Overbuilding in office markets: Are behavioural aspects important?

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General Table of Contents

Acknowledgements

Overview

Paper 1: Do investors behave myopically when deciding to invest in office buildings? An empirical study using Tobins Q.

Paper 2: Overbuilding in office markets, a behavioural approach to investigate possible explanations.
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Fredrik Brunes
Overview

Background / Aim
During the last decades there have been large fluctuations in the office-building sector, especially in Stockholm. Several times there have been "overbuilding" in the sense that large amounts of office properties have come on to the market after the economy went into a recession. This happened after periods of economic booms and has in the end led to large amounts of non-leased space.

How come that this situation occurs over and over again? Is it just due to bad luck: Who can anticipate sudden changes in the world of politics or in the world of economy that can make the country go into a depression? How can someone anticipate when a hysteric investment IT-boom suddenly stop and the valuable IT-companies quickly diminish in value and has lay off thousands of workers? Or is overbuilding due to the complexity in the decision and implementation phase: The difficulty to predict the market at the time of delivery of the new space and the difficulty to predict how long time production will take. Even if investors can predict the business cycle this can also lead to overbuilding. The production lag can turn out to be longer than expected, leading to entering of new office space in a time of recession.

Can there be any other explanation to overbuilding than the ones mentioned above? There might be situations when the investors have been influenced by different "behavioural biases", which has been analysed in the economic literature during the last decades. The aim of the research presented in this thesis is to investigate whether such "behavioural biases" have affected investments in office buildings in Sweden and thereby contributed to overbuilding.

Before going into this we would like to underline that there is a complex relation between "rationality" and "behavioural biases" - see theory section below - and that one should not from the existence of behavioural bias necessarily conclude that people are irrational.

Theory
In traditional economics it is assumed that all investors are rational, i.e. defined as well informed individuals who act in an optimal-smart/intelligent way according to this information so as to maximize their utility. A simple definition including the office-building sector might be “An investor using all available information, including information about past patterns such as the business cycle, when making investment-decision about office buildings”.

Over the years this assumption in economics about rational operators has been challenged. One of these challenges has its starting point that people has limited cognitive capabilities in processing information. With this limitation, bounded rationality, people rather satisfy than optimize their choice. The defenders of the rationality assumption have acknowledged this boundary but means that this action is rational in a world where information is costly. Another challenge is simplified decision-making, using rules of thumbs like for instance herd behaviour. Also here the defenders of rational theory have argued that in some circumstances it might be rational to actually follow the herd, e.g. if it is believed that they collectively have better information. The main issue of this thesis is not to argue whether a behavioural action
might be rational or not. Our main issue is to investigate whether the investors have been affected by behavioural bias.

Our first interest is to find out what kind of behavioural aspects might have influenced the investors before decision about production were taken. Secondly we are interested in the aspects that might have influenced the investors during the production period, e.g. whether to continue with project and/or adjust the scale. Things are happening during a three years of production, and the question is how investors reacted to new information?

We suspect the behavioural influences existing in the projects decision stage were herd behaviour, overconfidence and myopic behaviour. Herd behaviour is when investors are substantially influenced by the actions of other decision makers. In a worst-case scenario this could lead to investors ignoring their own competent analysis and instead follow what at the time is the trend on the market. Herd behaviour can arise in uncertain periods and when investors are concerned about their job and their reputations. Of course, for herd behaviour to exist the investor must have information about other investors’ actions.

Overconfidence is when people always expect that the results will be higher/better than what actually comes out; they have bad adaptation between expectations and actual outcome. This can lead to excess entry on a market. Investors know that the market has limitations but because they are relatively insensitive to risks and have high thoughts about their own project they still enter the market. If you, moreover, seldom get feedback the risk of making unwise decisions increase even more.

Myopic behaviour occurs when investors are very much influenced by the present situation on the market and thereby ignore well-known facts about the economy, such as booms and recessions that make demand for office properties oscillate over time. Myopic behaviour can arise when there is a long time between production decision and the time when the good will be sold at, which makes prediction about selling price difficult. In an efficient market where the current price reflects all available information it might be reasonable to see the current price as the best guess about the future price. A classical example of myopic behaviour is the so-called hog-cycle that will be explained in paper 2. Also there might be a wish among investors, and humans in general, that the good times shall last forever.

Our second aim in this thesis is to look at the actions during the production phase. We have in our scenario three behavioural aspects that might have influenced investors in the production phase. The first is confirmation bias – the tendency to disregard information that contradicts our decision and instead only focus on information confirming our decision. The second is the sunk-cost fallacy – the tendency to let already spent resources/money affect the decision making, "throwing good money after bad". The third is the status-quo bias – the tendency to demand stronger arguments for changing than to stay with the present choice.

**Method**

The optimal way to investigate the behaviour of investors would have been to participate when decisions were made and following the whole process from the initial idea to the last day of production. This was not possible in this project. Another way to follow the process would have been to go through all documents that were written about the investment projects. This has also not been possible as these documents usually are looked upon as business secrets.
Our way of approaching the problem has instead been by so-called triangulation. That is using three different methods to find answers to the questions. First we have used statistical data on office buildings such as level of production, prices and construction costs over a period of 20 years. With this data we have made regression analysis. Second we made case studies of three newly produced offices. People in decision-making positions were interviewed about their way of reasoning before making decisions about projects. Thirdly we have made a survey, which was sent out to independent people that has long experience and good knowledge about the office market. They should also have some insight into how the decision makers reasoned. We asked them questions about how investors had acted during the latest production boom.

The methods did not cover all behavioural issues. The most interesting issue for us - myopic behaviour - is analysed by all three methods. The other aspects are covered by the case studies and the survey.

**Results**

Our primary result is the existence of myopic behaviour. All three methods give indications of this phenomenon. In the statistical analysis the explanation using Tobin's $Q$, the quotient between price and construction cost, gives the best result when prices and construction cost at period one explains the production in period four. With the knowledge of a delivery lag of approximately three years, this means that the investors have systematically used the present circumstances and conditions when initiating a project. Also the case studies indicate myopic behaviour. For one of the projects it was admitted that they were too much influenced by the current situation of the IT-sector, not having analysed it enough. For another project they seemed to have followed what the people within the letting department thought about the present market, without doing any substantial analysis of the market. Thirdly the questions within the survey that were asked to illuminate myopic behaviour gives strongest indications for myopic behaviour, the clearly most significant result in the survey.

The hypothesis of herd- and overconfidence behaviour from investors cannot be demonstrated as clearly as myopic behaviour. There are evidence that point to this behaviour as well, but there are facts that point in the opposite direction too. Supporting the hypothesis of herd behaviour was partly the fact that the investors had good knowledge about competitors’ actions and partly the managers concern for their reputation. But for herd behaviour to evolve we should also have an insecure market and a bad situation on the labour market for managers. This could lead to the investors protecting themselves by doing as others even though this might be a bad decision. Then at least they are all “sharing the blame”. Feelings of uncertainty and a bad labour market was however not the case in the investigated market. There were also indications for overconfidence behaviour, especially in the case studies where the investors’ confidence in their own projects were not difficult to observe. But for overconfidence to be present the investors should expect the market to be too small for all present entrants. We believe that this was not the case, as all participants thought the market would grow enough to absorb most projects.

In the production phase it seems that the investors have been rather rational according to the survey. The survey indicates that if behavioural aspects have influenced the investors it is the sunk-cost fallacy that is prevalent.
Do investors behave myopically when deciding to invest in office buildings? An empirical study using Tobins Q.

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Abstract
The purpose of this paper is to build a regression model using the investment rule “Tobins Q” (TQ). TQ is the quota of the market price and the replacement cost of a good. TQ indicate when there is potential in the market to build and sell office buildings. We have used data for market price, construction cost and production for a period of 22 years for a suburban office market in Stockholm. TQ has been regressed on newly produced offices with different time lags. The result indicates that, with our model, we can with TQ decision rule explain the production of office space better with a three-year lag on TQ than with no lag. The result might indicate that investors have myopic view.

Keywords: TQ, myopic behaviour
1. **Introduction**

1.1 **Background**

Many studies have shown that the investments in new office buildings follow a cyclical pattern (see e.g. Wheaton 1999). There are of course both demand and supply variables that influence the level of production. For instance high volatility in office demand due to high volatility in the amount of people working in the office sector and preference changes that make tenants want more or less space per employer. Change in production cost due to, for instance, change labour cost or capital cost. Additional uncertainty is the time factor; the time it takes to plan a project, to get approval from the local authorities and for construction. In Sweden it can take many years to get approval from the authorities (Lind 2002).

With these uncertain circumstances present it is an interesting question how an investor makes a decision. One way to deal with this investment problem for a rational investor is to use Tobins Q ($TQ$), i.e. compare the market price for the durable good with its replacement cost. The problem for an investor in the office-building sector is however that it takes some years to construct the building, which make the estimation of $TQ$ at the delivery date difficult. The question is what $TQ$ the investor will use when making the decision to invest? Do they use the current $TQ$ or will they try to estimate $TQ$ at the delivery date? We suspect that the investors pay much attention to the present circumstances. Assuming that the present circumstances will continue is called myopic behaviour, defined as “short-sighted expectations”. Myopic behaviour might, according to Wheaton (1999), lead to periods of overbuilding where new space come on the market when demand already has began to fall.

Wheaton (1999) demonstrates that different types of real estate can have very different cyclical properties. In his model expected price at the date of delivery is a crucial variable to determine the level of new supply. On this point he makes a distinction between myopic and rational expectations about prices at this future date. Wheaton shows that strong cyclical behavior can arise if decision makers have myopic expectations and even stronger cycles if construction time is long and/or if the elasticity of supply is high (or higher than demand) and where the growth in demand is high.

If there, on the aggregate level, seems to be deviations from what looks like rational behaviour. There might be, besides myopic behavior, explanations related to biases in investors behaviour. How are they influenced by old information and new information? How are they influenced by recent trends in the market? How do other investors influence them? How rapidly do they change opinion due to changed circumstances? An extensive description of these deviations and an empirical study about their roles can be found in Brunes (2005).

1.2 **Aim and general strategy**

In this article our aim is to investigate whether investors had myopic expectations or not. The hypothesis is that if they have myopic expectations then there should be a strong relation between each year’s production and $TQ$ at the date where the decision was made. Given historical patterns there are no reason to believe that situation on the market at the date of delivery would be the same as when the decision was made. If there were perfect forecasts of the future we should instead expect that the volume of production in one year to be explained
by \( TQ \) at the date when the buildings are ready. The strategy in this study is to regress \( TQ \) with different lags against production of new office buildings. Will production be better explained by using non-lagged or lagged exogenous variables?

We are aware that there might be situations where it is rational to believe that the current situation will prevail. By this study it will not be possible to draw any definitive conclusions concerning the issue of myopic vs. rational expectations. The study can however add one piece to the puzzle of economic decision-making.

1.3 The geographical submarket under study

According to McDonald (2002), most econometric models of the supply side of the office market have been looking at a metropolitan area as a whole, and some have even done estimations at the national level. Most of these studies do not analyze a specific location within the metropolitan area. In some cases, for instance Wheaton, Torto and Evans (1997) and Hendershott, Lizieri and Marysiak (1999), they examine the office market in the Central Business District of a larger metropolitan area. In this study a smaller geographic submarket, Kista, outside the Central Business District of Stockholm will be analyzed.

Kista is known for housing many companies in the electronics and IT sector. Kista was by Newsweek in 2000 characterized as “a huge hub of wireless R&D” and Kista has also been called “The Swedish Silicon Valley”. Companies like IBM, Oracle, Intel and Ericsson are situated here.

Kista is situated approximately 10 kilometers north of central Stockholm. The suburb is divided by the underground into an area of residential houses and an area of commercial real estates. Kista has a good location near to highway E4 that connects Stockholm City with Arlanda airport. During the period under study there were a lot of excess land where new construction was possible.

Office space dominates the commercial sites. The office buildings have historically been rather standard office buildings with about 3-7 floors, a framework of concrete with facing brick with no special extravagances. The buildings are mostly built on rock or gravel bed. Recently there has, however, been constructed more expensive buildings, for example a skyscraper with a height of 160 meters.

Kista has a history of about 30 years. In the mid 1970’s Kista started to develop. The early buildings were traditional industrial buildings with low level of exploitation and owned by the companies that used the buildings. There were very few transactions with office buildings in Kista in the 1970’s.

During the earlier 1980’s office buildings were successively constructed and the supply of office space were increased from approximately 250 000 square meters to 750 000 square meters. This expansion was, among other things, due to the lack of space in Stockholm city. Kista became one of the suburban areas in which the Stockholm municipality was deeply committed. This large engagement reached its peak with the opening of Electrum, which is a part of Royal Institute of Technology of Stockholm.

In 1990-1991 the demand for office space dropped considerably, this lead to a high vacancy rate in Kista and to low levels of new construction. During the whole 1990’s the expansion
was very slow. But in the late 1990’s demand for office space in Kista increased dramatically because of the IT-boom, this lead to the start of a number of substantial new constructions that increased the supply of office space with about 20 percent in the early 2000’s.

During the 1990’s Kista increased its IT-profile substantially and in 2000 nearly 70% of the employees were found in IT-companies. In 2000 approximately 25 000 people worked in Kista.

1.4 Disposition
In section 2 we develop the economic theory that supports our model. In section 3 there is a literature review concerning the modeling of the supply side of the real estate market. In section 4 we build a model based on $TQ$. In section 5 the results from the regression analysis are presented. In section 6 we draw some conclusions and discuss further research.

2. Theory
In this section we will develop the theory behind the econometric models that will be used in this study. The theory is based on the stock-flow model (Poterba (1984)) and we have primarily used the interpretation of the model presented in Jaffe (1994).

2.1 Stock-flow model
The stock-part
The supply of office space at a specific point in time is the actual stock at that point of time. The demand for office space is determined by, as mentioned earlier, the amount of people working in offices and the demand for space per employer. This is in turn determined by the overall performance of the economy such as growth, employment rate, interest rates and so on. Equilibrium price for offices space is where demand equal supply.

The flow-part
The production of new office space, the flow part, is determined by the possibility to make profits, which are given by the quota between the price of the existing stock and the cost for new buildings. In the short run, $TQ$ could be above one and there should be construction going on forcing $TQ$ down towards one. $TQ$ can also be below one and then no construction would take place until increased demand (and perhaps reduced supply) raises the price of the office buildings so $TQ$ increase to 1.
First we will demonstrate a model which assumes that the price adjust to the equilibrium level immediately.

\[ P_0 \rightarrow P_1 \]

\[ S_0 \rightarrow S_1 \]

\[ P = MC \]

**Figure 1. Perfect adjustment to demand shock.**

Regard Figure 1 where the stock adjusts directly to a demand shift from \( D_0 \) to \( D_1 \), caused by e.g. higher GDP. The price changes from \( P_0 \) to \( P_1 \) and an immediate production increase the stock from \( S_0 \) to \( S_1 \). In this model \( TQ \) is always equal to 1 \((P=MC)\) as new production immediately come on the market when the price of office buildings is higher than the production cost. However, due to the time it takes to complete new buildings, this model of the adjustment on the market is usually not correct.

\[ P_t > MC \]

\[ S_0 \rightarrow S_1 \]

**Figure 2. Rigid adjustment to demand shock**

A more realistic description of the market can be found in Figure 2. In the short-run supply is not easily changed. The first thing that happens when demand increase is that the price will increase to \( P_2 \), considerably higher than the long-run equilibrium. This means that \( TQ_t \) is above its long run equilibrium value of 1 \((P > MC)\). New construction is profitable and in the long run the price will slowly fall to \( P_1 \) and the stock will rise to \( S_1 \).
We assume that the firm is a price taker with constant return to scale. Then according to Hayashi (1982) the average and marginal $TQ$ is equal. The problem that $TQ$ actually is the ratio of the market value of an additional unit of capital to its replacement cost is then avoided and we can use what is observable, namely the average $TQ$, the ratio of the market value of existing building to its replacement cost.

According to Dipasquale and Wheaton (1994) and Riddel (2004) the market for houses exhibit disequilibrium. Dipasquale and Wheaton (1994) uses data from the US housing market and include price, change in employment and price for land as exogenous variables, and level of construction as endogenous variable. They find that the speed of adjustment in the housing market is remarkably low at a value of 2%. They conclude that the earlier results that the price adjusts instantaneously to the long run level are obviously wrong. They also conclude that with this slow adjustment housing prices are not a sufficient statistic for describing the situation on the market. Riddel (2004) extends the model, which is a two-step model, by decomposing the disequilibrium into partly supply and partly demand related causes. Riddel (2004) concludes, using the model on US housing market, that a market clearing supply is an anomaly rather than the typical feature. We suspect this disequilibrium and rigidity also to be present in the office market. We should therefore be aware of that prices on market are not equilibrium prices. We will still use present market prices though we suspect investors to be more prone to regard these actual prices rather than hypothetical prices on a non-rigid market.

The econometric research of the office-building sector has the last decades been without $TQ$. We find support for our model in Jud and Winkler (2003), and of course Tobin (1969). Jud and Winkler (2003) perform analysis of the housing market in US for the period 1980-2000 using house price index, new home prices (representing construction cost) and level of construction represented by building permits and housing starts. They perform several regressions including $TQ$ lagged several times. Their findings suggest that the market function according to $TQ$ and that housing suppliers appears to respond to the demand of housing consumers, building new homes when existing home price are high relative to new home prices.

3. **Determinants of office market development**

In this section we give an overview of previous research on modeling the office market, particularly the supply side and the determinants of construction of new office buildings.

3.1 **Earlier studies of the office market**

The last 20-years of research on modeling the supply-side of office buildings has been without explicit use of $TQ$. The construction cost has often been included in an additive form. Market price has not been included in these articles; one explanation might be the difficulty to attain data. In this section we present earlier research\(^1\) and for our purpose focus on what exogenous variables have been included. The articles are first presented in chronological order.

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\(^1\) We focus on regression models and exclude articles about, for instance, option theory (Grenadier (1995)).
Rosen (1984) is one of the first to develop a statistical model of supply. The data used concerned San Francisco during the period 1961 – 1983. The model showed best result with a four-year distribution lag on vacancy. As Rosen points out, new construction is very volatile and therefore very difficult to fully explain in an equilibrium econometric model. Rosen used vacancy and rents as approximation of price.

Hekman (1985) used data from fourteen cities for the period 1979-1983. His results, from a two-stage regression model, indicate that the market for new constructions responds to rent, and to the long-term growth rate of office employment. First rent was regressed on vacancy, income, employment on a nation scale and local unemployment. Then the supply of space was regressed on construction cost, interest rate, expected growth and rent (given from the first regression). Hekman makes regression both on larger areas and on suburban areas. The result showed that construction responds strongly to rents and employment rates.

Wheaton (1987) uses a stock-flow model to explain the cyclical behavior of the office market. He uses data from thirty markets for the period 1967-1986 and ten markets for the period 1960-1986. The result from his construction equation (the flow part) indicates strong explanation from the employment growth, vacancy and current stock of space. The stock coefficient was used as a scaling factor – all else equal a larger market should have higher construction levels simply to account for demolition and replacement.

Pollakowski et al. (1992) test for structural differences in office markets across 21 metropolitan areas for the time period 1981-1990. Their model is based on Rosen (1984) and Wheaton (1987). They use a cross-section time-series model. The model is lagged for construction costs – this is calculated by regarding the growth in employment that is used by suppliers to approximate future demand. They made a few regressions and best result was produced with a three-year lag on construction cost and two-year lag on operating costs, rents and rate of change in office employment. Using standard explanatory variables their results showed that larger markets are better modeled than smaller markets. This is partly due to that rents adjust quicker in large markets because there is more competition in the market.

Clapp et al. (1992) studies how the market for office space is especially influenced by agglomeration effects, i.e. that the specialization of different branches in locations can explain the new supply of office space. They use a special location factor to differentiate between the areas. Data are from Boston metropolitan area for the period 1979-1987. Their conclusions are that growth potential (a measure of expected demand) lagged one year, tax considerations and population density explain the rate of new constructions. They also state that access to potential office employees is valuable for the rate of new constructions provided that enough land is available.

DiPasqule and Wheaton (1996) build a model for the demand and supply side of the office market. Data are from San Francisco for the period 1967 - 1992. In their supply model current stock, vacancy in absolute values and absorption are exogenous variables (construction costs are omitted). The variables are all significant and the model as a whole has strong explanatory power. From the perspective of our study their argument that strong explanatory power of lagged exogenous variables does not necessarily indicate myopic behavior. Instead they argue that even rational investors also have to include current values in their decision-making. It is not possible only to look at expected future values.
Evans, Torto and Wheaton (1997) build a model to investigate the London office market. Data are from London for the time period 1970-1995. They first state an important feature of the office market; the slow adjustment of rents and vacancies due to behavior in the market such as long-term leases and the bargaining over lease-terms. They assume that the level of new constructions depends on the asset price for office space relative to its replacement cost. The asset price is then based on rents, vacancies and a capitalization rate. They finally concludes that their London model demonstrates that commercial property in European cities is forecast, to the extent that any economic variable is, dependent on a pattern of economic growth. The dynamic structure of property markets means that response of these markets to economic change will be quite different than that which occurs in the markets for other goods and services.

Hendershott et al. (1999), model the London office market (similar to Wheatons earlier work). Data are from London for the time period 1983-1995. They use the concept of natural vacancies defined as vacancies that should occur even when the market is in equilibrium. They also use the concept real effective rents that must equate the user cost of capital. This is a product of replacement cost and the sum of the real interest rate, depreciation rate and the operating expense ratio. New office buildings are a function of the deviation between actual vacancy and natural vacancy together with the deviation between actual rents and real effective rents. They find that construction respond to lagged values of the gap between actual and equilibrium net rent when it is positive, and net space absorption is negatively related to rents and positively related to financial services employment growth.

In Table 1 we have summarized and listed the variables used in modeling the supply side in the above articles. Most of the variables that have been used can be related to $TQ$. The only major exception is the interest rates. In an early stage a model with $TQ$ and the interest rate was tested, but as it gave implausible results the study will focus on models only using $TQ$. 
Table 1. Exogenous variables in earlier studies using regression analysis to explain the production of office buildings.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of articles</th>
<th>Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating cost</td>
<td>2</td>
<td>Pollakowski et al. (1992), Clapp et al. (1992)</td>
</tr>
<tr>
<td>Taxation laws</td>
<td>1</td>
<td><em>Rosen</em>² (1984)</td>
</tr>
<tr>
<td>Growth of the market</td>
<td>1</td>
<td>Hekman (1985)</td>
</tr>
<tr>
<td>Office employment growth</td>
<td>1</td>
<td>Wheaton (1987)</td>
</tr>
<tr>
<td>Market size</td>
<td>1</td>
<td>*Pollakowski et al.*² (1992)</td>
</tr>
<tr>
<td>Rate of employment growth</td>
<td>1</td>
<td>Pollakowski et al. (1992)</td>
</tr>
<tr>
<td>Property tax</td>
<td>1</td>
<td>Clapp et al. (1992)</td>
</tr>
<tr>
<td>Population density</td>
<td>1</td>
<td>Clapp et al. (1992)</td>
</tr>
<tr>
<td>Absorption</td>
<td>1</td>
<td>Dipasquale and Wheaton (1996)</td>
</tr>
<tr>
<td>Demand variable</td>
<td>1</td>
<td>Grenadier (1995)</td>
</tr>
<tr>
<td>Capitalization rate</td>
<td>1</td>
<td>*Evans et al.*² (1997)</td>
</tr>
</tbody>
</table>

² Variable was not significant at 5% level.
4 Model and Data

4.1 The Models
The model used here is based purely on the investment rule of Tobin (1969), with support of the recent application of Jud and Winkler (2003) on the housing market. The model therefore becomes:

\[ P_t = \alpha + \beta TQ_{t-m} + \epsilon_t \]

Where \( P_t \) is the production of office buildings that are completed at time \( t \). \( TQ_{t-m} \) is the quota between the price of the building at \( m \) years before completion and the replacement cost at \( m \) years before completion.

4.2 Data
The data used here is a time-series for the period 1980-2002. The variables utilized in the models are presented in Table 2.

Table 2. Definitions and units for the variables included in the regression models.

<table>
<thead>
<tr>
<th>Variable ( P_t )</th>
<th>Definition</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production of office space at time ( t ).</td>
<td>Square meters</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable ( TQ_{t-m} )</th>
<th>Definition</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio of price and cost per square meter at time ( t-m ).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Production
The production of office buildings in Kista is presented in Figure 3; it is measured by using the Swedish land registry. As mentioned earlier, the supply increased substantially each year from 1980 to 1989. Then a period of recovery took place until the late 1990’s when an increase in real estate office investments took place again. The change in supply is stationary\(^3\), i.e. do not show any long-run trend during the period under study.

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\(^3\) See Appendix for an Augmented Dickey-Fuller test.
TQ

In Table 3 we present \( TQ \)-values for the research period. The \( TQ \) variable is stationary\(^4\), i.e. do not show any long-run trend during the period under study. To develop \( TQ \) we have estimated market value \((M)\) and construction cost \((C)\) for each year during the research period. We will first present how we estimated these variables.

\[
\begin{array}{cc}
\text{Year} & TQ \\
1980 & 1,18 \\
1981 & 0,83 \\
1982 & 0,38 \\
1983 & 1,44 \\
1984 & 1,07 \\
1985 & 0,37 \\
1986 & 0,58 \\
1987 & 0,79 \\
1988 & 0,59 \\
1989 & 0,57 \\
1990 & 0,80 \\
1991 & 0,93 \\
1992 & 0,51 \\
1993 & 0,55 \\
1994 & 0,71 \\
1995 & 0,69 \\
1996 & 0,48 \\
1997 & 0,68 \\
1998 & 0,97 \\
1999 & 0,88 \\
2000 & 1,38 \\
2001 & 1,33 \\
2002 & 0,78 \\
\end{array}
\]

\(^4\) See Appendix for an Augmented Dickey-Fuller test.
Price
Finding data on market price for office buildings is difficult. We could have used rents as proxy to price as many researchers do. The problem with this is that data about rents are also difficult to attain due to the fact that real estate companies want to keep rents secret as an advantage in future negotiations with tenants. Another alternative is to use vacancy as a proxy for rents, but these figures were also difficult to attain. A proxy might mean that we lose explanatory value in the conversion process.

To estimate the square meter price we used data from Statistics Sweden. The database included 342 price observations. Because of lack of trades it was not possible to estimate using only prices from Kista we have therefore included observations in nearby areas such as Bromma, Sollentuna, Sundbyberg and Spånga. We have eliminated data where the quota between price and taxation value were below 0.5. They are probably affected by special circumstances, e.g. the relationship between the parties in the transaction. Kista, as office market, is regarded as more attractive than the other areas and we therefore believe that the prices in Kista actually are a bit higher than prices in the other areas. We therefore suspect that the estimated price per square meter might be a bit low.

We have divided the total sales sum for each year \((t)\) with total area that has been sold each year \((t)\) to get the square meter price \((M)\).

\[
M = f\left(price, area\right)
\]

To be able to appreciate the realism in our data we have constructed a square meter price index \((MI)\) out of it with 1980 as base year. We have compared it with a modified, 1980 as base year, Price Index on Rental houses in Sweden \((SI)\). This index represents prices for commercial buildings in Sweden, including rental houses, offices and warehouses. It was not possible to get data on only office buildings.

The correlation between \(MI\) and \(SI\) was 76\%\(^5\) and the trend that the \(MI\) display seems reasonable. See Figure 4, a similar feature of the two indices is that they climb to peak in the late 1980’s. Then they both fall and start to recover to new high levels in the late 1990’s. There is a higher volatility in \(MI\) compared to the \(SI\). This is as mentioned earlier due to lack of data for some years. We chose to base the price variable on actual figures than to interpolate these uncertain years.

\[\rho = \frac{\text{cov}(MI, SI)}{\sqrt{\text{var}(MI) \cdot \text{var}(SI)}}\]

---

\(^5\) \rho = \frac{\text{cov}(MI, SI)}{\sqrt{\text{var}(MI) \cdot \text{var}(SI)}}
Construction cost
A specialist in the field has estimated the construction costs per square (C) meter for each year. There are substantial variances in the construction costs for different types of buildings and in different areas. We believe that the costs in Kista are on a somewhat lower level due to the fact that the buildings in Kista during this period are not of any special character. They are mostly of quite simple design. They are about five to six store high, with concrete as framework and facing brick. None of them have much glass façade and there has not been a lot of bursting and pile driving. For the years of 1980-1982, 1984 and 1986 we had to extrapolate and interpolate construction costs because lack of data.

With the data we have constructed a cost index (CI). The purpose is to compare it with the real estate factor price index for Sweden (FPI), which is based on price information for residential houses. We had to be content with this because data on office buildings were not available. See Figure 5, the indices have obviously the same trend with a correlation of 97%\(^6\). The only difference is that FPI is smoother than CI.

\[^6\] \(\rho = \frac{\text{cov}(C, FPI)}{\sqrt{\text{var}(C) \cdot \text{var}(FPI)}}\)
Figure 5. Consultant construction index (CI) and factor price index (FPI).

Land value is not included in cost of construction. Little reliable data is available on land price. This is a problem that we have dealt with by assuming that the land value probably has been constant in real term. The argument is that a great amount of land has been available during the investigated period, that the land has quite similar quality and therefore the price ought to be equal to the marginal cost of making the land ready for construction instead of a scarcity price.

5. Results

The strategy in the empirical estimations is to regress the level of new production coming on the market against $TQ$ at different years, starting 4 years before the completion of the building. As described in section 1, if there is a strong correlation between the level of completion and $TQ$ three or four years before the completion, then this could be a sign of myopic expectations. The investors then start to build if the current situation looks good, assuming that this situation continues. If people used all available information for predicting $TQ$ when the building is completed, then we should not expect a strong correlation between completion and $TQ$ at the date when the decision were made.
5.1 Descriptive statistic

The descriptive statistic presented in Table 4 covers data from a period of 23 years (1980-2002). When \( m \) - the lag - is larger than zero then the total number of years used in the regression will be \( 23 - m \), \( \{m\} \geq 0 \).

Table 4. Descriptive Statistics for the variables included in the regression for the period of 1980-2002.

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>( P_t )</td>
<td>28 282</td>
<td>0</td>
<td>115 421</td>
<td>35 731</td>
</tr>
<tr>
<td>( TQ_{t-m} )</td>
<td>0,8052</td>
<td>0,37</td>
<td>1,44</td>
<td>0,30866</td>
</tr>
</tbody>
</table>

All variables have a large spread, especially the level of production that has a larger standard deviation than the mean value. This can reflect a very high volatility in demand, which according to Wheaton might cause overbuilding. There is also a high variance in \( TQ \) with some extreme low values in the years of 1982, 1985 and 1996. This is dependent on the weak price index we have. See Figure 4, there are high fluctuations in the mean price index. This is due to lack of sales making the index instable.

5.2 Correlation matrix

The correlation between \( P_t \) and \( TQ_t \) are as expected positive (Table 5). \( TQ_{t-3} \) has the highest correlation with production \( (P_t) \) and is the only correlation that is statistically significant (at a 5% level).

Table 5. Correlation between production and \( TQ \) at different time lags.

<table>
<thead>
<tr>
<th>Variables</th>
<th>( TQ_t )</th>
<th>( TQ_{t-1} )</th>
<th>( TQ_{t-2} )</th>
<th>( TQ_{t-3} )</th>
<th>( TQ_{t-4} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( P_t )</td>
<td>0,06</td>
<td>0,30</td>
<td>0,14</td>
<td>0,50</td>
<td>0,47</td>
</tr>
</tbody>
</table>

5.3 The estimated equations and the results

Four different regressions were carried out on the model \( P_t = \alpha + \beta TQ_{t-m} + \varepsilon_t \), by varying the variable \( m \) between zero and four. The reason for limiting this to four is that the completion time for office buildings cannot be expected to be more than four years.
The results from the regression are presented in Table 6.

Table 6. Coefficient on constant, on $TQ$, t-test on $TQ$ and fitness of model 1 when regression made with different time lags on $TQ$.

<table>
<thead>
<tr>
<th>Variable</th>
<th>$T_{Q_{t}}$</th>
<th>$T_{Q_{t-1}}$</th>
<th>$T_{Q_{t-2}}$</th>
<th>$T_{Q_{t-3}}$</th>
<th>$T_{Q_{t-4}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient on constant</td>
<td>22354</td>
<td>1613</td>
<td>14175</td>
<td>-18567</td>
<td>-16258</td>
</tr>
<tr>
<td>Coefficient on $TQ$</td>
<td>7362</td>
<td>34549</td>
<td>14346</td>
<td>59101</td>
<td>55011</td>
</tr>
<tr>
<td>t-test $TQ$</td>
<td>0.29</td>
<td>1.42</td>
<td>0.61</td>
<td>2.48</td>
<td>2.21</td>
</tr>
<tr>
<td>Fitness of model (adjuster R-square)</td>
<td>-0.04</td>
<td>0.05</td>
<td>-0.03</td>
<td>0.21</td>
<td>0.18</td>
</tr>
<tr>
<td>Autocorrelation in residuals</td>
<td>No</td>
<td>Yes</td>
<td>No decision</td>
<td>No</td>
<td>No decision</td>
</tr>
</tbody>
</table>

The best result in terms goodness of fit of the model and validity of the $TQ$ coefficient was a regression with a three-year lag on $TQ$. It is presented below (t-test within parenthesis):

$$P_t = -18567 + 59101 \cdot T_{Q_{t-3}}$$

(-0.98) (2.48)

This gives an adjusted R square of approximately 21%. Both exogenous variables are statistically significant at a 5% level. The whole model is significant at a 5% level. Another interesting result is the very low explanatory power of the equation with no lag.

Incorporating production data for 2003 gives even better result for the three years lag. The equation then becomes:

$$P_t = -23562 + 69749 \cdot T_{Q_{t-3}}$$

(-1.44) (3.29)

This gives an adjusted R square of approximately 33%. Both exogenous variables are statistically significant at a 5% level. The whole model is significant at a 5% level. This result cannot be compared with a non-lagged regression because lack of data for price and construction cost for 2003.

6. Conclusions and further studies

The explanatory power of the $TQ$ model is quite good when a time lag of three to four years are included in the model. One interpretation of this is that the decision makers are characterized by myopic behaviour. If the model had fitted nice without any time lag we might have suspected that the investors did a pretty good job in forecasting the exogenous variables.

A single empirical study like this can never disprove a specific hypothesis. It might have been the case that there were, at the time of decision, reason to believe that the current situation would continue. That this turned out to be a mistaken belief might simply be bad luck - this is something that can always happen because of long construction time, and a volatile demand.
If the same result were found looking at other submarkets and different time periods the hypothesis of bad luck would however seem less credible.

One should also be aware of that using the current price on the market might be a reasonable procedure if the market is informational efficient. Then the current price includes all available information and it is not possible to know if the price will go up or down. There has been a long controversy about whether the real estate market is efficient or not (see e.g. Gatzlaff and Tirtiroglu 1995). Due to the fact that the real estate markets has substantial transaction costs, significant barriers to enter, costly information and that market participants are not generally price-takers ought to lead to inefficiency, especially in some submarkets. Models with mean-reversion that indicate some long run cyclical pattern have also become popular in recent years.

To cast further light on the questions weather myopic expectations has influenced the investors' decision in large extension we will continue this research by looking more directly at behavioral patterns of the investors, using interviews and questionnaires (Brunes 2005).
Appendix – Dickey-Fuller test and ADF-test

Dickey-Fuller test
Testing for unit roots begins with the AR(1) model:

\[ P_t = \alpha + \rho P_{t-1} + \varepsilon_t, \ t=1,2,\ldots \]  

(1)

If \( P_t \) follows 1, it has a unit root if and only if \( \rho = 1 \). If \( P_t \) has a unit root then 1 is a random walk and random walks are non-stationary\(^7\). In that case the time series \( S_t \) is also non-stationary. Therefore the null hypotheses is that \( P_t \) has a unit root: \( H_0 : \rho = 1 \). In almost all cases we are interested in the one-sided alternative: \( H_1 : \rho < 1 \).

To make things easier, the unit root test can be carried out by subtracting \( P_{t-1} \) from both sides in 1 and to define \( \theta = \rho - 1 \):

\[ \Delta P_t = \alpha + \theta P_{t-1} + \varepsilon_t \]  

(2)

This means that the hypothesis has changed to \( H_0 : \theta = 0 \) and \( H_1 : \theta < 0 \). To test these hypothesis we need to use Dickey-Fuller distribution.

For the Dickey-Fuller test to be usable the error term, \( \varepsilon_t \), must not be auto correlated. If they are the Augmented Dickey-Fuller test can be used.

Augmented Dickey-Fuller test
When the residuals in equation 2 are auto correlated one must use the augmented Dickey-Fuller test. This means that equation 2 are extended in a way which reduce autocorrelation between residuals:

\[ \Delta P_t = \alpha + \theta P_{t-1} + \sum_{i=1}^{m} P_{t-i} + \varepsilon_t \]  

(3)

The number of lagged difference terms \( P_{t-i} \) that should be included depend on when the residuals, \( \varepsilon_t \), is not auto correlated. When the right equation is used and no autocorrelation is at hand, the same decision rule is included as in Dickey-Fuller test. We have performed ADF test and result in Table 7 indicate that \( TQ \) is stationary and \( P \) is stationary.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Testvariable</th>
<th>t-test</th>
<th>Comment</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>( TQ )</td>
<td>( \theta )</td>
<td>-3,62</td>
<td>5% significance level</td>
<td>Stationary</td>
</tr>
<tr>
<td>( P )</td>
<td>( \theta )</td>
<td>-4,50</td>
<td>1% significance level</td>
<td>Stationary</td>
</tr>
</tbody>
</table>

References


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Overbuilding in office markets, a behavioural approach to investigate possible explanations.

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Abstract
The purpose of this paper is to apply behavioural theories on the decision-makers in the office-building sector. The market has a well-known feature of cycles of production. This can sometimes lead to overbuilding. This paper tries to illuminate the problem with overbuilding by using economic behavioural theory developed the last 25 years. We have formulated six possible behavioural explanations for overbuilding. The method we have used is partly by interviewing investors about specific projects and partly by a survey, which was sent out to independent persons that has followed the office market for a long time. Our results indicate that myopic behaviour and sunk cost fallacy have influenced decision makers.

Keywords: Rational behaviour, behavioural economics, herd behaviour, overconfidence, myopic expectations, sunk cost fallacy, confirmation bias, status quo bias.

1 Introduction
Currently we have a situation of oversupply in the real estate office market in Stockholm1. This is nothing new. We had a similar situation in Stockholm in the early 1990’s. This situation with oversupply (high vacancy rates in newly produced buildings) came after a period with low vacancy with increasing rents, just as in the late 1980’s and early 1990’s. Wheaton (1987) studied the real estate office market in the US and found that there is cyclical behaviour that last for approximately ten years.

This raises several questions. One is whether this is a problem or not. Is this simply a pattern that we should expect, directly related to the fact that the economy overall sometimes slows down and sometimes grows rapidly. It might however be the case that these cycles are stronger than they need to be?

Related to this is the question about possible explanations. In recent years behavioural aspects, such as herd behaviour and overconfidence etc, in economic decision-making have been more in focus than earlier. One interesting question is whether decision about investments in office properties has been affected by such factors. One way to answer these questions is to investigate the behaviour of individual decision makers.

2. **Aim / Disposition**

The purpose of this paper is to study if investors in office building sector in Stockholm during the boom in the late 1990s were being substantial influenced by behavioural bias. The study will look at the following behavioural biases that have been observed in early studies about economic decision-making:

- Herd behaviour.
- Overconfidence.
- Myopic behaviour.
- Confirmation bias.
- Sunk cost fallacy.
- Status quo bias.

The first three biases might primarily have occurred when the investment decision was made, while the last three concern behaviour when production is in progress and the market has changed.

We have omitted a substantial number of biases\(^2\) that are present in the decision-making of investments. Those chosen seem to be the most interesting from the perspective of office buildings.

In section 3 the standard economic theory of rational behaviour and biases from this interpretation of rational behaviour are presented. In section 4 earlier researches in the real estate sector using behavioural aspects are presented. In section 5 the methods used in the study are presented. In section 6 results are presented and in chapter 7 the analysis is made.

3. **Theory**

In this chapter we will first discuss the term rationality from an office building perspective. Secondly we will discuss in what extent investors might deviate from this rationality. We refer to the literature and experiments that illuminate these issues. We will mostly use literature that concerns companies' behaviour.

3.1 **Rational expectations**

If investors act rationally they have as Stiglitz (2000) express: *expectations for which people make full use of all relevant past data*. Using this data in a rational way, according to Wärneryd (2001), involves gains being maximized over a specific period. This will, in office

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\(^2\) Omitted are for instance heuristic representativeness, availability heuristic, anchoring, and conservatism.
building sector, mean that production will be triggered when the marginal income from an alternative portfolio of resources (including offices not yet produced) becomes larger than the current portfolio of resources.

If they do so and are not influenced by any psychological bias then one can say that the decision-makers has acted rationally in this sense and done what he can do within his power to succeed. If some individuals have deviated from this rational approach it has sometimes been neglected by arguing that such deviations will cancel out in the aggregate or that these deviations are so small that they do not affect the market on an aggregate level.

It is often also argued that arbitragers, buying properties when prices are below the rational price and selling when the price is above the average, could capture large deviations. This would push prices towards the rational level. This argument is however problematic in such a illiquid market as the office market where transaction-costs are high.

As argued by e.g. Grenadier (1995) and Wheaton (1999) overbuilding can occur in office building sector even if all investors act rational. Building takes time and the situation in the market cannot be predicted with certainty. If the investors have bad luck and the demand has fallen when the building is completed, it might also be rational to leave parts of the properties vacant. The option to let the space at a higher rent level in the future might be worth more than letting the space in the recession. There are also studies that explain what at first glance may be considered irrational but can be argued as rational. Gunnelin (2000) shows with option theory that overbuilding can be rationally motivated in a volatile and rapidly expanding property market.

As mentioned in the introduction, there is a discussion about what could be considered rational, and the purpose of this article is not really to enter that discussion, but only to test theories of behavioural bias by regarding how decisions were made and how the decision-makers formed their expectations.

3.2 Behavioural model

There seems to be occasions when production of office buildings has not been based on the best information, thus leading to losses for investors. It seems that investors have deviated from rationality in the narrow sense. Simon (1956) presented an early general explanation of this deviation from rationality. He proposed that people “satisfies” rather than optimize when they make decisions. This can however be seen as rational when information is costly. Another explanation according to Shillers (2001) is “less-than perfect rationality”. It is not that investors are lazy; they are striving to do the right thing but have limited abilities and certain natural modes of behaviour that decide their actions when perfect information is lacking. In this report six possible modes of behaviour that might have affected the decision-makers in current situation in Stockholm in the late 1990’s are analysed: herd behaviour, overconfidence, overreaction due to myopic expectations and under reaction due to confirmation bias, status-quo bias or sunk-cost fallacy. These are explained below, concentrating on the definition of the behaviour and what can trigger the behaviour in an investment situation.
3.2.1 Herd behaviour
Wärneryd (2001) describes herd behaviour in the following way: *The essential meaning of herd behaviour is that investors tend to do as other investors do, at least if they are exposed to information about others’ behaviour. They imitate behaviour and, in the typical terms of economists, disregard their own information or private signals, which for some investors are supposedly contrary to the current information from others.*

There seems to be three aspects, which can trigger herd behaviour in investment decisions. First is the reputation of the managers. They are afraid to deviate from the average manager. Keynes (1936) and Zwiebel (1995) argue that investors might be reluctant to act according to their own information and beliefs. The investors fear that their contrasting behaviour will damage their reputation, and their career concerns, as sensible decision-makers. Moreover in times of uncertainty is an unprofitable decision not, according to Scharfstein and Stein (1990), so bad when others are making the same mistake: they are “sharing the blame”. Second (and influencing reputation) is the managerial labour market. If managers have relatively unattractive labour opportunities herding is more likely to occur. Third, according to Wärneryd (2001), herd behaviour seems to increase when people are in a state of uncertainty and confusion.

3.2.2 Overconfidence
Calibration is defined as the degree to which confidence matches accuracy. A decision maker is perfectly calibrated when, across all judgements at a given level of confidence, the proportion of accurate judgements is identical to the expected probability of being correct. We have a situation of overconfidence when the expected probability of being correct exceeds the proportion of accurate judgements.

The problem with overconfidence in the office building market is that it can make more investors enter the market than what is profitable on average. This means that on average the companies will make losses. According to Camerer and Lovallo (1999) there are some attributes that could point to excess entry in a market due to overconfidence. First in a situation where the investor thinks the total profit earned by all entrants will be negative, but their own profit will be positive. Second investors are relatively insensitive to risk; when risk is high their overconfidence might lead them to prefer riskier contracts because they think they can beat the odds.

It has also been noted that the risk of overconfidence is diminished when the decision-maker receives regular feedback to their judgements. Murphy and Winkler (1984) showed for example that weather forecasts were well calibrated. And according to Lichtenstein and Fischhoff (1977), overconfidence is greatest when accuracy is near chance level. Overconfidence diminishes as accuracy increases from 50 to 80 percent and once accuracy exceeds 80 percent, people often become underconfident.
3.2.3 Myopic expectations

Stiglitz (2000) define myopic expectations as: “short-sighted expectations” for instance simply assuming that today’s prices will continue into the future. In office building market suppliers must commit to a supply decision before they know the price at which the product will sell. If the market has this feature combined with a myopic (short-sighted) view a typical Cobweb or Hog-cycle can arise, as described in Figure 1.

Figure 1. A typical Cobweb scenario.

If we assume that the market has initially come into disequilibrium due to e.g. a demand shock. When the suppliers, in period 0, plan to produce the quantity $Q_1$ for period 1 and this quantity reaches the market. Then there will be excess demand and price rises to $P_1$ to clear the market. In period 1, suppliers therefore plan to produce the amount $Q_2$ for period 2, as this is profit maximizing given the price $P_1$. When this quantity reaches the market in period 2, price falls to $P_2$ to clear the market. At this price, suppliers plan $Q_3$ for period 3. In period 3, price rises to $P_3$ to clear the market. There will in period 1,3,.. be shortage and in periods 2,4,.. be oversupply. This process of oscillation then continues and the market will never reach the steady state of $P_{ss}$ and $Q_{ss}$.

The Cobweb scenario, in office building sector, is according to Hekman (1985) due to the time lag in production. The supply responds to current price, where the current price is the expected price at the time the new supply will be brought to market. The classical mistake is that the expected price is, according to Wheaton (1999), an extrapolating of current rents. This will generate the cobweb-cycles. The most simple form is to assume that asset prices simply

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are a constant capitalization (with a discount rate r) of known rents at the time the investment decision is made: $P_t = \frac{R_{t-n}}{r}$.

One explanation of myopic behaviour is made by Tversky and Kahneman (1982a, 1982d) where they show that people do not revise probabilities, as they should do when there is new information. They tend not to use prior probability when estimating a conditional probability. They do not use Bayes rule properly. Hekman (1985) also uses the explanation that there is no learning in that suppliers do not adjust their expectations with experience. The alternative to this market situation is one, which suppliers respond to price signals in such a way as to prevent an over reaction to high prices and under reaction to low prices. It might also be assumed that in good time myopic behaviour is quite common, the wish that the market will stay in present good situation.

### 3.2.4 Confirmation bias

Is it possible that during the time of construction there were signals that indicated that wrong decisions had been made? Was it possible that these signals showed that the projects were not profitable but investors did not take notice? There are substantial literature within the cognitive psychology that shows that people try to avoid disconfirming and searching for confirming information. Or you may express it as new information will readily be accepted if it points in the same direction as the earlier decision. According to Davidsson and Wahlund (1992) the confirmation bias is reduced if the concreteness of the task is increased, the certainty about the building's production and final result. Also confirming bias is reduced with experience and prior knowledge.

### 3.2.5 Sunk cost fallacy

Sunk-cost fallacy is connected to the idea of loss aversion in Kahneman and Tversky (1979) prospect theory. The interpretation is that people's utility is reduced more by a loss of a certain amount of income than what the utility is increased by gaining the same amount. This makes people more concerned about postponing the realization of losses than of gains.

Assume we have two different scenarios from a project. See Table 1. Assume that the project has three stages. At each stage it is possible to stop the whole project and cause oneself a loss of C dollars. The expected revenues of the project are E dollars. The changes over the stages are due to external factors that were not predictable.

#### Table 1. Investment scenario with and without loss-aversion.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Stage one</th>
<th>Stage two</th>
<th>Stage three</th>
<th>Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C=0</td>
<td>C=9</td>
<td>C=30</td>
<td>C=50</td>
</tr>
<tr>
<td>A</td>
<td>E=10</td>
<td>E=10</td>
<td>E=10</td>
<td>E=10</td>
</tr>
<tr>
<td></td>
<td>Continue</td>
<td>Continue</td>
<td>Stop</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C=0</td>
<td>C=9</td>
<td>C=30</td>
<td>C=50</td>
</tr>
<tr>
<td>B</td>
<td>E=10</td>
<td>E=10</td>
<td>E=10</td>
<td>E=10</td>
</tr>
<tr>
<td></td>
<td>Continue</td>
<td>Continue</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In scenario A the investor realises at stage three that this investment gives a negative outcome. This makes him stop at stage two and realize the loss of 30. In scenario B the investor tries to delay or escape from the loss by continuing the project and therefore makes a loss of 40, which is higher than scenario A.
3.2.6 Status-quo bias

Decision-making experiments show that individuals disproportional stick with their present situation, the status quo. This might be due to rational explanations such as the transition costs to change alternative. Samuelson and Zeckhauser (1988) show that people even without transition costs present still in large extent choose the status quo alternative. Samuelson and Zeckhauser (1988) conclude that status quo bias is a general experimental finding, which is in some content consistent with loss-aversion, the fact that people proportionally more dislike losses than gains. Their experiments also show that the status quo bias is increased when there are more alternative options and decreased when an individual’s preference for a selected alternative is strong.

4. Real Estate sector and behavioural research

In this chapter we will describe what has been written about behavioural economics in the real estate sector. To our knowledge much has not been written in general and especially not about the office-building sector. Diaz (1999) gives a review of the research accomplished during the 1990’s. Diaz first defines the property as an applied social academic discipline analysing many sorts of activities such as lending, investing, government action, brokerage, valuation and so forth. An essential part of the discipline is the need to describe economic behaviour of the market and the need to prescribe improvements of economic behaviour of the market. He then states that economic activity is human behaviour.

Valuation is the activity within property research where the greatest amount of behavioural research has been made. This is, according to Diaz, because the group is accessible, easy to observe and quite homogenous. Moreover valuation is a branch with normative rules (at least in Sweden), it is relatively easy to compare actual behaviour of the valuer with the normative rules. The types of behavioural biases that are included in this study that has been treated within a valuation context are for instance myopic behaviour by Diaz (1990a) and Gallimore (1994), herd behaviour by Diaz and Hanz (1997) and confirmation bias by Gallimore (1996).

The research about other behavioural aspects about the real estate sector is poorly. Hardin (1997) examine lenders deviated behaviour whether they had a background with business lending training or property lending training. Black and Diaz (1996), Black (1997) and Diaz et al. (1999) found out that asking price plays and important role as anchoring in property negotiation. Bruin and Flint-Hartle (2003) with their research on the investment behaviour of residential rental property investors found that the investors were affected by different behavioural biases.

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4 Definition på anchoring
5. **Method**

The usual empirical strategy in explaining and exploring the property market is regression-based econometric techniques. This method is also used in Brunes (2005). According to e.g. Diaz (1999) it is not sufficient for exploring behavioural aspects on the market. Instead a closer study of the investors’ behaviour should be made by experiments, surveys and interviews.

The strategy in this study is to triangulate the problem and use several methods. If the result of the methods should converge, the conclusions would thereby be stronger than if only one method was used, see Figure 2. The statistical analysis is not used in this article but in Brunes (2005).

![Figure 2. Convergence of results from different methods.](image)

In this chapter the methods used in this part of the study will be described more in detailed.

5.1 **Case studies based on interviews**

A motivation for doing case studies can be found in Schramm (1971): “The essence of a case study, the central tendency among all types of case studies, is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented and with what result”. A practical thing about case studies is that it is easier to follow what has been done and how decisions have been made. According to Yin (2003) a benefit is to have a set of hypothesis before conducting a case study.

Figure 3 demonstrates how the case studies will be carried out. We will start with a description of each case, which will be based on the interviews. The next step is to interpret each case. We will try to understand what has happened and try to understand how decision-makers reasoned. From each case conclusions will be drawn that can be used when studying the next case, and so on. When all cases have been investigated a comparison between all cases can be done. From this a more general explanation and conclusions can be developed. It is though in the comparing of differences and similarities between cases that a degree of understanding is possible. A comparison between more cases also gives a higher degree of reliability.
Figure 3. Case study method and its structure.

Normatively this work should go on until an understanding of the problem has reached a level where an extra case gives only marginal contribution. Therefore you cannot in advance state how many cases to study. The cases should therefore be chosen sequentially during the time of the survey. It is a question of judgement when a satisfying understanding has been reached. We have a substantial lack of cases and therefore in advance decided to study three cases. The chosen projects are office buildings that were built in the late 1990’s and early 2000’s. They were all projects that started in the same state of the market. The study includes people that were participating in the central decision-making: see table 2 for the position the interviewed had in the projects. We interviewed two persons in case A and one person each for case B and case C.

Table 2. Interviewed persons and their position within the company.

<table>
<thead>
<tr>
<th>Case A</th>
<th>Case B</th>
<th>Case C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Responsible for the project. 2. CEO for the company.</td>
<td>1. Responsible for the project.</td>
<td>1. Responsible for the project and vice CEO for the company.</td>
</tr>
</tbody>
</table>

The cases have been divided into five phases.
1. Initiating phase. What made them interested in this project, and when? Whose idea was the project originally?

2. Investigating phase with investment analysis, market research etc. We will concentrate on the economic investigation and leave out the architectural and building technology. How did they make the investment and market analysis? What variables were important and what were their expectations about the project. What was the risk? Where there any variables that worried them?

3. Time of decision. We are especially interested in what the main arguments were for them to go on with this project. How did they handle the risk with the project?

4. Production phase. In this part we were especially interested in how they handle eventually changes within the market. Did they have any plan to change the project.
5. The thoughts today, after the project is finished. We are here interested in how the managers, wise after the event, analyze their earlier expectations.

The arrangement of the interview was with open questions. We followed the five stages presented above and avoided to many deviations to be able to get comparable information from the three cases. But the interview questions have developed over time in an attempt to try to cover all the hypothesis of this article. To minimize the risk of misunderstanding and inaccuracy, a summary of the interview was written down and sent to the interviewed person for verification of our interpretation. This gave the interviewed person a chance to correct and add information to their answers.

5.2 The Survey

The criterion for choosing respondents was that they should be independent of the investors and have experience of how the office market function and have long experience concerning the Stockholm office market. The selection has been accomplished by using an Internet site covering the major consulting firms within the real estate markets. From information about these firms, 37 persons who we think fulfil our criteria were selected. Before the survey was sent out a contact by telephone was made to ask if the respondent wanted to participate in the survey. The survey was after that sent out by mail. After approximately one and a half week a reminder was made by phone to them who not yet had returned the survey. The deadline for the respondents was set approximately one week after the reminder was made.

We have designed the survey in such a way that it should be able to catch the biases presented in section 3.2. The survey has 16 questions where the first 12 are concentrated on the time before the production while the last 4 concerns the production phase. All questions contained a statement and they had four different reply alternatives; totally agree, agree partially, disagree and no opinion. For each question there was space where the respondent could comment on the question.

The following questions were asked to reveal how careful the investors had made their forecasts and what their expectations in common was about the future:

Q1. "The investigations that were performed before new office projects were carefully done and gave well-founded information about the office market."
Q2. "Investors were in the late 1990’s convinced that there would not be a substantial decrease in the rental market for offices."

The following questions were asked to reveal if investors were influenced by overconfidence:

Q5. "When evaluating new office projects the individual investor overestimated his possibilities to cope with the competing companies."
Q8. "The investors in general consider that they are better as investors than their competitors."
Q9. "Investors were very careful and would rather give up than complete a project when the uncertainty about the outcome was very large."

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5 See appendix A for a final design.
6 See appendix B and C for the entire survey.
The following questions were asked to reveal if the investors had been influenced by herd behaviour:
Q3. "Decision makers in real estate companies were looking for a good reputation as investors among their competitors and colleges."
Q6. "Investors in office buildings knew to a large extent how far the competitors had advanced in their planned projects."
Q11. "Labour market (for similar job) was very good for decision makers within the real estate sector."
Q12. "Office market appeared as very insecure in the end of the 1990’s."

The following questions were asked to reveal if the investors had been influenced by myopic behaviour:
Q4. "When analysing a new office project the investors assumed that the present good market situation would exist."
Q10. "In good times, with increasing rent revenues, investors have a tendency to expect that this good state will exist a long time."

The following question was asked to reveal if the investors had been influenced by confirmation bias:
Q13. "The investors did not decrease the size in the project at the time of the overall economic downturn because they had too much focus on elements that still indicated a good outcome."

The following question was asked to reveal if the investors had been influenced by status-quo bias:
Q14. "The investors kept, at the time of the overall economic downturn, the size in projects because they did not in general change already made-up plans."

The following question was asked to reveal if the investor had been influenced by sunk-cost fallacy:
Q15. "The investors did not decrease the size in present projects, at the time of the overall economic downturn, because they had already invested so much in the project."

There are several possible problems with using a questionnaire. Some of these problems we tried to avoid by testing the questions carefully on different persons. One possible problem is however whether the answers have been affected by hindsight: Now we know that there are high vacancies and this might be seen as a sign that people were not rational. The people answering the questionnaire might therefore be unfair to the decision makers. We believe that this risk is small since the questionnaire is directed to experts that have followed the market a long time. They can be expected to know that overbuilding can be the result of bad luck and should therefore not be affected by hindsight in a major way.
6. **Results**

In this chapter the results from the case studies and the survey will be presented.

6.1 **Case studies: Descriptive analysis of each case**

**Case A**

*Initiation stage*

The initiating of this project was an internal idea. The project was an idea that had been successively growing within the firm. The municipality showed interest in this project and had a positive approach during the whole project.

*Phase of investigation*

The phase of investigation started with a rough cost of construction analysis and a market and investment analysis. These calculations were modified during the project. In the market analysis the business cycle was observed. The demand for the project was supposed to come from companies in the telecom market. The project leader had hoped to rent to a level a bit over the current market rent. During the investigation phase and production phase there were negotiations with interested tenants, among them a large telecom company. They also had some other “letter of intents”. During the phase of investigation the demand for space in the market increased and the rents also increased. The cost for production also increased.

*Decision phase*

After approximately two and a half years of investigation a decision of investment was made. The most important motive to build this project was the substantial demand for space. The most important concern was the large dimension of the project.

*Phase of production*

After the decision the production phase was initiated and lasted for approximately three years. In order to get flexibility in the size of the project it was divided into several phases. However this solution was not actually used because the project team thought it was not defensible from an economic point to interrupt the project. The speed of completion was decreased during the production phase when the demand for office space fell substantially. Today the building has substantial vacancies. The cost of production was lower than expected.

*Afterwards*

Afterward the team says that the market decrease was much worse than suspected. They are also a bit critical to their analysis of what the customer demanded. They have not been successful in getting the tenants to see their comparative advantages compared to the competitors’ product. One of the interviewed pointed to the fact that they had little knowledge about the behaviour of the IT-market.

**Case B**

*Initiation stage*

This project was initiated internally. The project team had good knowledge about the neighbourhood and continuously searched for new projects. In their business plan they had a list of interest objects to start and proceed with. The concerning project seemed to have good chances of giving high profit at a low risk.

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7 February 2004.
Phase of investigation / Decision phase

The investigation phase took approximately one and a half year. The company in question had been in the neighbourhood for a long period. They felt that they knew the market well and a special market analysis was not necessary for this project. The investigation was primary focusing on the physical development of the building. Their goal was to get a building that was as flexible as possible. During the investigation period the project leader negotiated with a lot of interested tenants. If all negotiations had come to a deal more than the full building would have been rented. The project was thought to be more flexible than its competitors, and more in line with the current demand. Investment analyses were continually done with higher precision closer to time of decision. The expected high profit was the main reason for realizing this project.

Phase of production

The phase of production lasted for approximately three years. During this period the demand for office space abruptly decreased. The production was divided into stages. The first stage was directly started. The last stage was initiated some years later.

Afterwards

Today\(^8\) a large amount of space is vacant. The rents are at the levels that were calculated. The project team is satisfied with their building and think it has managed better than the competitors.

Case C

Initiation stage

This project was initiated internally. The project had existed for over ten years. It was first initiated in the late 1980’s when a lot of investors were searching for space. Production was also initiated and was completed in the early 1990’s. The first stage of the project also included dwellings. The management had plans for more space to build, but in the mid 1990’s the market had declined and there was no demand for additional office space. In 1998 the managers thought it was time to start to plan for production again.

Phase of investigation

An investigation phase was initiated in 1998 and continued for approximately one and a half year. During the investigation most effort was spent on the technical development of the project. The economic investigation was primarily on controlling the cost for building in order to keep the rents as low as the market was believed to be able to cope with. No market analysis was performed. The managers thought they had good skill within the staff, which worked with letting out space, and it was enough to listen to their knowledge about the present demand. They had expectation of only approximately 5 % vacancy when the building was completed. Those expectations were based on the successful leasing of the first stage and that a market in balance (in function) has a vacancy rate of approximately 3 to 5 %. Expectations on rents for the project were in level with the market rents at the time of investigation. The managers were well aware of the competitors’ action. Actually they increased their efforts because they knew that they had an advantage because they were already established at the site and had only to continue their project. They also felt that their project had substantial advantages compared to their competitors, especially as their project had a large flexibility which would attract both small and big companies, and that the location

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\(^8\) February 2004.
was close to services. Another advantage was the design of the building that meant that the tenants would have a felling of having a building of their own with a special entrance for each tenant. The only disadvantage was the distance to public transport. The managers hope that a new tramline will be built in the future, connecting the building to the underground railway.

**Decision phase**
The argument for this project was that it primarily would be a good investment in the long run. Furthermore this investment would make their already completed offices and dwellings more valuable. The only concern was the question about Kista and its ability as a long-term office market. The decision was easy to make and they did not hesitate.

**Phase of production**
The project could be divided into three stages. During the production phase many detailed decisions were made with great care. When producing stage one, decision about planning stage two was made. When producing stage two, decision about planning stage three was made. The fact that other projects had started in the area gave energy to this project because they had a lead compared to the competitors.

**Afterwards**
According to the management the expectations of vacancy rate were almost fulfilled for the first stage. Today the vacancy is about twice the expected level. It was especially difficult to find tenants to the last stage, which was due to unexpected movements among the tenants. This movement was due to that, among other things, tenants went into bankruptcy. To cope with the competition the management made fast decisions about the production. They consider these decisions as controlled without rashness.

### 6.2 Survey – descriptive.

In this section we will present the results from the survey. We have got answers from 30 respondents (81 percentage), representing 21 companies. There were two ways in which the respondents dropped out. First seven persons did not answer the survey after the deadline was reached. Our opinion is that they represent an average of the survey population and do not change the data substantially. Second the respondents who replied could choose to have no opinion about a certain question. This was the case in 37 specific cases. The no-opinion answer is evenly distributed among the questions, except for question number seven where ten persons had no opinion.

Below the questions will be sorted under the specific behavioural aspect it is assumed to illuminate. But first we present the results from the questions where the aim was to get an indication of the average performance of the market forecasts.

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The quality of forecasts
It seems that the experts in the survey do believe that the investigations could have been more carefully done (Figure 4). The majority only partly agree and more disagree than totally agree to the statement of carefully done investigations. Having done these investigations the investors was, according to experts, in general sure that the market was at a stable level (Figure 12) and would not decrease (Figure 5).

**Figure 4. Statement to expert: “The investigations that were performed before new office projects were carefully done and gave well-founded information about the office market.”**

**Figure 5. Statement to expert: “Investors were in the late 1990’s convinced that there would not be a substantial decrease in the rental market for offices.”**
**Overconfidence**
The experts consider that investors in general underestimated the competition and had great expectations of their own project (Figure 6). The investors had high thoughts about themselves (Figure 7). Very few of the experts agree with the statement that investors acted very careful and the experts believe that the investors would have continued with a project even if the uncertainty were high (Figure 8).

**Figure 6.** Statement to expert: “When evaluating new office projects the individual investor overestimated his possibilities to cope with the competing companies.”

**Figure 7.** Statement to expert: “The investors in general consider that they are better as investors than their competitors.”

**Figure 8.** Statement to expert: “Investors were very careful and would rather give up than complete a project when the uncertainty about the outcome was very large.”
**Herd behaviour**
It seems that the investors were quite concerned about their reputation (Figure 9). They also knew quite well how far the competitors had come in their planning (Figure 10). This might not be surprising in such small market as the office building market in Stockholm. And it seems that the decision-makers had a quite good labour market (Figure 11): and the market appeared (as earlier mentioned) quite stabile (Figure 12).

**Figure 9. Statement to expert:** "Decision makers in real estate companies were looking for a good reputation as investors among their competitors and colleges."

**Figure 10. Statement to expert:** “Investors in office buildings knew to a large extent how far the competitors had advanced in their planned projects.”

**Figure 11. Statement to expert:** “Labor market (for similar job) was very good for decision makers within the real estate sector.”
Figure 12. Statement to expert: “Office market appeared as very insecure in the end of the 1990’s.”

Myopic expectations
The experts are quit sure of that the present economic circumstances are a substantial influence when a new project is being developed (Figure 13). The experts also think that when there is a boom market the actors tend to believe that this will continue (Figure 14).

Figure 13. Statement to expert: ”When analysing a new office project the investors assumed that the present good market situation would exist.”

Figure 14. Statement to expert: “In good times, with increasing rent revenues, investors have a tendency to expect that this good state will exist a long time.”
Sunk-cost fallacy, Status quo bias and Confirmation bias
When production has started the experts in general agree partly that the investors changed the size of their projects in a rational way (Figure 15). If the investors in some sense did deviate from a rational behaviour this was primarily due to sunk-cost fallacy (Figure 16). Secondly this deviation might have depended on a general rigidity in the organisation, what we call status quo bias (Figure 17). The experts to a large extent disagree with the proposition that the investors tended for confirming evidence (Figure 18).

Figure 15. Statement to expert: “The investors did change the size in present projects in a rational way.”

Figure 16. Statement to expert: “The investors did not decrease the size in present projects, at the time of the overall economic downturn, because they had already invested so much in the project.”
7. Analysis and Conclusions

In this section we will analyse each bias, using the results from case studies and the survey.

7.1 Quality of investigations

One simple explanation to the existence of overbuilding could be a lack of carefully made investigations. Both in the case studies and in the survey there are some indications that point in this direction. In two cases no special market analysis was made. In case C the only analysis made was asking their own staff that worked with letting space. One can also point to the lack of knowledge about the IT-sector as one interviewed person afterwards admitted. There also seems to have been a lack of time to do the investigations carefully. One interviewed said that some tenants asked them to throw out other tenants just to prepare space for them. The survey also showed that only a small minority totally agreed with the statement that the analyses were carefully made.

7.2 Overconfidence

Both the case studies and the survey indicate that the investors had good confidence in their projects. In all three cases investors seemed to be very confident about the competitiveness of
their own office building. They all thought that they were on average better than the competitors in the sense they knew what the customers needed. Today it seems as perhaps one has accomplished this task. One of the investors also expressed afterwards that they had miscalculated the way that they thought the customers would choose their building compared to the competitors. They thought that the customers would be ready to pay extra rent in a “high-tech building”. Another condition for overconfidence, and mentioned in the literature, is that the investors should be indifferent to risk. We assume, according to Figure 8, that the investors are, if not risk lovers, at least risk neutral.

This is however not enough to declare them overconfident. If the market had become as big as the investors thought: it would have absorbed all planned projects. Overconfidence includes, according to Camerer and Lovallo (1999), the belief that they should manage better than their competitors if the market would diminish. No one however thought that the market would shrink. The problem was to a higher degree that the actors thought that the good times would continue - without any real factual foundation for this. This can be related to myopic behaviour (see the section below).

7.3 Herd behaviour

According to the experts the decision-makers were quite dependent upon their reputation. This might, according to Scharfstein and Stein (1990), be a breeding ground for herd behavior. For herd behaviour to easily arise the investors should strongly hold on to their jobs and therefore rather share the blame with other investors if the decisions fell out badly. Of the three investors none seemed to regard the time of investing as a time of uncertainty; “Many years of increased demand” as one explained. They all thought that the market was strong enough for their projects. If they were having a tendency for herd behaviour they were in position where they had information about the competitors actions. The problem for them might be that the possible ground might be occupied; it is in fact, even if they would have liked to act as a herd this might be difficult due to lack of space. Besides the physical problems the labour market was good for investors at the time in question and the market seemed stable. This would also point against herd behaviour. One of the interviewed was also certain that they were first on the market and that they were only slightly affected by the competitors.

It should however be pointed out that herd aspects could have been important on a deeper level. For some reason “everyone” believed that the good market conditions would continue and that there were no big uncertainty on the market. By having the same beliefs they all “independently” took the same decision and acted as if they were affected by herd behaviour.

7.4 Myopic behaviour

The case study strongly indicates myopic behaviour, as in case A where they were very focused on current situation in the Telecom market. The survey also gives substantial support to the hypothesis that investors were very much affected by the short run situation on the market.

They all believed that they had good knowledge about the business cycle, but it is difficult to see any real foundation for this view. It seems clear that they lacked an historical perspective on how investment markets like this work. At least one said they were expecting a future
downturn on the market, but then it was expected to be rather minor and rather far into the future.

“Maybe we should have had better investigations of the Telecom-sector”, one comment was, and the resulting behaviour can be seen as the result of a combination of myopic expectations and poor knowledge about what was believed to be the most important customer demanding new space.

7.5 The behaviour in the production phase

The experts regard the actions of investors as partly rational when the projects were adjusted to new information about the market: see Figure 15. We think that the experts do interpret investor’s action in line with Shiller (2001) that investors are “less than perfect rationality” and that they are striving to do the right thing in a complex situation and that they are influenced by behavioral modes. We primarily suspect sunk-cost fallacy, as the survey indicates, while confirmation bias and status quo bias are of less importance.

Even though there were some tendencies to behavioural biases in the production stage, the most important biases could be found in the investigation and decision phase.”
Appendix A – Interview questions

A  Initiation stage

A1 Discuss when (date) the idea of the building first came.

A2 How did the idea of the building come up?
   • Their own idea.
   • Other investors discussed the project.
   • The possibility of developing this project was, since many years ago, known.
   • Suggestion from community/consultant/other.
   • The project was taken over from others.
   • There was a rent contract with a customer. Long term – short term?

A3 Were there other operators who were interested in developing this project? Competitors – who?

A4 Were there any other interesting projects that you gave up due to this project?
   1. What?
   2. Why was that project less interesting than the realized project?

A5 Were there any person who was engaged (dedicated) for the project? (Overconfidence)
   1. Were there any special reasons for them to be dedicated?
   2. How many were they?
   3. What position in the company did they have?

A6 What was the government/city/politicians attitude towards the project?
   • Understanding
   • Uninterested
   • Against

B  Phase of investigation

B1 Who made the investigation?
   • Internal – who?
   • External – who?

B2 What did the investigation contain?
   • Alternativa förslag på byggnadens utseende.
B3 How was the economical investigation performed? What did it contain? When was it modified (several times)?
- The market – was real estate cycle regarded? (McDonald 2002).
- Construction cost.
- Estimated rent/cost/vacancies.
  - What expectations did they have on the rent? (Overconf)
  - What were these expectations based on? (Myopic)
  - What were the expectations on leased amount? (Overconf)
  - What were these expectations based on? (Myopic)
- The competitors’ behavior.
  - Had anyone started producing? Did you know if any competitor had got far in their planes? Who? (Herd).
  - Did your product differentiate substantially from theirs? How? (OC)
- Was the project leased in advance (before completion)? Who?

B4 How long was the investigation phase (date)?

B5 Was there any large change in any important variable during the investigation phase?
- Cost of production increased.
- Demand diminished/increased.
- Extraordinary – war.
How did you handle this in the investigation?

B6 Did the vision about the project (before the investigation phase) change during the investigation phase? How, discuss.
- Design of the building (outside/inside) changed.
- Budget restriction.

B7 Were there any persons, in this phase, who were pushing the project extreme enthusiastic?
- Were there any special reasons for their enthusiasm?
- How many were they?
- What was their position in the company?

B8 Is this project considered as an ordinary project in your business or is it extraordinary?
- Due to size.
- Due to cost.
- Design.
**C Decision**

C1 What was the most important argument for the investment?
   - Important variables.

C2 Were there arguments against the investment?)
   - What?

C3 Was it a difficult or easy decision?
   - If difficult, did you postpone the decision many times?
   - Was anyone extremely enthusiastic about the project?

C4 Was any alternative project, during the decision phase, seemed to be more attractive than project in question?
   1. What project?
   2. In the end, why did not that project finally beat the project in question?

C5 How uncertain/risky was the project?

C6 What expectations did you have at the time of decision?
   - Vacancies.
   - Level of rents.

C7 At the time of decision were there any alternative solutions for the project – flexibility?

**D Production phase**

D1 When did construction start and when were you finished?

D2 Were there any change in any important variable during the phase of production?

D3 Were there any larger changes of the project during the phase of production? What and why?

D4 How large amount of the total investments, for the company, was this project during its production phase?
E  Afterwards

E1  Afterwards, what expectations were fulfilled?

E2  Afterwards, are there any deviations from your expectations about the project?
  • Construction cost.
  • Time for construction.
  • Change in demand (market).
  • Change in supply (market).

E3  How good knowledge did you have about other building projects in Kista. Were you stressed by other projects?

E4  You knew that a number of projects were starting up. The competition increased. Have you succeeded in the competition from others?

E5  There were vacancies in Kista in the first 5-6 years of the 1990’s. How did you regard the risk that the increase in demand during late 1990’s only was temporarily? What do you think about your evaluations afterwards? Lessons?
Appendix B – The survey questions. (English version)

Survey about production of office buildings in Stockholm in the late 1990’s.

Mark with a cross the alternative that is in accordance with your opinion.

1. ”The investigations that were performed before new office projects were carefully done and gave well-founded information about the office market.”

Totally agree □      Agree partly □      Disagree □      No opinion □

Comments: ……………………………………………………………………………………………
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2. ”Investors were in the late 1990’s convinced that there would not be a substantial decrease in the rental market for offices.”

Totally agree □      Agree partly □      Disagree □      No opinion □

Comments: ……………………………………………………………………………………………
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3. ”Decision makers in real estate companies were looking for a good reputation as investors among their competitors and colleges.”

Totally agree □      Agree partly □      Disagree □      No opinion □

Comments: ……………………………………………………………………………………………
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4. ”When analysing a new office project the investors assumed that the present good market situation would exist.”

Totally agree □      Agree partly □      Disagree □      No opinion □

Comments: ……………………………………………………………………………………………
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5. ”When evaluating new office projects the individual investor overestimated his possibilities to cope with the competing companies.”

Totally agree □  Agree partly □  Disagree □  No opinion □

Comments:........................................................................................................................................................................
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6. ”Investors in office buildings knew to a large extent how far the competitors had advanced in their planned projects.”

Totally agree □  Agree partly □  Disagree □  No opinion □

Comments:........................................................................................................................................................................
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7. ”In real estate companies that invest in office buildings the chief executive officer and the industrial management had substantial power while the board of directors were relatively passive.”

Totally agree □  Agree partly □  Disagree □  No opinion □

Comments:........................................................................................................................................................................
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8. ”The investors in general consider that they are better as investors than their competitors.”

Totally agree □  Agree partly □  Disagree □  No opinion □

Comments:........................................................................................................................................................................
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9. “Investors were very careful and would rather give up than complete a project when the uncertainty about the outcome was very large.”

Totally agree □ Agree partly □ Disagree □ No opinion □

Comments: ..............................................................................................................................
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10. ”In good times, with increasing rent revenues, investors have a tendency to expect that this good state will exist a long time.”

Totally agree □ Agree partly □ Disagree □ No opinion □

Comments: ..............................................................................................................................
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11. ”Labor market (for similar job) was very good for decision makers within the real estate sector.”

Totally agree □ Agree partly □ Disagree □ No opinion □

Comments: ..............................................................................................................................
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12. ”Office market appeared as very insecure in the end of the 1990’s.”

Totally agree □ Agree partly □ Disagree □ No opinion □

Comments: ..............................................................................................................................
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The questions below refer to the same time period and market but here we refer to projects were the production has begun when the decrease on the office market becomes apparent.

13. "The investors did not decrease the size in the project at the time of the overall economic downturn because they had to much focus on elements that still indicated on a good outcome.”

Totally agree ☐  Agree partly ☐  Disagree ☐  No opinion ☐

Comments:…………………………………………………………………………………………
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14. "The investors kept, at the time of the overall economic downturn, the size in projects because they did not in general change already made-up plans.”

Totally agree ☐  Agree partly ☐  Disagree ☐  No opinion ☐

Comments:…………………………………………………………………………………………
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15. “The investors did not decrease the size in present projects, at the time of the overall economic downturn, because they had already invested so much in the project.”

Totally agree ☐  Agree partly ☐  Disagree ☐  No opinion ☐

Comments:…………………………………………………………………………………………
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16. ”The investors did change the size in present projects in a rational way.”

Totally agree ☐  Agree partly ☐  Disagree ☐  No opinion ☐

Comments:…………………………………………………………………………………………
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### Appendix B – The survey questions. (Swedish version)

**Enkät om Nyproduktion av kontorshyresfastigheter i Stockholm under slutet av 1990-talet.**

Sätt kryss i den ruta som stämmer bäst med dina åsikter.

1. ”De utredningar som gjordes inför nya kontorsprojekt var noggrant gjorda och belyste kontorshyresmarknaden på ett väl underbyggt sätt.”

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2. ”Investerarna var i slutet av 1990-talet övertygade om att det inte skulle bli en kraftig nedgång på hyresmarknaden för kontor.”

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3. ”Beslutsfattare i fastighetsbolag var måna om att ha ett gott anseende som investerare hos sina konkurrenter och kollegor.”

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4. ”Vid utredning om ett nytt kontorsprojekt utgick investerare från att den rådande goda marknadssituationen skulle bestå.”

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5. ”Vid bedömning av nya kontorsprojekt överskattade den enskilda investeraren sina möjligheter att klara sig gentemot konkurrerande företag.”

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6. ”Investerare i kontorsfastigheter visste i stor utsträckning hur långt konkurrenterna hade hunnit med sina planerade projekt.”

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7. ”I fastighetsföretag som investerar i kontorsfastigheter hade ledningen stor makt medan styrelsen var relativt passiv.”

Instämmer helt □  Instämmer delvis □  Instämmer inte alls □  Ingen uppfattning □

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8. ”Investerare ansåg genomgående att de var duktigare än sina konkurrenter.”

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Kommentar:.....................................................................................................................................................
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9. ”Investerare var väldigt försiktiga och avstod hellre än genomförde ett projekt när osäkerheten om utfallet var stort.”

Instämmer helt ☐ Instämmer delvis ☐ Instämmer inte alls ☐ Ingen uppfattning ☐

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10. ”I goda tider med ökade hyresintäkter har investerare en tendens att förvänta sig att det goda tillståndet kommer att bestå en längre tid.”

Instämmer helt ☐ Instämmer delvis ☐ Instämmer inte alls ☐ Ingen uppfattning ☐

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11. ”Arbetsmarknaden (för liknande jobb) var väldigt god för beslutsfattare inom fastighetsbranschen.”

Instämmer helt ☐ Instämmer delvis ☐ Instämmer inte alls ☐ Ingen uppfattning ☐

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12. ”Kontorsmarknaden framstod som väldigt osäker i slutet av 1990-talet.”

Instämmer helt ☐ Instämmer delvis ☐ Instämmer inte alls ☐ Ingen uppfattning ☐

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Nedanstående frågor avser samma tidpunkt och marknad men här avses projekt där produktionen har påbörjats (spaden satt i jorden) när nedgången på kontorsmarknaden blir påtaglig.

13. "Investerare minskade inte omfattningen i pågående projekt vid konjunkturfallet på grund av att de fokuserade för mycket på de faktorer som ändå pekade på ett gott utfall.”

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14. "Investerarna behöll, vid konjunkturfallet, omfattningen i pågående projekt på grund av att man inte gärna ändrade uppgjorda planer.”

Instämmer helt □ Instämmer delvis □ Instämmer inte alls □ Ingen uppfattning □
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15. "Investerare minskade inte omfattningen i pågående projekt vid konjunkturfallet på grund av att man redan har lagt ned så mycket resurser på projektet.”

Instämmer helt □ Instämmer delvis □ Instämmer inte alls □ Ingen uppfattning □
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16. "Investerare ändrade omfattningen i pågående projekt på ett rationellt sätt.”

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Appendix C – Comments in the survey.

1. ”The investigations that were performed before new office projects were carefully done and gave well-founded information about the office market.”
   Comments:
   - Projects good documented, market less good. (AP).
   - Developers fail to adjust to slower speed during times of prosperity in the branch. (DA)
   - From the present situation they had a good foundation, but included few viewpoints from a sensitive analysis. (AP)
   - Often based on a trend without discussion of risks. (AP)
   - During the period of recession when new projects were “forbidden” this was certainly the case, afterwards there is some kind of herd behaviour. (TA)
   - You should have leased at least 2/3 of the area before production could start. (AP)
   - In contrast to the period at the end of 1980’s few projects were accomplished because of speculation i.e. they had most part of the area leased before production started and thereby knew the rent level at least the first period of rent. (AP)
   - By the end of the 1990’s there was a general spread IT and telecom delirium of joy – the new economy. Few people within the finance- and real estate business realized that this was a bubble. (TA)
   - With final result at hand you can probably make this conclusion. (DA)
   - Decisions were often made from the viewpoint that the market is strong at time of decision. (DA)
   - Market existed when the decisions were made. Badly performed analyses of the long-term capacity to pay. (AP)

2. ”Investors were in the late 1990’s convinced that there would not be a substantial decrease in the rental market for offices.”
   Comments:
   - They probably calculated with some oscillation but it was underestimated. (AP)
   - They was clearly conscious that the aggregated production would lead to vacancies for elderly offices. (DA)
   - Maybe not in a short term! However many were of the opinion that the development of new projects started too late considering the development of rents. (AP)
   - Depends on point in time. (AP)
   - Often based on a trend without discussion of risks. (AP)
   - Investors and advisers/analysts wondered how the space that was vacant, due to moving about to new space, should be absorbed. (DA)
   - Few realised the dynamic in the market and the substantial influence the IT- and financial sector would have on building/use of premises. (AP)
   - They probably assumed that their projects were better than the average. (AP)
   - They should have expected a certain amount of decline. They were aware of that we were at the top of a rent cycle. (TA)
3. ”Decision makers in real estate companies were looking for a good reputation as investors among their competitors and colleges.”
   Comments:
   • Not important for investors. (DA)
   • Absolutely, construction companies wanted to sell their newly produced objects to investors. (AP)

4. ”When analysing a new office project the investors assumed that the present good market situation would exist.”
   Comments:
   • They probably calculated with some oscillation but it was underestimated. (AP)
   • It was clearly conscious that the aggregated production would lead to vacancies for elderly offices. (DA)
   • It is quite natural that a positive market supports decisions about investments. But not forever. (AP)
   • In time of prosperity this is true. Caution was successively released. (TA)
   • The most common is, that you underestimate future expectations. (AP)
   • They should have expected a certain amount of decline. They were aware of that we were at the top of a rent cycle. (TA)

5. ”When evaluating new office projects the individual investor overestimated his possibilities to cope with the competing companies.”
   Comments:
   • Those who realized projects probably thought that they would succeed better than average. This is a natural approach but of course not reasonable for the whole market. (AP)
   • They were clearly conscious that the aggregated production would lead to vacancies for elderly offices. (DA)
   • In some cases more investors would try to strengthen an already good position by a little bit more effort. It is easier to see weakness in competing objects than in your own. (AP)

6. ”Investors in office buildings knew to a large extent how far the competitors had advanced in their planned projects.”
   Comments:
   • I think many got “aha” reaction when Fastighetsvärlden summarized all projects and expressed them in thousands of square meters. (DA)
   • Analyses of competitors and markets were not especially given priority at that time. (AP)
   • Probably total control (TA)
   • They wanted to be seen in the media. (PA)
   • Good information was at hand so they were probably initiated in what was going on. (AP)
7. “In real estate companies that invest in office buildings the chief executive officer and the industrial management had substantial power while the board of directors were relatively passive.”

Comments:
- On the whole a correct statement even if there were exceptions (i.e. Hufvudstaden). (AP)
- Those who realized projects probably thought that they should succeed better than average. This is a natural approach but of course not reasonable for the whole market. (AP)
- Difference between companies. (AP)
- Probably correct for that period. (AP)
- Still the case. (AP)
- It is always a decision for the board. (DA)
- Yes when it comes to separate projects but not for the portfolio. (AP)
- In most cases the board makes the decisions. The management always has a strong position when motivating why the specific investment should be executed. (AP)

8. “The investors in general consider that they are better as investors than their competitors.”

Comments:
- But just as good. (DA)
- Who does not! (TA)
- Those who realized projects probably thought that they should succeed better than average. This is a natural approach but of course not reasonable for the whole market. (AP)

9. “Investors were very careful and would rather give up than complete a project when the uncertainty about the outcome was very large.”

Comments:
- Yes compared to the 1980’s – there is always a certain amount of uncertainty. (AP)
- Most projects were developed with substantial amounts leased and not much on speculation. (DA)
- There is always a risk when there is speculation in the production. (AP)
- Yes in the beginning of the cycle, no at the end of the cycle. (AP)
- Unlike the period at the end of 1980’s few projects were accomplished because of speculation i.e. they had most part of the area leased before production started and thereby knew the rent level at least the first period of rent. (AP)

10. “In good times, with increasing rent revenues, investors have a tendency to expect that this good state will exist a long time.”

Comments:
- In any case a longer period than this time. (AP)
- A larger understanding about the cyclical events has started. (AP)
- Yes, they prolong willingly. (TA)
- Counts as well for the stock-, bond and interest market. (TA)
- The market has no memory. (AP)
11. "Labor market (for similar job) was very good for decision makers within the real estate sector.”
Comments:
- Yes, it is the same people that appear in the branch. (TA)

12. "Office market appeared as very insecure in the end of the 1990’s.”
Comments:
- All graphs pointed right even if many investors although were sceptical to the IT-companies quite careless attitude towards costs. (DA)
- One expected good times. (DA)

13. ”The investors did not decrease the size in the project at the time of the overall economic downturn because they had to much focus on elements that still indicated on a good outcome”.
Comments:
- Nobody wanted to believe that the large telecom companies and others would get problems when 11/9-2001 happened. (AP)
- Stage 2 and 3 were often given up if not stage 1 had developed according to plan. (DA)
- A number of projects were certainly reduced. (AP)
- Of course they tried to slow down. (DA).
- Numbers of projects were cancelled or reduced in size. (DA)

14. ”The investors kept, at the time of the overall economic downturn, the size in projects because they did not in general change already made-up plans.”
Comments:
- Rather that stop in production + change in project often gives a worse product to the same price as the original. (DA)
- Stage 2 and 3 were often given up if not stage 1 had developed according to plan. (DA)
- In principle it is difficult to change the extent on a project when production has started. (AP)
- Of course they tried to slow down. (DA).
- Numbers of projects were cancelled or reduced in size. (DA)

15. “The investors did not decrease the size in present projects, at the time of the overall economic downturn, because they had already invested so much in the project.”
Comments:
- If the large costs were made the concern is although to make sure that the totality becomes good. (TA)
- Often stage 2 and 3 were given up if not stage 1 had developed according to plan. (DA)
- Again, when the production has started it is difficult for the investor to change the external parameters for the project. (AP)
- Of course they tried to slow down. (DA).
- Numbers of projects were cancelled or reduced in size. (DA)
16. “The investors did change the size in present projects in a rational way.”

Comments:

- I do not know so many projects where the extent actually were changed in an obviously way. (NO)
- Maybe one should have been faster in reactions and besides not so one sided investing in offices for the IT-companies. But when Ericsson ordered offices the developers were quite flexible. (AP)
- Varied – serious attempts were made - A number of projects were certainly reduced. (AP)
- Several office projects were stopped and changed to compartments similar to what happened 1990-1992. (AP)
- They did when they had an opportunity. (AP)
- For instance Kista Tower was not “completed”, they awaited tenants for final production. (AP)
References:


