 4.9 \% + 5.8 \% = 10.7 \%
\] (8.5)
How the factors in the vector $s$ are scaled depends on the predominant market situation. In our model it is scaled in such a way that the sum of the elements in vector $s$ is 2.6% and thus gives a discount factor between 7.5 and 22.5%. These percentages are chosen because the current property prices imply that investors are expecting yields for their investments that are in this range.

In Figure 7 is shown how the discount factor changes when changing the vector $t$, given the risk-free rate and the vector $s$.

![Figure 7 Examples on how the vector $t$ affects the discount factor, given the risk-free interest rate $r_f = 4.9\%$ and the vector $s = [0.81 \ 0.32 \ 0.32 \ 0.56 \ 0.48]$](image)

**Total value**

The value of perpetuity is counted with the formula 6.3 with an annual growth rate of 0.9% and also discounted. The results and the value the model gives for this property is summed in the Table 2. The final value for the property is thus 4.4 million. For comparison it can be stated that the received bids for this particular property varied between 4.5 and 6.5 million. The constructed model gives a value that is somewhat in the range with the actual ones but the reason why it is a bit lower is mostly because of the rather large discount factor or too conservative future prospects. Perhaps risks related to this real estate are not as big as we considered.
Table 2 Results generated by the model

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<tr>
<th>Metric</th>
<th>Value</th>
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<tr>
<td>Discount Factor</td>
<td>10.7 %</td>
</tr>
<tr>
<td>DCF sum</td>
<td>2 548 689</td>
</tr>
<tr>
<td>Perpetuity CF Growth</td>
<td>0.9 %</td>
</tr>
<tr>
<td>Perpetuity Value</td>
<td>4 615 780</td>
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<tr>
<td>Discounted Perpetuity</td>
<td>1 847 944</td>
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<tr>
<td>Total Value</td>
<td>4 396 633</td>
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**Sensitivity analysis**

The projections of the future are of great importance when determining the value of the real estate. However, if it is assumed that these can be done precisely enough, then the elicited total value is mostly dependant on the used discount factor. In Figure 8 it can be seen how much changes in the discount factor changes the total value. A change in the perpetuity growth, on the other hand, has a significant effect only if the discount factor is small. In the figure, it should be noticed that already a small decrease in the discount factor raises the value to the level of the actual bids. For instance with a discount factor of 10 % we get a value of some 4.8 million.

![Figure 8 Total value as a function of the discount factor](image-url)
9 Conclusions

The value of a certain real estate is mainly driven by two factors. The first is the property specific features, that is for example the location, the purpose of use, tenant, the lease agreement, the condition of the property as well as the aesthetic appeal of the property. On the other hand the price is determined by demand and supply. While the are more and more professional and international large investors in the market, also macro economical future prospects must be taken into consideration. The subject country’s future development (mainly the GDP growth, inflation and employment) influence directly the country risk and thus also the expected return. This then again has a direct influence on the discount factor in the constructed DCF model. The fact that real estates compete in the portfolios of major investors together especially with dept instruments but also with equity, also their future expected performance must be taken into consideration when valuing real estate.

Future studies

In this study, the main focus was to determine the value of a specific real estate. While the issue was approached from an investor’s perspective the income approach was considered the best and a discounted cash flow model was constructed. In this model, there were still some questions that should be more thoroughly approached. Some of them are related to risk and return and in this way affect the discount factor. Others are in trying to make better estimations of the future development and performance of real estate.

In this study we constructed only one model and thus did not compare the different approaches with each other in a real case study. It would be interesting to see how much the value would differ if another approach was used. For example the sales approach could be used to build a sophisticated model that would with the help of regression analysis determine the main factors that affect the value of a real estate. This approach would, nonetheless, require a lot of data collection. Also alternative valuation models could be studied, such as option based valuation, for instance.
References

Books:
American Institute of Real Estate Appraisers, 1987. The appraisal of Real Estate. Chicago, IL.
American Institute of Real Estate Appraisers.

Magazines:
Internet:


## Appendix I The Model

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<td>518,829</td>
<td>539,518</td>
<td>539,800</td>
<td>550,598</td>
<td>561,508</td>
<td>572,480</td>
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Discount factor: 10.7%
Discounted CF:
- Discounted CF: 2,859,592
- Perpetuity value: 4,155,760
- Total Value: 6,015,352