Pacific Rim Real Estate Society (PRRES)
Conference 2006

Auckland
January 22-25, 2006

Valuation variation
– Result from a repeated experiment[1]

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Keywords: Uncertainty, valuation experiment, accounting, financial reporting

[1] An earlier version of this paper was presented at the ERES Conference in Helsinki 2003.
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ABSTRACT

The discussion about valuation accuracy and variations in valuation has been given new fuel when new worldwide accounting standards with a strong emphasis on market value are implemented. The most far- reaching new rule is that changes during the year in market value should affect both the income statement and balance sheet. This new accounting standard is currently implemented for Swedish listed real estate companies and has led to a strong focus on valuation variation and valuation accuracy as well as the magnitude of the property cycle.

A general discussion about uncertainty in valuations is illustrated with results from a repeated valuation experiment that give an indication about the magnitude of variation in estimated market values as well as variation in individual discounted cash flow parameters. The variation in market value estimates is found to be much dependent on the special market situation with fast escalating rents in Stockholm CBD during the late 1990s and a more stable situation in the year 2005. The results from the experiments are discussed in relation to results from other studies and implications are drawn for valuation as well as for accounting and portfolio management.

PROBLEM FORMULATION

Ratcliff (1972) introduced a probabilistic view on the concept of market value. 30 years after Radcliff's seminal work on the theory of valuation we can observe an increasing awareness of uncertainty as a concept. The latest years there are a flow of articles that, based on both theory and empirical observations in different contexts, discuss uncertainty, valuation variation and valuation accuracy, e.g.; Hager – Lord (1985), Matysiak – Wang (1995), Crosby –Lavers – Murdoch (1998), Mallinson – French (2000), Bretten – Wyatt (2001), Mokrane (2002), Adair-Hutchison (2005) and French – Gabrielli (2005).

The growing interest for uncertainty can mainly be explained by institutional changes induced by the rapid globalization and integration of the real estate market into the capital market. Portfolio management, executive compensation and information to the investment community is nowadays conducted on an international arena, and to an increasing extent based on information from nationwide property indices. All indices have one characteristic in common – the return figures are based on valuations. This special feature, in relation to transaction based stock and bond indices, has given raise to a long lasting discussion about uncertainty in valuations. The discussion is about how well valuations reflect transactions, if valuations are lagged and smoothed, and how valuation based property indices can be used in strategic decision making, e.g.; Geltner (1989), Adair *et al* (1996), Brown *et al* (1998) and Hordijk – van de Ridder (2005).

A rather new discussion is about new and world wide accounting standards (International Accounting Standards, IAS 40) that to a greater extent focus transparency in the financial reporting. Several examples of accounting fraud, the

Enron and WorldCom scandals in the USA, have underlined the need for common definitions and increased disclosure of financial information, see Verrechia (1999) and Healey-Palepu (2001) who summarizes much of the general discussion about information disclosure linked to accounting.

The EU Regulation 1606/2002 states that International Accounting Standards (IAS) and International Financial Reporting Standards (IFRS) should be implemented to increase transparency. One important part of that regulation is that listed companies should report market values ("fair value") and changes in market values instead of, or in combination with, the traditional book value. This view was supported by EPRA (European Public Real Estate Associations, 2001).

The full disclosure, and eventually full financial impact, of unrealised changes in market values raises a set of question related to valuation, accounting and portfolio management, e.g.:

- How consistent are valuers in their opinion about market value for a specific property?
- How accurate are valuations in different market contexts as predictors of market values or transaction prices?
- What kind of market evidence is needed before writing-up or writing-down the value of properties in the balance sheet?
- What other effects could be expected in the market place from the emphasis of market value that is a clear change in the institutional framework?

This paper will discuss all these four questions with an extra focus on the first two items.

ORGANIZATION OF THE PAPER

The discussion about valuation variation is based on a literature review and three almost identical valuation experiments. The experiments where conducted in the year 2000, 2001 and 2005 as a part of the valuation process within the Swedish Property Index, Lundström (2000). First there is a more general discussion about uncertainty in market valuations and how this uncertainty has an impact on financial information. The main part of the paper contains a description and analyses of the results from the three experiments. In the final part the results are discussed in relation to other studies on valuation variation, and conclusions are drawn about the use of estimated market values for purpose of accounting and portfolio management.

EXPRESSIONS FOR UNCERTAINTY IN MARKET VALUE

A market value definition like "the most probable price…" (Ratcliff, 1972) indicates that all valuations are more or less uncertain. The degree of uncertainty can be expected to be a function of the quality and quantity of market information. The market value itself is never direct observable, but it can be expressed as a central tendency in a distribution of valuations or transactions of identical/similar properties as described by Mallinson and French (2000).

Uncertainty in valuations is discussed in different contexts. Much of the early discussions were about court decisions and what "margin of error" could be accepted without accusing the valuer for negligence (Crosby *et al* 1998). The Hager and Lord (1985) survey is recognized as a starting point for a debate about valuation methodology and uncertainty that was given extra fuel in the Mallinson report (RICS, 1994). Several studies thereafter provide quantitative expressions to uncertainty, Adair *et al* (1996), Brown *et al* (1998) and Parker (1999). While studies like Ekelid *et al* (1998) and Joslin (2005) analyze expression of uncertainty in the value reports.

A distinction is made between valuation variation and valuation accuracy, see e.g. Adair *et al* (1996) or McAllister and Bowles (1997). Valuation variation is about the spread in valuations with no direct reference to market value or transaction price. Valuation accuracy is related to how close a reported value figure is to the market value or the transaction price. It is about the validity and consistency of valuations. Bias in valuations is the systematic over- or undervaluing of a property, while valuation error expresses how the estimated value deviates from transaction price.

Variation in valuations follows from the fact that valuers interpret information differently. Even given the same information the valuers will deliver different value opinions. However, common uses of modern and theoretical well-based methods will most probably increase accuracy and lower the spread in results. At the other hand is different expectations and different value opinions (user values and reservation prices) the driving force behind the property market (Geltner, 1997).

Both the valuer and the dart player want to have low variation with high accuracy. The dart player have an immediate feed back on both variation and accuracy, while the feed back to the valuer is more vague. Several studies of valuation error show a high degree of correspondence between estimated values and prices Cullen (1994), Matysiak and Wang (1995) and Mokrane (2002). However, these findings are argued to partly be a product of the impact of the value report on price. Baum *et al* (1996) argues that the valuation impact on price is greater than generally supposed. Besides the value report itself will the uses of the same methods (Discounted Cash Flow, DCF), and widely agreed parameter values, create a consensus about the market value.

Bretten – Wyatt (2001) give examples of factors that affect valuation variation. Based on their survey and own experience can the following factors be listed:
- Pressure from the principal on the agent (the valuer) to undertake the valuation in a certain manner and deliver a certain result, (Levy – Schuck, 2005).
- Access to information. Different kinds of properties are in different market regarding uniqueness, liquidity and information.
- A recent transaction price for the subject property can have a huge impact on the valuation estimate, especially in thin markets.
- Valuers with high competence in big firms with an outspoken business culture are expected to present valuations with relatively low variance.

- Presence of valuation guidelines, like the British "Red book" or the guidelines for the Swedish Property Index, can be expected to result in less variance in valuations.
- Systematic feedback on valuations in relation to transaction prices, yields, discount rates, rents etc, will by time give a lower spread in valuations results.

Valuation can, based on this list, be regarded as a partly objective and partly a subjective process. The "degree of objectively" is most dependent on the access to information and competent valuers. However, valuation variation will always to a great extent be situation dependent.

UNCERTAINTY IN FINANCIAL INFORMATION BASED ON VALUATIONS

Problems related to variation and accuracy in market value estimates occurs when end users of financial information in more general terms observe;

- Longitudinal relative changes in property values and return figures that motivate questions about the validity of performance measurement and the financial reporting.
- Cross-sectional differences in value estimates that are systematic and not motivated with differences in basic assumptions about property management and the property market. This problem is related to uncertainty in a wider sense, both concerning the spread itself and valuation bias.
- Uncertainty that stems from the property cycle and sudden changes in market values that cannot be foreseen in time and to magnitude.

Accounting rules state that decisions about writing down or up the capital base within the balance sheet should be taken for each individual piece of property. Uncertainty has then to be calculated and considered on the individual property level as well as on the portfolio level. At the portfolio level will most certainly the law of big numbers even out most of the individual variation at the property level.

With a capital base that to a great extent can vary due to forces out of control from the management will there obviously be a need for margins in both the income statement and balance sheet. The question is then what margins are needed? High leveraged property holding companies on volatile markets will most certainly have problems while all equity financed vehicles will be less affected by changing rules for information disclosure.

THE VALUATION EXPERIMENTS

The here presented valuation experiments were originally designed to reflect the variation in valuation assumptions and results given that DCF is used as valuation method. Different kind of experiments has over time been undertaken as tools to develop the valuation process for the Swedish Property Index (SFI). In the year 2000 an experiment was designed that was followed up in 2001 and 2005 with experiments that have almost identical structure. Here the year 2000 experiment is described and comments are made about deviations in assumptions for the later experiments.

Design of the three experiments

24 Stockholm based valuers (internal, external and bank-related) were in August 2000 asked to conduct a market valuation of a centrally located office property in Stockholm CBD. All were, independent of each other, given the same basic information. They had three weeks to conduct the value report, and they were told not to cooperate. The method used should be DCF, and all critical assumptions should be reported together with the market value. With reference to an existing freehold property all data were simplified as follows:

Location: Stockholm CBD, at a well-known address
Space uses: Office 9000 m^2 and an archive with 1000 m^2
Standard: Built 1975 and renovated to modern standard 1996
Main content of lease contracts:
a) 3 000 m^2, Financial institution, rent passing 2000 SEK/m^2, expires 2001/2002
b) 3 000 m^2, Bank, rent passing 2200 SEK/m^2, expires 2002/2003
c) 2 700 m^2, IT Company, rent passing 2400 SEK/m^2, expires 2003/2004
d) 300 m^2, vacant for rent
e) 1 000 m^2, archive, rent passing 800 SEK/m^2, expires 2002/2003

20 out of 24 valuers conducted the year 2000 survey while the corresponding numbers for the 2001 and 2005 surveys was 18 out of 23 respectively 16 out of 23. The rent passing for the year 2001 and 2005 studies was adjusted to a "normal" level with the same assumptions about time to expiration for leases as in the year 2000 study. Important information is that the market rent in the Swedish context is all-inclusive, which follows that the property owner carries cost for operations and maintenance.

Results

The main results from the three experiments are presented in table 1 and appendix I

Table 1   Average levels and coefficient of variation for market value and cash flow parameters in the three experiments.

	Market Value Mill. SEK	Exit yield %	Discount Rate %	Operations & Maintenance SEK/m^2	Expected market rent SEK/m^2	Number of valuations within +/- 10% of average
Average						
2000	532	5,9	7,9	292	4 100	11 out of 20
2001	532	6,4	8,4	299	4300	18 out of 18
2005	467	5,6	7,5	346	3400	15 out of 16
Coefficient of variation						
2000	0,12	0,05	0,04	0,14	0,11	
2001	0,06	0,03	0,04	0,13	0,07	
2005	0,06	0,05	0,05	0,13	0,05	

If we just read the numbers, the following observations can be made:
- The spread in market value estimates and assumptions was at the highest level in the year 2000.

- Most obvious is the spread in assumptions about market rent in the year 2000.
- The spread in exit yields and discount rates is at a relatively low level for all three experiments.
- Notably is also that for the year 2005 experiment is the relative spread in operation and maintenance cost more than double as high compared to other parameters.

The results in a market context

The relatively widespread consensus among valuers about exit yields and discount rates make deviations in assumptions about market rent to be the most powerful explanation of variations in market value estimates. The situation on the rental market can be illustrated as in diagram 1 where an index is made on lease transactions between year 1998 and 2004 for office space in Stockholm CBD. The transaction based rental indices for new lets (795 observations) and lease renewals (1100 observations) are related to assumptions about market rental value made by valuers in their DCF forecasts.
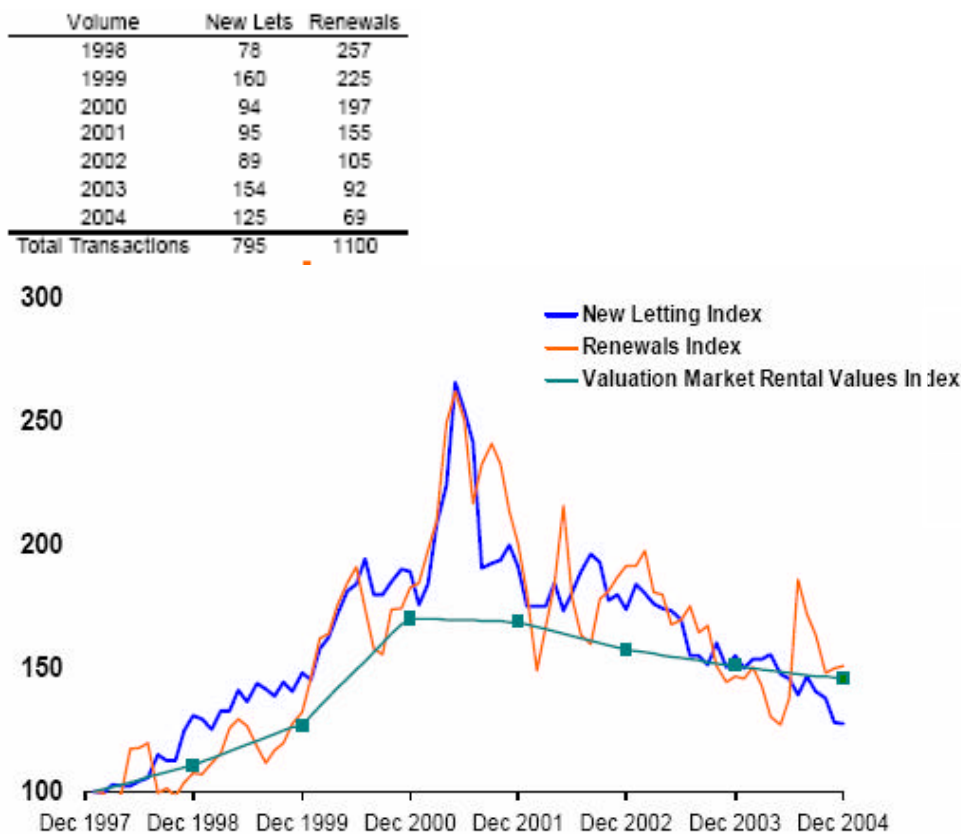
Volume	New Lets	Renewals
1998	78	257
1999	160	225
2000	94	197
2001	95	155
2002	89	105
2003	154	92
2004	125	69
Total Transactions	795	1100

Diagram 1   **Transaction based rental index for office in Stockholm CBD based on rent per square meter and 3-month moving average. Source: SFI/IPD.**

It is obvious that mid 2000 was the turning point for the Stockholm office market and that the experiment in August 2000 was conducted in a turbulent and unclear market situation. It's also evident that the valuers – on average – smoothed out the rental peak in year 2000. In the same way the valuers are optimistic about the rental market at the end of year 2004. Diagram 1 also illustrates a softening rental market when lease

renewals the latest years tend to be at a higher level per square meter compared to new lets.

The huge impact of market rent assumptions on market value estimates in the year 2000 is illustrated in diagram 2
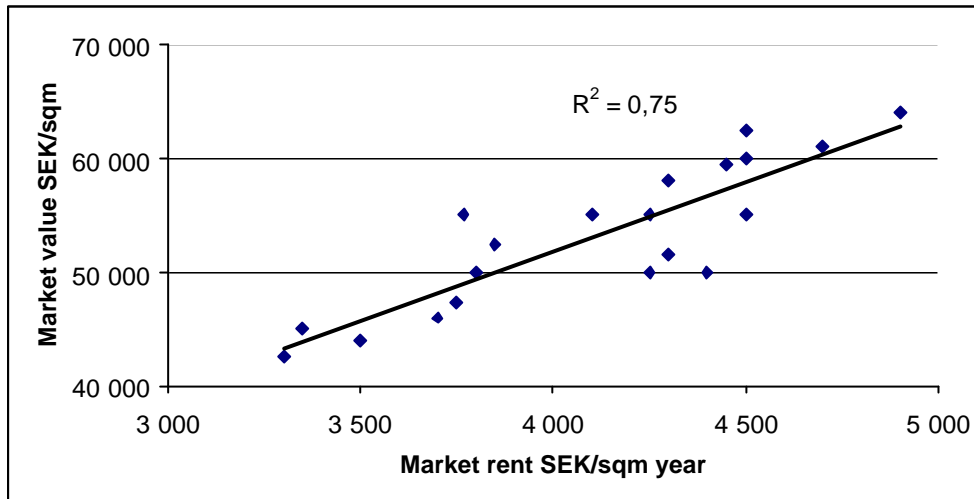

Diagram 2   Market value as a function of the expected market rent in the year 2000 valuation experiment.

75% of the variation in the market value estimates can be explained by the variation in assumptions about the market rent. The strong value impact in the year 2000 follows from the fact that all lease contracts are short term and are strongly influenced by expires in a couple of years.

In the year 2005 experiment the spread in market rental value is much lower compared with the year 2000 experiment. Less of the market value variation is also explained by the market rental value, $R^2 = 0,49$ compared with $R^2 = 0,75$.

THE RESULTS RELATED TO OTHER STUDIES OF VARIATION
Almost all studies of valuation variation and accuracy are different in design, information available, number of observations and statistical tools used. Straight comparisons are therefore difficult. Conclusions should therefore be drawn with some care.

To begin with is it a common behavior that the valuer qualifies the value estimate with an expression for uncertainty, e.g. 100 million SEK +/- 10%. The exact meaning of these +/- 10% is in a statistical sense unclear (Mallinson and French, 2000). The year 2000 experiment shows that 11 out 20 valuers have value estimates that are within +/- 10% of the mean value. This is the result when a group of 20 rather homogenous valuers and analysts value the same property in a situation with comparatively short lease contracts and fast raising market rents. The subject property is located in a sub

market – Stockholm CBD – which contains the comparatively best property related information in the Swedish property market. The observed spread of market value estimates give a hint about the spread that could be expected in a situation with a more complicated property in a market with weak information.

With a more stable situation in the rental market, as for the year 2001 and 2005 experiments, almost all valuers are within +/- 10% of average. This improvement of result can to some extent be an experiment effect, as some of the valuers participate in all three experiments. However, most obvious is the increased consensus about the rental market.

In the Hager and Lord (1985) study a smaller group of valuers where given the same instructions for valuation of an office and a retail property. An expert valuer carried out a control valuation. Nine out of ten valuations where within 10% of the control valuation for the office property, while the corresponding numbers for the retail unit was seven out of ten. The maximum variation in estimated value for the two properties was about 13%. This figure is much lower than the 40% noted in the year 2000 experiment.

Adair *et al* (1996) makes a more full-scale valuation experiment (446 observations) to illustrate valuation variation. They used a structured survey instrument with a standardized property description for 14 different main city locations. National valuers, and local valuers for the centers chosen, undertook the valuations. The results are reported as average percentage variation from the mean market value and as standard deviation for the main results. In summary the Adair *et al* study give that the average absolute variation for all market value observations is 9.53%. The corresponding standard deviation is 8.55%. The mean percentage variation for all kind of properties is around 10%. The lowest mean variation (8,04%) is found for reversionary office property while the highest variation (12,0%) is for rack-rented industrial property. Another observation from the Adair *et al* study is that most of the valuations are based on traditional yield methods. It is also a tendency that valuations conducted by local valuers have a higher degree of variation compared with national firms.

Crosby *et al* (1998) summarize several studies concerning valuation variation and valuation error (e.g. Brown *et al* 1998, Matysiak and Wang, 1995). The main finding is that a significant number of valuations will be outside the +/-10% range from the actual sale price. In the year 2000 experiment nine out of 20 valuations were outside 10% of the mean. The corresponding numbers from the Adair *et al* study is in the range of 11 to 15 out of a total of 20.

Adair *et al* also reports variations (mean percentage variation) in rental values and initial yields. Their "average of average variation" for the rental value in 14 locations is some 5% with a spread between 1 and 15%. The corresponding number for the year 2000 study in Stockholm CBD is 11%. This 11% could best be compared with 1,27% for London West End in the Adair *et al* study. It is clear that a fast raising market in

Stockholm CBD give a wide range of opinions about the market rental level. Adair *et al* reports a mean percentage variation in *Initial yields* that varies between 1,65 to 8,24% for the 14 different locations. The average of these average numbers is about 4,3% to compare with 3,5% for *exit yields* in the year 2000 experiment.

General and longitudinal variations in market values on the portfolio level, from one year to another, are indicated by the value growth factor in national property indices. The value growth factor in Sweden varies from +28% for the year 1987 to – 27% for the year 1991 and +16% for the year 2000. For individual properties and certain sub-markets is the property cycle even more dramatic. As briefly discussed above can the widest variation in valuations and the lowest valuation accuracy be expected at the top and the bottom of the property cycle.

CONCLUSIONS AND IMPLICATIONS FOR ACCOUNTING AND PORTFOLIO MANAGEMENT

The here presented valuation experiment and other surveys give information about valuation variation. It is clear that the spread in valuations is much dependent of the situation; market liquidity, market depth and the valuers' access to information. There is also some general agreement about the magnitude of variation and accuracy that can be expected in different market contexts. The main affects of market value as the capital base within financial reporting can be summarized as follows:

- The most important advantage with the market value as the capital base is that, together with cash flow statements, accounting information can be more relevant as input to financial analysis. The transparency will increase and the number of adjustments before ratio-analysis and benchmarking can be reduced.
- Management of real estate companies that report other market value levels than generally agreed, or use other value concepts than market value, will have to defend their assumptions and show what information they have used in their value judgment.
- The main disadvantage is that the market value as a capital base will always be questioned and that the spread in opinion about the market value is dependent on the market situation. Sudden shocks in the market can for a shorter time period give market values that to a high degree are both uncertain and markedly lower than the long run trend.
- The consideration of market value as the capital value in the financial reporting will certainly have to an effect that property companies will lower their leverage to have a safeguard against financial distress and foreclosure.
- Especially in downturns of the property cycle will there be a discussion of the valuer and the valuation reports.
- Valuation variation is much dependent of the homogeneity of market information and in the Swedish market context with short-term leases is rental market information crucial.
- The comparatively low variation in exit yield and discount rate can partly be explained by the fact that most valuers have access to the same market reports. However, the common notion in financial analysis is that differences in expectations about risk should be reflected in the discount rate (exit yield). When a

bigger group of valuers and analysts for the same property report discount rates within a small range it can be an expression for a consensus about risk.

- An interesting observation is that the average assumptions about operations and maintenance cost are about 20% lower than the actual outcome from property management measured by the Swedish Property Index. From all the years of feed back analyses in the Swedish Property Index it is also concluded that that valuers systematically underestimate the long run vacancies. Under the assumption that the reported market values are correct will that give discount rates and exit yields that are about one percentage unit to high.

Professional areas such as valuation, financial analysis and accounting are gradually integrated. This integration of different areas with different academic foundation and professional bodies will take some time as all actors need to have the same notion to central concepts such as market value. The producers of market value estimates – the valuers – may have a different opinion about both accuracy and variation compared to the users – analysts and accountants - of market value information.

Two measures are here suggested to increase the quality in the process that starts with valuation and ends with financial reporting. First there should be a partly common academic curriculum for valuers, accountants and financial analysts. Second is it important to have increased emphasis on the quality of market information. Without better information is it limited use to adopt more sophisticated valuation models.

Appendix 1 Results from valuation experiments year 2000, 2001 and 2005

2000	Number of valuations	Estimated Market Value	Valuation yield (Exit yield)	Discount rate	Calculation period	Inflation assumption	Operating costs assumption	Estimated Market Rental Value SEK/m2		Long term Vacancy rate
		1 000 SEK	%	%	years	%	SEK/m^2	Office	Storage	%
Average	20	531,950	5.9	7.9	7.1	1.9	292	4,108	1,130	2.3
Minimum		425,000	5.3	7.3	5	1.5	213	3,300	800	0.0
Lower Quartile		493,500	5.8	7.8	5	2.0	270	3,763	1,000	2.0
Median		537,500	5.9	7.8	5	2.0	295	4,250	1,100	2.0
Upper Quartile		583,750	6.0	8.0	10	2.0	324	4,463	1,250	3.0
Maximum		640,000	6.5	8.5	10	2.0	355	4,900	1,500	5.0
Standard deviation		63,737	0.3	0.3	2.5	0.2	40	454	225	1.4
Relative standard deviation		0.12	0.05	0.04			0.14	0.11	0.20	0.60
10 of 20 valuations within +/-10% of average										

In-house	9	521,000	6.0	8.0	7.2	2.0	295	4,133	1,144	2.9
External	8	561,250	5.9	7.7	6.4	1.8	299	4,269	1,125	2.0
Bank	3	486,667	5.9	7.8	8.3	2.0	261	3,606	1,100	1.3

2001	Number of valuations	Estimated Market Value	Valuation yield (Exit yield)	Discount rate	Calculation period	Inflation assumption	Operating costs assumption	Estimated Market Rental Value SEK/m2		Long term Vacancy rate
		1 000 SEK	%	%	years	%	SEK/m^2	Office	Storage	%
Average	18	532,278	6.4	8.4	7.8	2.0	299	4,308	1,131	3.1
Minimum		470,000	6.0	8.0	5.0	2.0	208	3,700	800	0.0
Lower Quartile		520,000	6.3	8.3	5.0	2.0	290	4,125	1,000	3.0
Median		532,500	6.4	8.5	10.0	2.0	302	4,300	1,200	3.0
Upper Quartile		550,000	6.5	8.5	10.0	2.0	326	4,500	1,200	4.0
Maximum		585,000	6.8	8.9	10.0	2.0	356	5,000	1,500	5.0
Standard deviation		32,340	0.2	0.3	2.6	0.0	38	311	192	1.4
Relative standard deviation		0.06	0.03				0.13	0.07	0.17	0.47
Variationsbredd		0.22								
18 of 18 valuations within +/-10% of average										

In-house	8	541,250	6.4	8.4	7.5	2.0	309	4,406	1,163	3.3
External	7	525,429	6.4	8.4	7.1	2.0	295	4,243	1,093	3.4
Bank	3	524,333	6.4	8.4	10.0	2.0	284	4,200	1,133	1.7

2005	Number of valuations	Estimated Market Value	Valuation yield (Exit yield)	Discount rate	Calculation period	Inflation assumption	Operating costs assumption	Estimated Market Rental Value SEK/m2		Long term Vacancy rate
		1 000 SEK	%	%	years	%	SEK/m^2	Office	Storage	%
Average	16	467,376	5.6	7.5	7.2	1.9	346	3,414	959	5.1
Minimum		430,000	4.8	6.8	5.0	1.2	263	3,200	800	3.0
Lower Quartile		449,003	5.5	7.2	5.0	2.0	320	3,250	814	5.0
Median		460,000	5.5	7.6	5.1	2.0	343	3,400	1,000	5.0
Upper Quartile		486,250	5.8	7.8	10.0	2.0	380	3,566	1,000	5.0
Maximum		525,000	6.0	8.0	10.0	2.0	420	3,700	1,200	8.0
Standard deviation		28,373	0.3	0.4	2.5	0.2	44	168	138	1.3
Relative standard deviation		0.06	0.05	0.05			0.13	0.05	0.14	0.25
Variationsbredd										
15 of 16 valuations within +/-10% of average										

In-house	7	461,000	5.5	7.5	6.4	2.0	373	3,407	931	5.3
External	7	475,144	5.6	7.4	7.2	1.8	332	3,429	1,001	4.9
Bank	2	462,500	5.8	7.4	10.0	2.0	299	3,386	908	5.0

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