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The relationship between urban street configuration and office rent patterns in Berlin

NON-SPATIAL CHARACTERISTICS OF THE LEASE SAMPLE

PhD Thesis by Dr. Jake Desyllas

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About this thesis

This thesis presents a study of the influence of urban street configuration on the pattern of commercial office rents in Berlin. The hypothesis is that there is a relationship between the two, and that the alteration of the street network with reunification has precipitated a spatial reorganisation of office rents.

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6 NON-SPATIAL CHARACTERISTICS OF THE LEASE SAMPLE

6.1 Introduction

The purpose of this chapter is to review the main empirical source of rent data used in the thesis (the sample of leases) in order to see whether the effect of non-spatial characteristics of the sample could rule out any explanation of the spatial pattern of rents in terms of their location. In other words, before using the empirical data to investigate the main problem of this thesis, which is the relationship between the spatial pattern of rent and the layout of the built environment, this chapter reviews the available lease data for other non-spatial factors that might influence the spatial pattern of rent.

In the previous chapter, a distinctive pattern of two peak areas of office rent was shown in agents' reports. One of these appeared to correspond to the West Berlin core of global integration as it was before reunification and the other corresponded to the core of the reunified city *after* the wall. But the evidence of the agents' reports is limited both in terms of the unclear methodology, the lack of reliability and the level of detail[23]. A visual similarity between rent and the pattern of global integration was found, but in order to analyse this relationship properly it is necessary to move on from the evidence of published sources to the study of a sample of real lease transactions.

6.2 The Lease Sample

As was explained in the methodology chapter, this thesis uses real lease transactions rather than asking rents as the sample of rent data for analysis. The complex relationship between a tenant and a landlord is documented in the rental contract. When large numbers of contracts are analysed, general regularities in landlord tenant relations can be seen. Previous research has shown that in a recession, negotiating power shifts from the landlords to the tenants and this shift in market power allows tenants to push for changes in lease provisions to their own advantage (section 2.5.1.1 on page 36 above). This makes the comparability of leases suspect and it is therefore important to investigate lease provisions if the sample is to be used to compare location rents. In this chapter the investigation of the non-spatial characteristics of the lease sample is undertaken in order to control for three issues:

[23] As has been stressed in the literature review, the methodology chapter and the previous chapter, this is not a criticism of agents' reports, it is simply a consequence of the fact that the reports were not produced for academic research purposes.

6.2.1 What are the non-spatial characteristics of the lease sample?

In this chapter, the analysis of the lease data will begin by looking at the non-spatial characteristics of the leases. The property agents' reports analysed in the previous chapter provided general information about the Berlin market in the period under discussion. In particular, all the agents' reports presented evidence that the office rental market has undergone a recession after the short lived reunification boom. However, very little detailed evidence on such fundamental market characteristics as building quality or lease provisions was available in the market reports. Section 6.3 below will provide a description of the main non-spatial characteristics of both the detailed JLW sample of leases and the larger sample of headline rents.

6.2.2 How comparable are the leases?

As well as the lease provisions that show differences in the kind within the sample, there are also a number of provisions can be seen to influence the effective cost of the lease to a tenant. Effective rent is an elusive term and it has already been seen in the literature review that there is no agreed definition. Epstein and others have argued that the nature of rent data makes a proper accounting for such differences in provisions impossible and that effective rents must be *indeterminate* (see section 2.5.1.1 on page 36 above). However, the lack of any accounting for those lease variables that may influence the value of the lease to the tenant is one of the weaknesses of published rent values and the study of actual leases will allow for this issue to be tackled.

Despite the uncertainties involved in calculating effective rents, chapter three introduced two kinds of adjusted rent values that could be calculated for the smaller sample of Berlin leases where all lease provision data was available. In section 6.4 below the difference between these adjusted rents and the headline rent value is analysed for the study sample to see how important these other provisions are.

6.2.3 How can an objective value for 'location rent' be created?

In the previous chapter, the limitations of rent maps from agents' reports were outlined. The first problem was that it was unclear exactly what values are being represented. In this chapter a control of non-spatial variables will be undertaken in order to allow for a more objective representation of the residual difference that remains. The influence of the non-spatial variables alone will be tested in a Multiple Regression Analysis in section 6.5. This 'location-blind MRA' is the same technique as that used by Gallimore (see section 2.7.3 of the literature review) to provide an objective 'location rent' value that can be

used in representations of rent patterns. The process of representation that will be used for this sample of rents is however different to that of Gallimore's, and that will be the subject of the next chapter.

6.3 Analysis of Non-Spatial Variables and the Lease Sample

Table 6.1 to Table 6.3 below provide the summary statistics for the lease and other non-spatial variables used in this study. The methodology used to calculate each variable was provided in section 3.3 of the methodology chapter above. A quick reference guide to the definition of each variable can be found in Table 11.1 in Appendix B: Definition of Lease variables.

	Lease begin month code	Months pre-let	Floor space m2	Obligatory lease term	Option total	Option/ contract	Headline Rent (91prices)	Build Quality Dummy
Mean	53.966	1.592	616	5.189	3.153	.720	30.991	.602
Median	59	1	313	5	3	.750	28.815	1
Mode	64	1	182	5	0	0	39.890	1
Std. Dev.	21.828	1.702	1413.908	2.531	3.078	.803	12.637	.491
Std. Error	1.521	.119	98.512	.176	.214	.056	.880	.034
Minimum	1	0	21.85	1	0	0	15.640	0
Maximum	84	14	12943	10	12	4.500	85.630	1
Variance	476.443	2.896	1999136	6.408	9.475	.644	159.695	.241
Range	83	14	12921	9	12	4.500	69.990	1
Skewness	-.822	3.365	6.648	.823	.583	1.596	1.804	-.417
Kurtosis	-.193	18.889	48.298	-.084	-.432	3.659	4.163	-1.827

Table 6.1: Summary Statistics of the Leases in the Jones Lang Wootton Sample (n=206)

	rent free months	free time fraction	addition	Appreciation
Mean	1.323	.022	.255	.024
Median	0	0	0	.031
Mode	0	0	0	.031
Std. Dev.	2.461	.040	.843	.016
Std. Error	.171	.003	.059	.001
Count	206	206	206	206
Minimum	0	0	0	0
Maximum	15	.200	6.438	.103
Variance	6.055	.002	.711	2.541E-4
Range	15	.200	6.438	.103
Skewness	2.354	2.057	4.878	-.044
Kurtosis	6.497	3.876	27.592	1.769

Table 6.2: Summary Statistics of the Lease Incentives in the Jones Lang Wootton Sample (n=206)

	Floor space m^2	Obligatory lease term	Headline Rent (91prices)	Lease begin month code	Build Quality Dummy
Mean	846	5.120	29.127	58.597	.659
Median	353	5	26.600	64	1
Mode	200	5	39.890	70	1
Std. Dev.	2448.875	2.291	10.427	18.620	.475
Std. Error	117.146	.129	.499	.891	.023
Minimum	21.85	1	13.940	1	0
Maximum	40000	12	85.630	84	1
# Missing	0	120	0	0	0
Variance	5996989	5.250	108.720	346.723	.225
Range	39978	11	71.690	83	1
Skewness	10.834	.983	1.902	-.989	-.671
Kurtosis	153.484	.784	5.805	.660	-1.550

Table 6.3: Summary Statistics for the landlords sample (n=437)

6.3.1 Rent Levels of the sample compared to market

In chapter 5, rent levels from agents' reports were quoted to show how rents have developed over time. The most often cited rent levels in agents' reports are so-called 'top rents'. Figure 6.1 below shows two examples of top rent time-series and their mean:

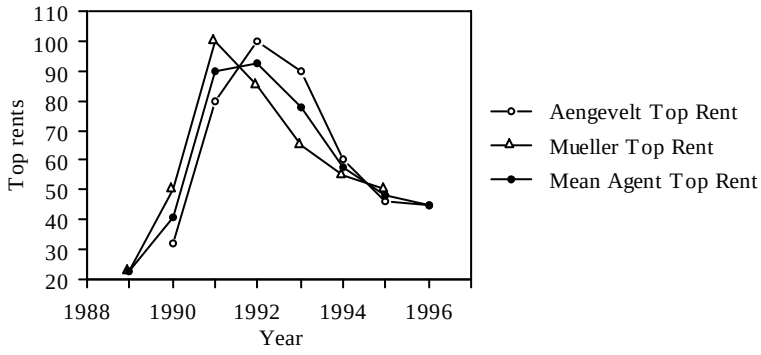


Figure 6.1: Agents Stated Top Office Rents (Aengevelt Research 1996; Müller GmbH 1996)

Top rent is an ambiguous term and less reliable than mean rents as a variable for comparison between the sample and the market as a whole[24]. The disadvantage of top rents is that single outliers may have a great effect on the series. This is shown in the box plot[25] of the JLW rent series in Figure 6.2 below:

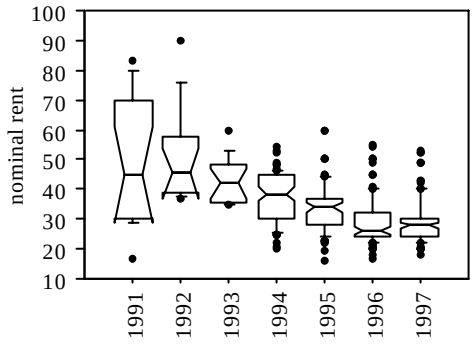


Figure 6.2: Box plot of nominal rent values

In Figure 6.3 below, the sample data is compared to the mean of agents top rents both by using the top number and the 90th percentile. There is no explanation of an adjustment for inflation in the other agents' reports and so the assumption must be that they are using unadjusted, nominal prices. When displaying any kind of monetary data that varies over time it is necessary to adjust for inflation in order to represent the real price movements (Tufte 1983; Wheaton and Torto 1994). The rents of the sample used in this study have

[24] Agents may use top rents because they vary more clearly over time than mean rents, or in order to 'boost' perceptions of the market, or perhaps because the agents are keen to attract a higher segment of customers.

[25] The box plot uses the normal convention of representing the 90th and 10th percentiles in the whiskers, the 25th and 75th as the box boundary and the median as the line in the box. The outliers are values outside 2 standard deviations.

been adjusted to constant ('real') prices, but for the comparison with agents' reports the nominal values from the JLW sample have been used.

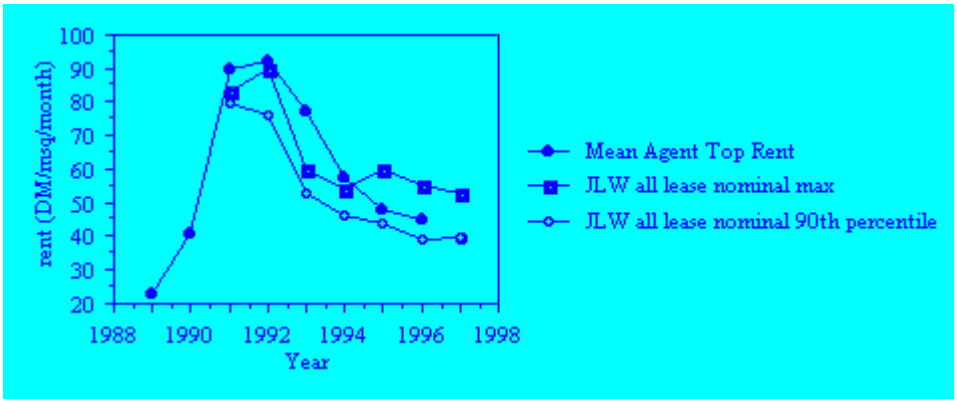


Figure 6.3: Comparison of Top Rents

The JLW sample can be seen to follow the trend over time shown by other agents. The sample is lower than the agents' estimate in the earlier period but higher in recent years. Although the 90th percentile is lower than the absolute JLW top figure (for obvious reasons), it fits the curve of the other market estimates better because the outliers have been removed, so the trend is much smoother. As a result of this study, a suggestion for a useful standard to construct indices of top rents is to use the 90th percentile, thus removing some of the erratic behaviour at the very end of the rent scale but maintaining the more marked changes that the top rent shows.

The falling trend in mean real rent prices with the recession is shown in Figure 6.4. The trend for the sample reflects the market trend shown in the property agents' reports of chapter 5 closely. The 95% confidence intervals show that the range was greater in the earlier years of the sample and narrowed as the market slumped (the earlier years also have smaller sample sizes).

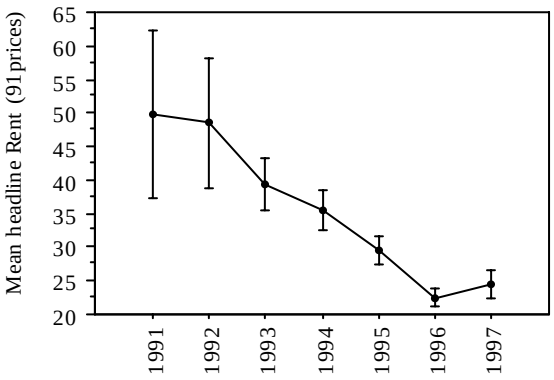


Figure 6.4: Berlin's Falling Office Rents

6.3.2 Building Quality

As was seen in chapter 5, very little information about differences in Berlin rents between new and old buildings has been published, but there is a general view that new buildings should command a premium. This was seen in the comments of the property agents' reports analysed in chapter 5 and the few price estimates reproduced in Table 5.2 (page 170). However, no statistically significant premium for new buildings is detectable in the lease data.

A possible explanation for this may be that location is acting as an intervening variable in the relationship of building type to rent. Perhaps rents were slightly higher in old buildings during the earlier years because there were fewer new buildings in the prime locations, whereas it may have been easier to renovate older buildings for office use quickly. On this basis, the narrowing of this differential after 1995 would be explained by the increase in supply of new buildings in central locations. The role of location in the sample is explored in chapters 7 and 8. At this stage, it is of interest to note that a direct premium for new-build is *not* detectable in the sample.

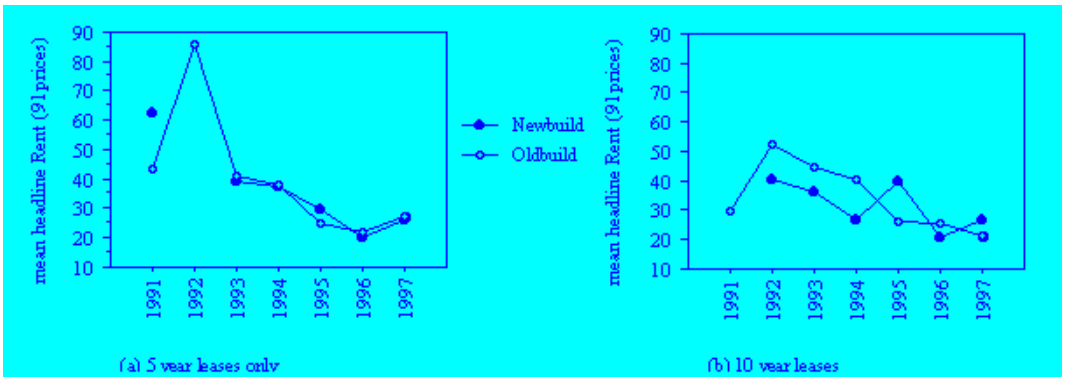


Figure 6.5: Headline rents in new and old buildings for the JLW sample

The proportion of new buildings in the sample rises through time, as can be seen in Figure 6.6 below. This pattern may reflect a more general rise within the office market as new buildings were completed, as has been shown in chapter 5. Indeed the dominance of lettings in new buildings in the sample after 1995 coincides with the completion of many new buildings in the first wave of development. A similar pattern emerges when the sample is analysed according to the total floorspace let in old and new buildings, as can be seen in the right hand graphic of Figure 6.6. From a total of 437 leases (including the landlords leases) 288 are in new buildings (66%).

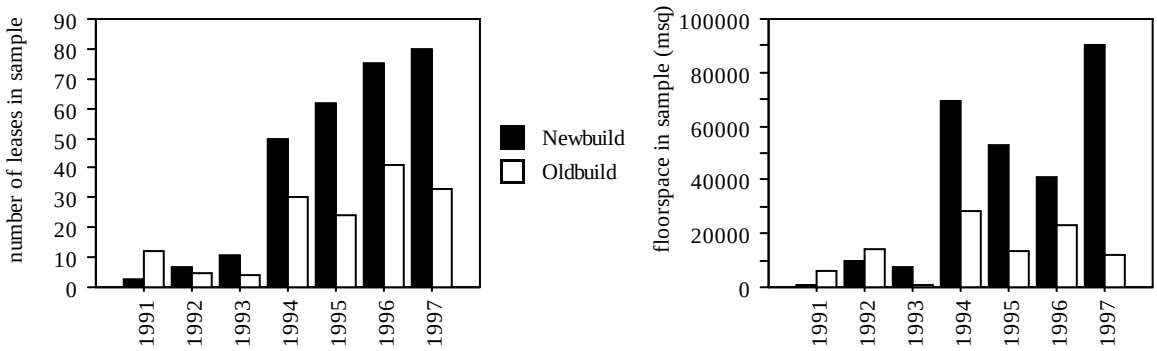
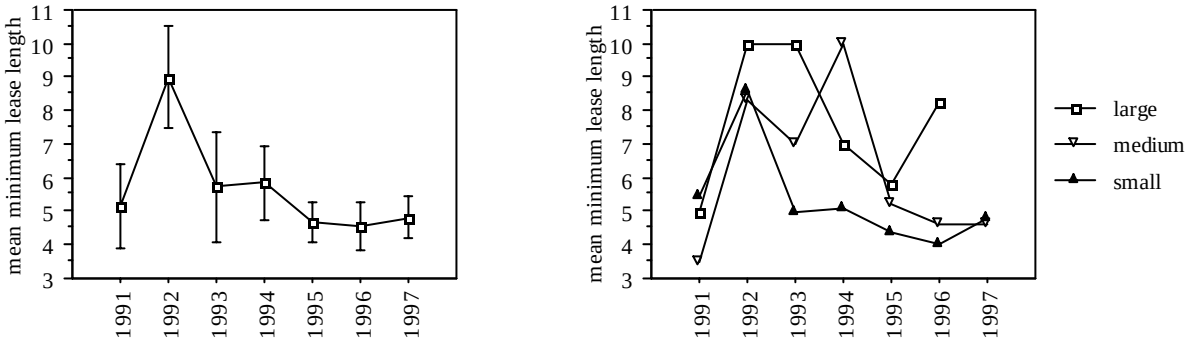


Figure 6.6: Leases in new and old buildings per year by number (left) and floorspace (right)

6.3.3 Obligatory lease term

Research in the UK reviewed in chapter 2 showed that one of the most prominent characteristics of the last office recession was the shortening of average lease terms and a greater diversity of lease lengths (section 2.5.1.2 on page 39 above). The recession in Berlin has also led to a reduction in the average length of leases in the sample, with a much shorter minimum term in the later period compared to the boom peak of 1992, as can be seen in Figure 6.7(a) below. This reflects a shift in favour of the tenants given a continued expectation of falling rents, as the tenants are left with an opportunity to seek a better rent price elsewhere or renegotiate.



(a) whole JLL sample
Error bars show 95% confidence intervals

(b) split by floorspace size

Figure 6.7: Average obligatory lease length

As was noted in section 2.5.1.2 (page 39 above), Brennan found that lease length was highly positively correlated with the size of the unit. There is also a broad relationship between lease length and floorspace size for the lease sample. The longer 10-year leases are more likely to be in larger units of over 1000 m2. This is to be expected if larger firms are less mobile and therefore more likely to trade off flexibility against their high moving

costs. This can be seen in Figure 6.7(b) above, which shows the average obligatory lease term split by floorspace size category. Small units (less than 500m2) were on average leased for less than 5 years during the recession.

For the Jones Lang Wootton sample, the most common length was 5 years and accounted for 50% of the leases. The second most common length of 10 years accounted for a further 18%, as can be seen on the right hand distribution of Figure 6.8 below. The obligatory lease length for the larger sample of landlords leases compares well with the JLW sample. As can be seen in Table 6.3 on page 195 above, the mean for the landlord sample is 5.21 months compared with the JLW sample of 5.189. The larger landlord sample has a lower standard deviation at 2.291 compared to 2.531.

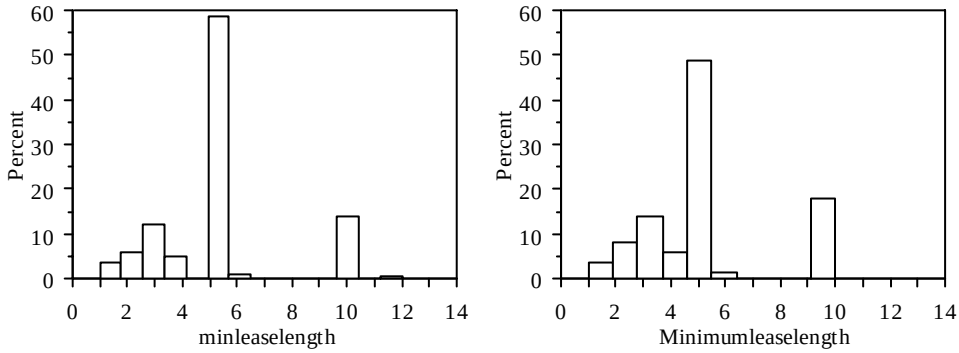


Figure 6.8: Frequency distribution of obligatory lease terms in all leases (left) and JLW leases (right)

Apart from some insignificant differences in the earlier years of the sample, there are no clear differences in rent between them, as can be seen in Figure 6.9 below. This finding is similar to the results of Brennan's study of Chicago office rents (Brennan, Cannaday et al. 1984) which also showed no clear relationship between lease length and rent (as discussed on page 39)[26].

[26] It may be noted that the lease lengths in Germany are much shorter than those in the UK (although these have been falling since the early 1990s too). Consequently the issue of lease length is not quite as important in the German market.

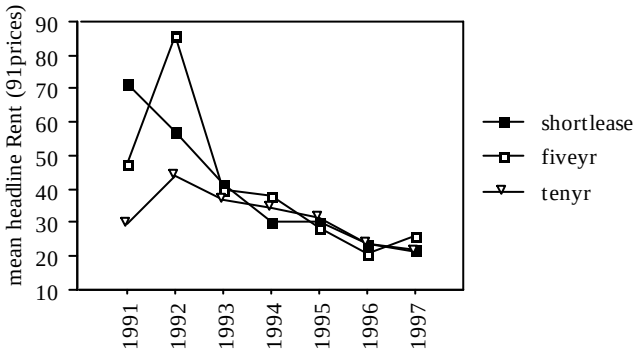


Figure 6.9: Rent in leases of different lengths

6.3.4 Optional renewal time

Evidence on optional renewal times from other studies of office markets is patchier than that for lease terms. As was seen in section 2.5.1.2 of the literature review (see page 39), Lizieri et al concluded from their study of the UK office market during recession that the short lease and long option would be optimal for tenants. They suggested that this would therefore be the favoured lease form in a tenants market (Lizieri, Crosby et al. 1997). This is exactly the pattern that development has taken in the Berlin market, which has been a tenants' market. As well as securing shorter obligatory lease terms, the recession in Berlin has also given tenants the power to demand longer periods of optional renewal time. The rising trend in optional renewal times is shown in Figure 6.10 below.

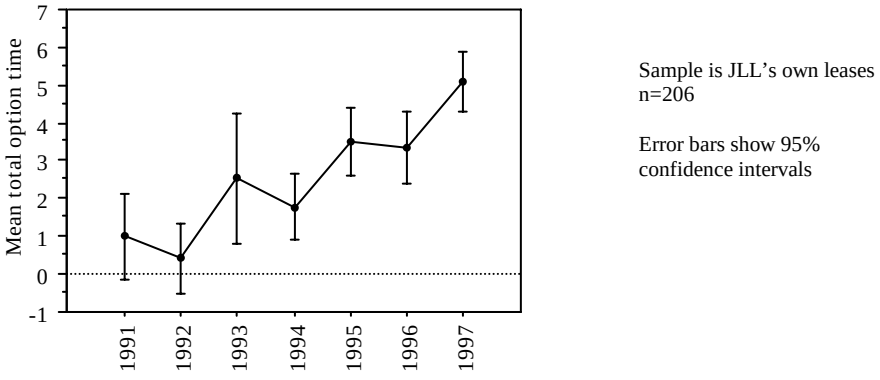


Figure 6.10: Mean total optional renewal period in years (95% confidence intervals)

The frequency distribution for optional renewal time is shown in Figure 6.11 below. Over 70% of the sample had either no renewal period or 5 years, with other periods much less

frequent. This means that optional renewal times are not normally distributed- landlords and tenants tended to either agree them at a fixed 5 year period or not at all. As the proportion of landlords allowing optional renewal times increased with the recession, the mean period per year crept upwards. The high error bars of Figure 6.10 reflect that the sample is mostly composed of either 5 years or no years (as shown in Figure 6.11).

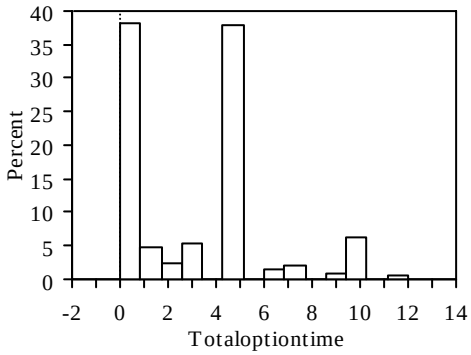


Figure 6.11: Frequency distribution of optional renewal time

6.3.5 Optional renewal fraction

The length of optional renewal time as a fraction of the minimum mandatory lease length is shown in Figure 6.12 below. This fraction has also been growing steadily over the period since 1991, which is symptomatic of the shift to a tenants market as it reflects greater flexibility on behalf of the tenant. In times of a falling market, it is in the interests of the tenant to have a short obligatory lease term (as in Figure 6.7) but a long option. This allows the tenant to get out and seek a better bargain if rents continue to fall as they have been (Figure 6.4), or to remain at a low level (using a long option time at the favourable rent terms defined in the existing lease) if rents begin to rise[27]. The fraction is greater for 5 year leases (shown on the left) than it is for 10 year leases (right) as the differences in absolute free time given are not scaled up for longer leases.

[27] This is not to say that the option will be at the same rent as the initial or headline rent, but the rent for the option period will have been defined by the rent increase terms agreed in the lease under poor market conditions.

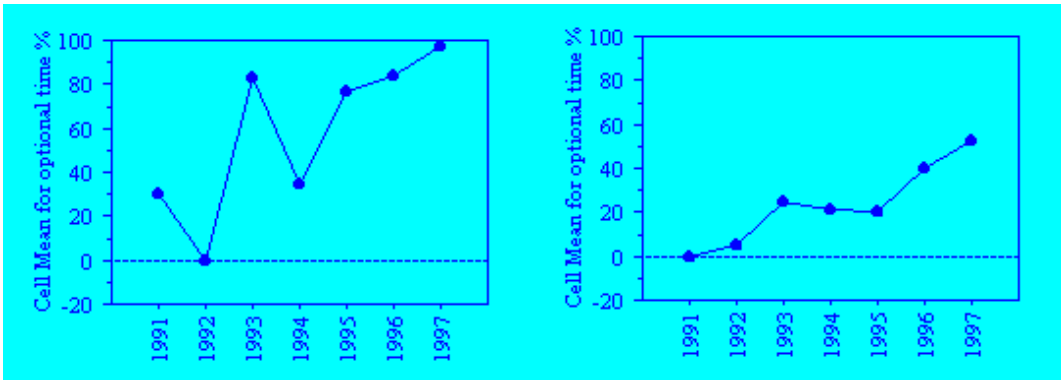


Figure 6.12: Optional renewal time as a fraction of obligatory lease length for 5 year leases (left) and 10 year leases (right)

6.3.6 Leased floorspace area

A factor that might be thought to affect the rent price per square metre would be the size of the letting. This would be a result of the economies of scale involved in letting larger premises: with fewer tenants costs are lower as management is easier. In times of high vacancy such as the period under analysis, the advantages of letting a larger proportion of a building at once may be much greater. It would therefore seem reasonable to expect a lowering of the per square metre price with the size of the letting.

No clear linear relationship between unit size and rent per square metre value could be detected. However, the average value of very small leases (under 500 square metres) was found to be higher for most years, as can be seen in Figure 6.13 below. The difference was between 5 and 10 DM, and was significant in the years 1993 to 1996 at 1 standard error but not 95% confidence intervals. However, no significant savings in unit cost could be detected for the very large leases (over 1000 square metres) compared to the others. Given that the size of units in the sample is logarithmically distributed, it might be expected that savings would be most visible at the extreme end of the scale.

The lack of a clear saving for large units may reflect a shortage of very large units that outweighs the economies of scale effect. As was seen in chapter 2, Wheaton also found little evidence of an economy of scale effect in his study of 5000 US office leases. He suggested that that supply and demand conditions for large blocks of space might actually lead to larger lease premiums in certain cases (Wheaton and Torto 1994).

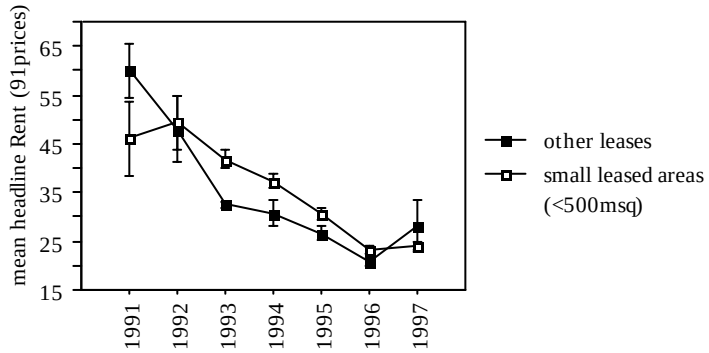


Figure 6.13: average rents in small leased areas compared to larger leased areas

Floorspace sizes are on average smaller in the later period, as can be seen from Figure 6.14 (a) below. The floorspace size is related to the length of the lease, as can be seen from Figure 6.14 (b) which shows the mean unit size split into the main lease lengths of short term (less than 5 years), 5 years and 10 years. The earlier period before the recession is characterised by more leases with large floorspaces (over 1000 m^2) and longer 10-year leases.

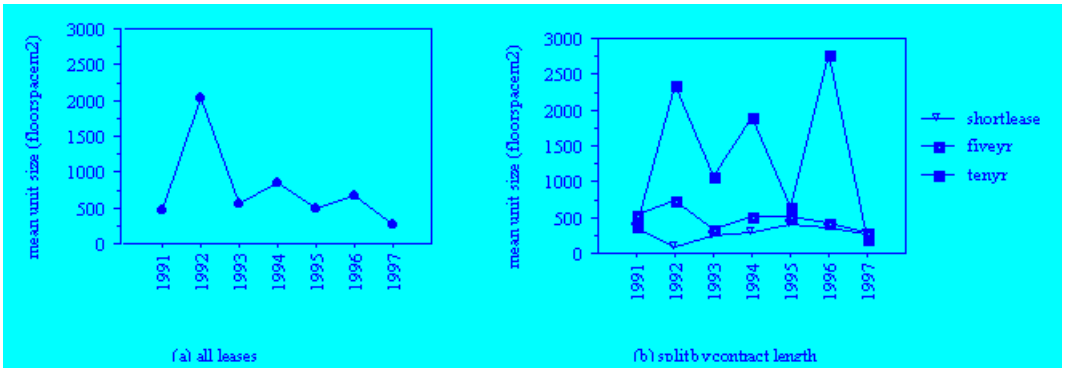


Figure 6.14: Unit floorspace size

As can be seen from Figure 6.15, the distribution of floorspace sizes is highly positively skewed, owing to a few very large lettings.

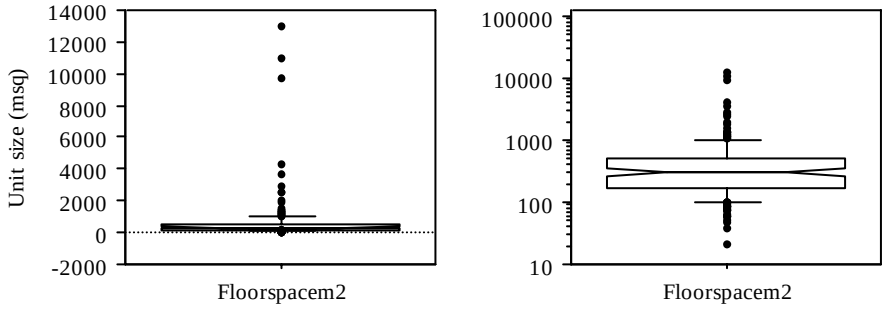


Figure 6.15: Box plot of unit floorspace size: linear scale (left) and log 10 (right)

As has been noted in chapter 3, the landlords' leases are on average larger than the JLW sample. The most plausible explanation for this difference would seem to be that landlords are more likely to have made the effort to tell JLW about larger lettings, whereas for the JLW sample the author recorded all available leases. The skewness of the landlords sample is also greater (10.83 in Table 6.3 compared to 6.65 in Table 6.1), owing to the much larger maximum outlier.

6.3.7 Pre-letting time

The pre-letting time is often discussed as an interesting index of market confidence as tenants are thought to secure space earlier in advance if the market is expected to rise. Yet evidence on pre-letting times is often limited to anecdotal information. Analysing the pre-letting times of leases has shown characteristics of the market that were not visible from the property agents' reports. Firstly, the mean pre-letting time is greatest in the earlier years of 1991 and 1992 before the recession began, as can be seen in Figure 6.16a below. This makes intuitive sense in a market with restricted supply of office space as Figure 6.16b on the right, the main cause of the higher pre-letting times in the earliest years of the sample is shown to be short term leases. This may reflect companies wishing to establish a foothold in Berlin after reunification by reserving some space on a short lease basis. The sample size is so small in the first year for pre-letting that it impossible to draw statistical significance from this finding.

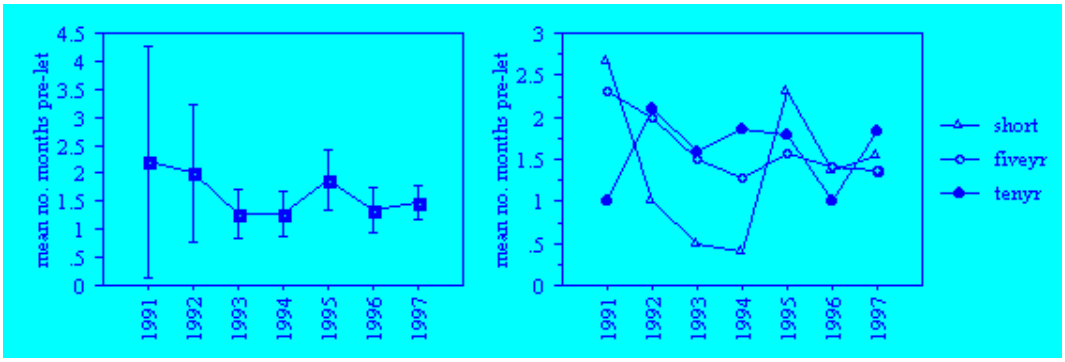


Figure 6.16: Mean Pre-letting times per year in the JLW lease sample

Secondly, there are higher mean pre-letting times for leases in new buildings compared to old buildings. This difference is significant to 1 standard error. The pattern of pre-letting times in new and old buildings also varies in relation to the broader supply and demand conditions of the market. Pre-letting times increased more in new office space after 1994, when the bulk of the first wave of buildings since reunification came onto the market. The difference between new and old is more pronounced for 10-year leases as can be seen in the right hand Figure 6.17b below. This may reflect the a more ready acceptance of pre-letting by larger companies looking for a high quality, longer term unit amongst the new building stock, but it is difficult to generalise from the small sample of JLW leases where this information was available[28].

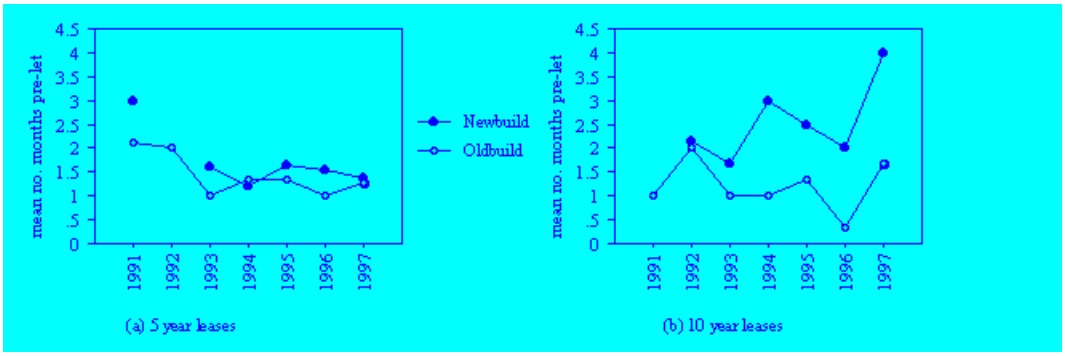


Figure 6.17: Mean pre-letting time in new and old buildings

[28] A thorough examination of the interrelation of these lease characteristics would merit a specific study, which is beyond the scope of this research. For the purposes of this thesis the investigation is limited to the question of whether any market characteristics can be identified that are pertinent to the thesis being tested (that there is a relationship between urban street configuration and location rent).

6.3.8 Rent-free periods

The use of lease incentives to attract tenants was a prominent feature of the Berlin office market in the recessionary period of the study years after 1992. 34% of the leases in the JLW sample had rent free months, making this the most prominent direct incentive. This percentage seems lower than some estimates from the British recession of the early 1990s, for example a focus group of investors, occupiers and developers in the UK estimated that 90% of office leases had rent free periods (Lizieri, Crosby et al. 1997). However, the longer average lease terms in the UK would lead to a more important role for some rent free time in leases.

There is also a great degree of variation in the amount of rent-free time given in each lease and this amount has also changed over time. The upward trend in rent-free time for the Berlin sample can be seen in Figure 6.18[29].

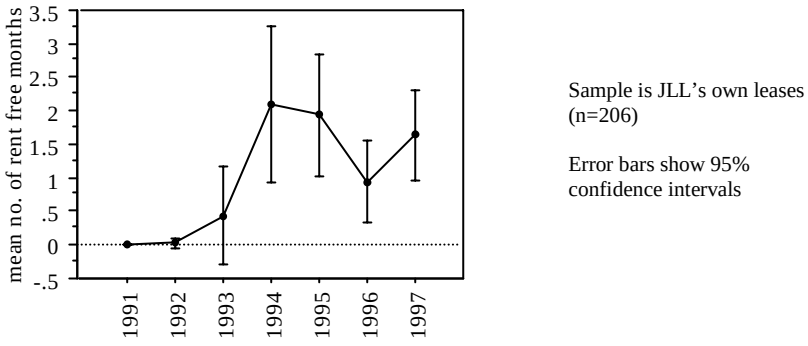


Figure 6.18: Number of rent-free months per contract

The percentage of the obligatory lease term that this period of rent free time represents is shown in Figure 6.19 below. A difference can be seen between new and old buildings, with a peak in 1994 for old buildings but a steady increase for new buildings.

[29] Crosby noted the same phenomenon of increasing rent free periods in UK office leases during the recession of the early 1990s. Rent free periods peaked at 18 months in the West End of London in 1992 and 36 months in central London in 1993 but the whole market average peak in 1993 at 12 months (Crosby and Murdoch 1998). These periods are much longer than those shown in Figure 6.18 are. However, UK lease terms are also much longer on average. Assuming a standard UK office lease to be 15 years after 1990, a very rough estimate of UK rent free period percentages for comparative purposes would imply peaks in the West End office market of perhaps 10%, in Central London at 20% and for the market as a whole at 6%. These are significantly higher than the averages shown for Berlin.

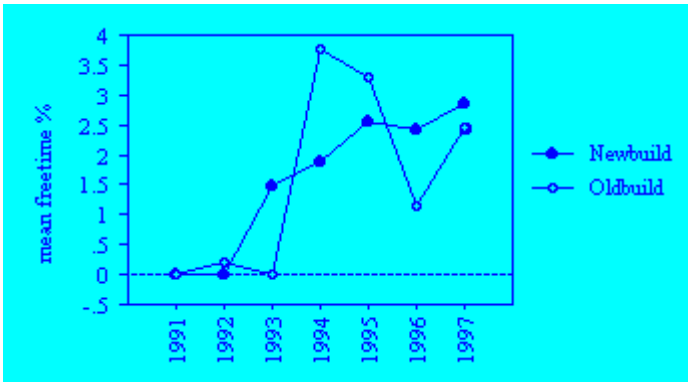


Figure 6.19: Percentage of rent-free time in new and old buildings

6.3.9 Increase Clauses

Approximately half of the leases were adjusted automatically to the *Lebenshaltungskostenindex*, a German consumer price index that averaged 3.1% p.a. during the study period (Bundesanstalt für Statistik 1998). 11% of the leases had an adjustment percentage clause above this average rate of inflation and 38% were below the rate. Of those below the rate, 26% had no multiplier adjustment clause at all. Appreciation multipliers have been decreasing slightly on average over the period, reflecting the more favourable terms being won by tenants, as can be seen in Figure 6.20 below.

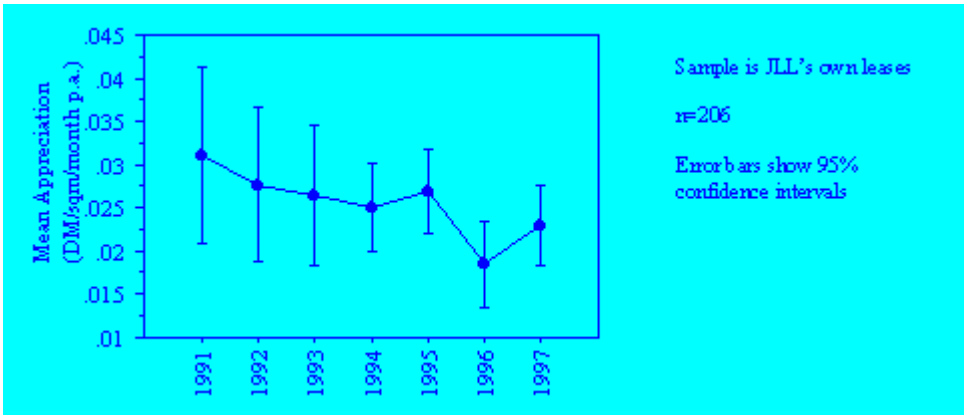


Figure 6.20: Mean rent appreciation multiplier per year

Another form of rent increase over the course of the lease is the step addition, but this was much less frequently used in Berlin. Over 80% of the sample had no yearly step addition.

6.4 Incentive Adjusted Rents

The lease provisions that can be quantified as incentives described above all show a trend in favour of the tenant for the period after 1992. When these incentives are taken together they have an influence on the effective price to the tenant of the lease. Incentives are very common in a recession because landlords attempt to conceal the fall in the *effective* value of their rental income in order to protect expected capital values. From the lease data used in this study, two kinds of incentive-adjusted rents have been calculated. Owing to the differences in incentive levels that arise with leases of different lengths it was necessary to control the sample for length. As the largest group of leases was that of 5-years in length, this group was chosen.

6.4.1 Consideration Rent

The first adjusted rent represents the most basic calculation for the effect of incentives on the cost to the tenant. It is the average rent price per annum of the jagged income flow of a lease with all its incentives (section 3.4.3.1 on page 93). The nominal consideration percentage shown in Table 6.4 below is a calculation of the average price per year set out in the lease without an adjustment for inflation. As can be seen, this leads to a nominal median value of almost 105% of headline rent. The mean value of 103.9% is just above the average rate of inflation during the years under consideration. This shows that on average, leases contained clauses to increase the consideration rent enough to offset inflation.

	Headline Rent (91prices)	nominal consideration rent %	effective rent %(5yr)
Mean	30.878	103.692	86.540
Std. Dev.	13.456	6.881	5.863
Std. Error	1.339	.685	.583
Minimum	16.660	83.804	68.336
Maximum	85.630	131.698	109.580
Range	68.970	47.894	41.244
Median	27.870	104.727	87.728

Table 6.4: Consideration and effective rent percentages

Figure 6.21 shows the average percentage of the headline rent that tenants paid in each year of their lease for five-year leases. The pattern conforms to the *front-loading* of lease incentives within the whole term of the lease described in Davidsons' model of incentives

(Figure 2.2 on page 37). Tenants were on average paying around 85% of the headline rent in their first year for 5-year leases[30]. This means that although a certain 'start price' was agreed for a lease, tenants are actually paying much less than the start price in the first year because they are receiving incentives like rent free time. Landlords were using incentives at the beginning of a lease rather than lower rents to attract tenants. They then increased the rent incrementally until the end of the lease. As Davidson et al noted, this is a rational policy for landlords: as well as supporting the appearance of higher capital values somewhat, it means that rent review negotiations at the end of the contract begin from a higher starting point (Davidson and Darlow 1993). After the first year, the consideration rent is higher than the headline rent and continues to rise to the end of the lease, where it averaged over 10% more than the headline rent.

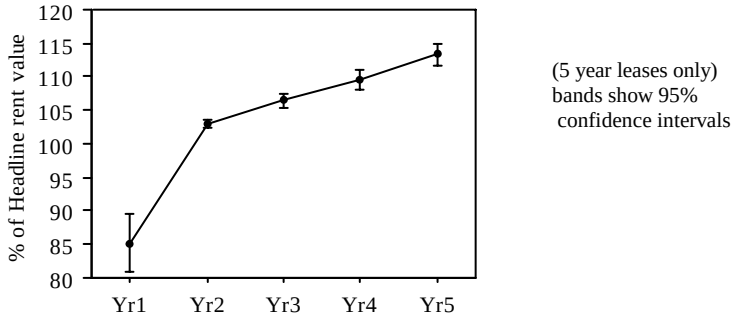


Figure 6.21: Consideration rent value as a percentage of headline rent for each year of the lease life

A slight positive trend is detectable in the relationship between the headline rent value and the percentage of consideration rent for 10 year leases but the relationship does not reach statistical significance (r squared=.069 p=.117). The coefficient is also positive for 5 year leases but the relationship cannot be considered to be significant (r squared= .005, p=.4873).

The trend in the consideration percentage of headline rents over the period can be seen in Figure 6.22. The 5-year leases show two drops in consideration rent percentage. The first

[30] It may be noted that in Germany, headline rent is always quoted as the start rent, regardless of adjustments that will take place over the life of a lease. This is the case in market reports and in the landlords sample of prices used in this study. This headline rent is not defined in the same way as Davidson's 'Target rent', which is the rent price at the end of a lease. Although it would be possible to create an estimate of the target rent (the price per square metre per month in the last year of a lease) for the smaller sample of JLW leases, this would not be comparable with the landlords leases. The definitions of Headline Rent, Consideration Rent and Effective Rent are provided in more detail in the Glossary.

drop was in 1994, when the mean consideration rent percentage fell to almost 100% of the headline rent. After recovering in 1995 and 1996 the rents dropped again in 1997.

An interesting difference in the timing of incentives can be seen between leases in new and old buildings, as in Figure 6.22 (b) below right. The first drop in consideration percentages in 1994 was more pronounced in old buildings whilst the second drop in 1997 was more pronounced in new buildings. At their lowest, average consideration rent percentages in old buildings declined to less than 100% in 1994. This means that even *before any discounting for inflation or a bank interest rate*, they were on average worth less money than they appeared to be from the headline rent, owing to the high incentives. However, they began to recover as a percentage in 1995 and continued to do so until 1997. Although the lease sample is very small and the data has a great deal of noise, this might suggest that leases in new buildings weathered the 1994-drop in consideration rents better than those in old buildings did, but declined further afterwards.

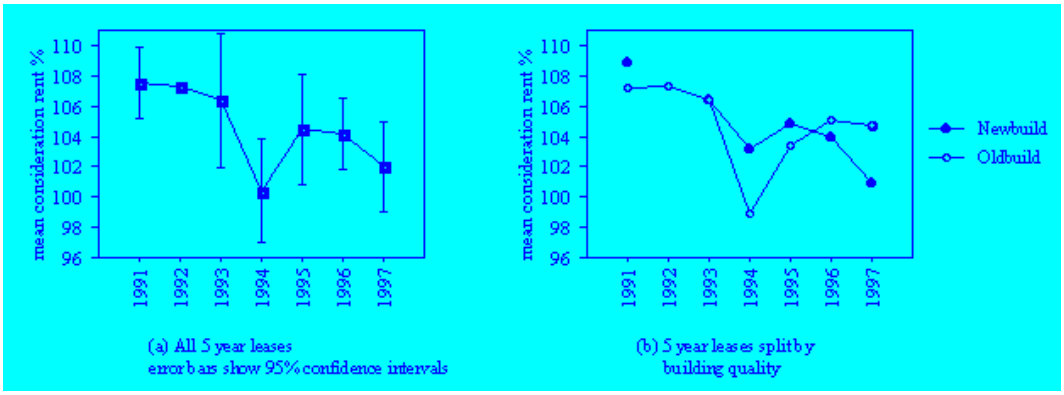


Figure 6.22: consideration rent percentages over time

6.4.2 Effective rents

The consideration rent shown above does not take into account depreciation to reflect the time aspect of money. Incentives have a differing impact dependent on the year that they are implemented: rent-free months at the beginning of a contract are worth significantly more, especially in terms of the cash-flow advantage to the tenant. As was explained in chapter 3, a discounted cash flow technique has been applied to the consideration rents to calculate an *effective rent*.

The trend in effective rent percentages shown in Figure 6.23 is very similar to the consideration rent trend shown in Figure 6.22. The two drops at 1994 and in 1997 are still

featured with the discounted rent. The difference between new and old buildings is also shown.

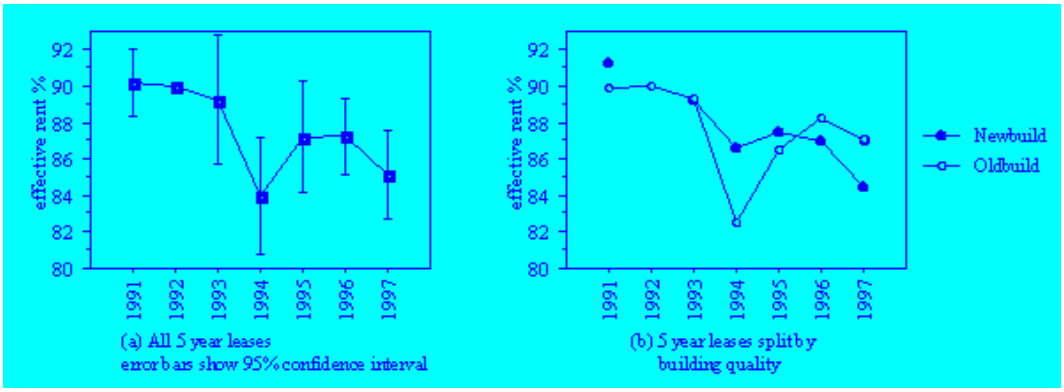


Figure 6.23: Effective rent percentages for 5-year leases

The effective rent is on average around 87% of the headline rent. At the extremes, it varies from 68% to 109%: a full 41% range. Table 6.5 below shows examples of the lease provisions for the 10 most extreme differences between headline and effective rent (the 5 lowest and 5 highest):

Year	Area	Pre-letting time (months)	Unit floorspace size (m^2)	obligatory lease term (years)	Total optional renewal time (years)	Headline Rent in 1991 prices (DM)	Rent-free period (months)	Build Quality	Step addition per month (DM)	Appreciation %	consideration rent %	**effective rent %**
1994	West inner	0	406	5	5	42.55	12	Old-build	none	index	84	**68.3**
1997	East core	1	252	5	5	43.84	7	New-build	none	none	88	**73.2**
1995	West inner	2	1566	5	5	28.75	6	New-build	none	none	90	**74.8**
1995	West inner	0	356	5	5	36.59	10	New-build	none	4%	92	**75.1**
1996	Outer	1	352	5	5	20.60	9	New-build	none	index	91	**75.2**
1996	Outer	3	607	5	0	18.88	0.5	New-build	.86	index	115	**96.0**
1997	Outer	0	527	5	5	16.86	0	New-build	1.26	none	115	**96.2**
1995	East core	4	119	5	5	51.50	0	New-build	4.29	index	119	**99.4**
1995	West inner	1	138	5	0	30.49	0	New-build	2.61	index	121	**100.7**
1995	East core	2	123	5	10	43.55	0	New-build	6.10	index	132	**109.6**

Table 6.5: The 5 lowest and 5 highest effective rent percentages (5 year leases only)

6.4.3 Headline Rents Vs Effective Rents

As has been explained in the methodology chapter, the landlords' sample of rent data cannot be adjusted to an effective rent because the lease documents were not available for inspection and it was therefore not possible to control for incentives. Only the headline rents (but adjusted for inflation as constant 1991 prices) can be used for the landlords sample.

If this larger sample of non-effective rents is to be used as a proxy for the effective rents, the reliability of the sample must be tested. Table 6.5 above showed that at the very extremes of the JLW sample, significant differences can occur between the headline rent and the effective rent. How reliable is the whole sample of headline rents as a proxy for effective rent? This can be tested by looking at the statistical correlation (r-squared) between the headline rent and the effective rent.

However, as was discussed in the literature review, it is not clear what the discount rate used to calculate effective rent should be. This raises the further question of what the effect of discount rate *itself* is on the relationship between headline and effective rent. Figure 6.24 below shows the strength of the correlation between effective and headline rents for different discount rate assumptions. This means that each point in the graph represents the r-squared correlation for the variables of effective and headline rent at a certain discount rate, for all leases where these two rent types are available. The two lines represent the correlations for two different samples of effective rent: leases of a fixed 5 year length and leases of all lengths. For leases of a fixed 5 year length, the predictability of effective rent from headline rent declines only minimally as the discount rate rises for all reasonable rate assumptions. But for the sample of all leases, the correlation worsens logarithmically the higher the discount rate.

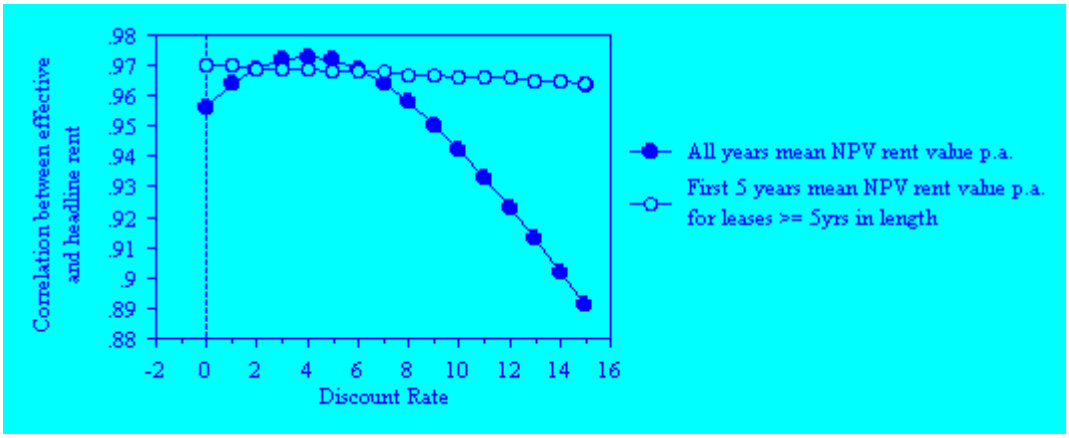
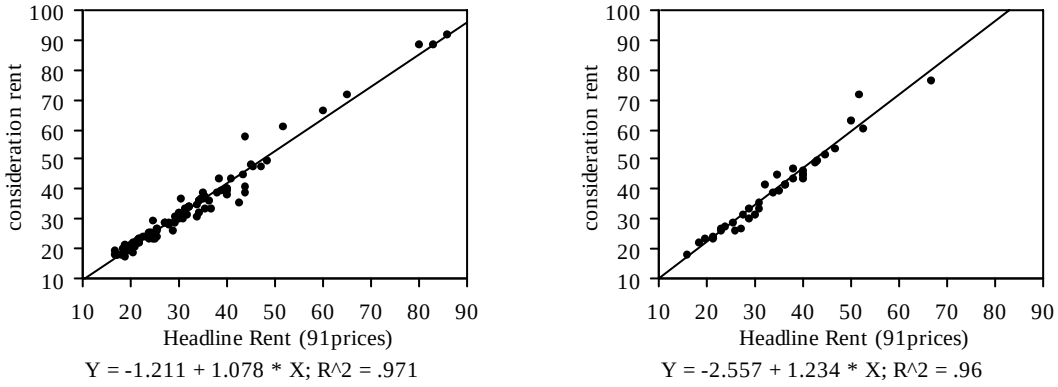


Figure 6.24: Correlation between headline and effective rents for various discount rates

Two conclusions can be drawn from this exercise:

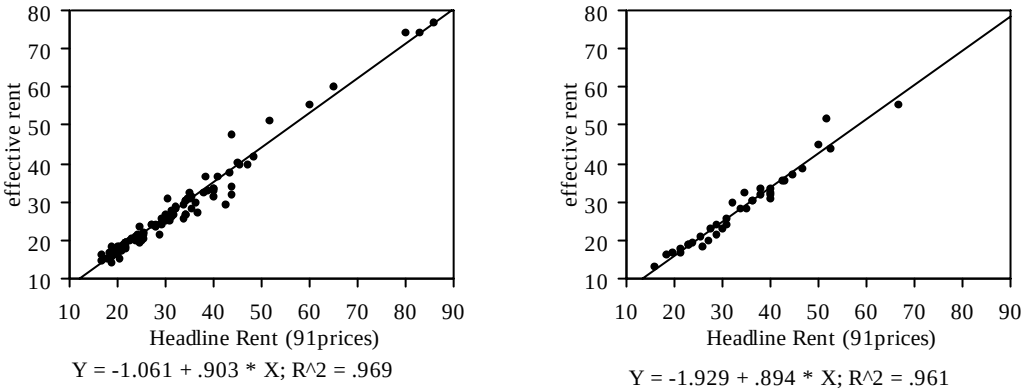
- It is not possible to compare the effective rent of leases that differ in length because the effective rent diverges from headline rents the higher the discount rate simply as an artefact of the different lease lengths.
- Once lease length has been controlled for, the headline rent predicts the effective rent to between 96% and 97% for the sample as a whole. This is true for the whole range of reasonable discount rate assumptions

Figure 6.25 and Figure 6.26 below show the extent to which the headline rent can be used as a proxy for both of the incentive-adjusted rents. Figure 6.25 is the correlation between headline and consideration rent (with incentives but before discounting) for the sample of JLW's own leases. The relationship is extremely strong for both 5 and 10 year leases. Figure 6.26 shows the relationship between the headline rent and the effective rent. The relationship between the two is still very reliable with this discounted version of incentive-adjusted rent. For a small number of individual outliers the non-effective price can hide some differences in the effective value of the rent, as has been documented in Table 6.5 above. But given that the headline rent predicts the effective rent to 97% for the sample as a whole ($p<.0001$), it is justifiable to use the larger sample of non-effective rents bearing this possible error margin in mind. This test was repeated for the sample of 10 year leases, as can be seen in the right hand scatter of Figure 6.26 below. The relationship was very slightly weaker (r squared=.961, $p<.0001$), possibly because the range of values is diminished.



(a) 5-Year Leases only (b) 10-Year Leases only

Figure 6.25: Correlations between consideration rent and headline rent



(a) 5-Year Leases only (b) 10-Year Leases only

Figure 6.26: Correlations between effective rents and headline rents

The debate about effective rents outlined in the literature review centred around how they might be calculated and whether a comparable effective value that takes into account all the different lease terms was possible. In this section it has been shown that it is not possible to compare the effective values of leases that differ in length because of the effect of time in the discounted cash flow calculations that are necessary for effective rents. However, for the small sample of 5-year leases that are comparable, the effective rent has been shown to differ significantly for some cases but to correlate very strongly with headline rent for the sample as a whole. For this reason, the larger headline rent sample is used without any adjustment for real or assumed effective rent differences.

6.5 Isolating Location Rent

In the preceding sections of this chapter, the non-spatial characteristics of the leases have been investigated. This section looks at ways of controlling for these lease variables in order to reach a sample of comparable *location rents*. In order to do this, other variables that systematically affect the rent price will be excluded using a location blind Multiple

Regression Analysis or MRA. This technique has been use by Gallimore et al. for a sample of house prices (Gallimore, Fletcher et al. 1996), as was discussed in section 2.7.2 (page 60).

Many variables might be considered important in determining rent, but it is necessary to detect a systematic effect in the empirical data (albeit a probabilistic effect) to be sure that any theory of rent determination not just a prejudice. MRA provides a method of investigating which variables have a systematic effect, so that the lease variables can be tested to see whether they influence rent in the sample. More importantly, it is possible to derive a residual figure for the amount of rent that is not explained by the systematic effect of lease variables. This figure, the residual that cannot be explained by other variables, can then be used as a 'location rent' because it is the closest we can get to a price that is attributable to the location itself.

Table 6.6 shows the correlation matrix for the main lease variables[31]. By far the strongest correlation is that of the time variable (month of lease begin) determining rent negatively at R=-.561. None of the other correlations are as strong, although the time variable does exert an influence on both obligatory lease term and floorspace, as was shown in the falling yearly averages of these variables in sections 6.3.3 and 6.3.6 above.

	Ln Floorspace	Ln Headline Rent	Contractlength	BuildQualityDummy	Leasebeginmonthcode
Ln Floorspace	1.000	.032	.319	.231	-.190
Ln Headline Rent	.032	1.000	.147	-.158	-.561
Contractlength	.319	.147	1.000	-.006	-.279
BuildQuality Dummy	.231	-.158	-.006	1.000	.079
Leasebeginmonthcode	-.190	-.561	-.279	.079	1.000

Table 6.6: Correlation Matrix for Lease Variables

317 observations were used in this computation.120 cases were omitted due to missing values.

Table 6.7 below shows the correlation analysis, sorted in descending order of the correlation coefficient R.

[31] As can be seen from the note at the bottom of the table, some cases are missing because not all variables were available for these leases. The sample size declines further when the more obscure lease variables are included. For this reason, the less relevant lease variables (such as option time) have not been included.

	Correlation	P-Value	95% Lower	95% Upper
Ln Headline Rent- Leasebeginmonthcode	-.561	<.0001	-.634	-.478
Ln Floorspace- Contractlength	.319	<.0001	.214	.417
Contractlength- Leasebeginmonthcode	-.279	<.0001	-.379	-.171
Ln Floorspace- BuildQualityDummy	.231	<.0001	.122	.336
Ln Floorspace- Leasebeginmonthcode	-.190	.0009	-.296	-.078
Ln Headline Rent- BuildQualityDummy	-.158	.0059	-.266	-.046
Ln Headline Rent- Contractlength	.147	.0104	.035	.256
BuildQualityDummy- Leasebeginmonthcode	.079	.1728	-.035	.190
Ln Floorspace- Ln Headline Rent	.032	.5829	-.081	.144
Contractlength- BuildQualityDummy	-.006	.9120	-.119	.107

Table 6.7: Correlation Analysis for Lease Variables

317 observations were used in this computation.120 cases were omitted due to missing values.

When multiple regression and stepwise regression are used on these variables only the time variable (month and year of lease begin) is shown to be highly significant but the dummy variable for building quality is shown to be *just* significant. This can be seen in the multiple regression of Table 6.8 below[32].

R	.575				
R Squared	.330				
Adjusted R Squared	.321				
RMS Residual	.246				
	Coefficient	Std. Error	Std. Coeff.	t-Value	P-Value
Intercept	4.070	.114	4.070	35.790	<.0001
Ln Floorspace	-.016	.016	-.054	-1.026	.3059
BuildQualityDummy	-.063	.031	-.101	-2.052	.0411
Leasebeginmonthcode	-.010	.001	-.561	-11.207	<.0001
Contractlength	.001	.007	.007	.141	.8879

Table 6.8: Location Blind Multiple Regression Analysis for Ln Headline Rent

6.5.1 The factor of time

The result of the MRA shows how fundamental the time factor is in the property market. Before the location variable is considered, the temporal aspect of a lease (the start date) is by far the most critical determinant of price. In this sample it is the only lease variable that has shown a systematic and highly significant influence on price.

[32] This regression can also be seen in Table A of Appendix F, where regressions are summarised.

Price is determined by the interaction of supply and demand within variable market conditions and the point at which a contract comes onto the market within the cycle of boom and recession is critical. To analyse the part of price that can be said to reflect location preference, the rent price relative to the market average at the time a contract was settled is the relevant measure, as opposed to the rent price per-se.

One of the ways of measuring the relative level of rent would be to adjust values with reference to a market index. The most widely used market indices are 'top rents' and a number of these are available for Berlin. However, these indices were investigated in detail in chapter 5 and large discrepancies were found between different agents figures. It was also shown in section 6.3.1 above that the use of 'top rents' as indices is less reliable than mean rents. Top rent indices are very volatile and depend on the exposure of particular agents to highly valued properties. There is no standard market index of rent in Berlin for the study to use as control values against which changes over time can be investigated.

For these reasons, the time factor has not been controlled using indices provided by agents but rather by measuring the time trend within the sample of data itself. There are a number of ways of calculating this, one of which is just to take a simple linear regression of rent against time, shown in Figure 6.27. This is an objective way to create a trend line for rents over time: the residual value shows the level of rent above or below trend for each lease in the sample. Time can be said to explain around 35% of the variability in price on this linear model.

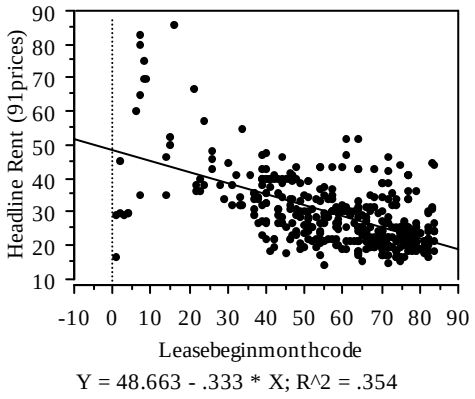


Figure 6.27: Linear regression of rent against time

Another method of creating this trend line would be to capture it by using a curve fitting function rather than a linear regression. There is no need to expect the relationship with time to be linear, in fact a more polynomial relationship could be expected if the market is

cyclical. Figure 6.28 shows a 6th degree polynomial regression[33]. This regression fits the rent to time variables even better, accounting for around 48% of the variability in rent.

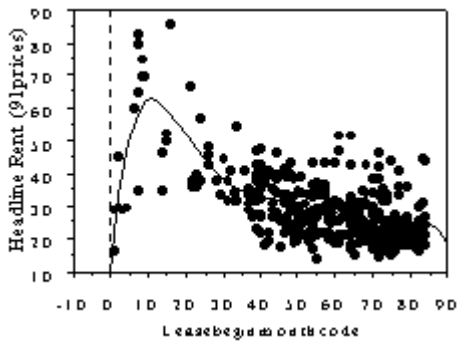


Figure 6.28: Polynomial Regression (6 degrees) of Rent over Time

The main result of taking the polynomial regression is to show a rise during 1991 (until month 12 of the *leasebeginmonthcode* on the x axis). As was seen in Figure 5.2 (page 167) property agents' reported a rise in rents until 1992. The curve in the polynomial from 1991 to 1992 can be explained by the change from rising to falling rents that occurred as the market tipped over into recession. The greater range in rents during the first two years of the sample can also be attributed to the changes occurring as the market rose to its peak and began to fall.

In view of the difference between the rising market before 1992 and the falling one after it, the first year of the sample (1991) has been excluded from the multiple regression models. Figure 6.29 shows the relationship between rent and time for the period 1992 to 1997. The removal of 1991 has not improved the correlation, in fact it is a little worse because the values for 1991 were high anyway. However the removal of 1991 is necessary in order to prevent mis-specification of the regression model. To the right of Figure 6.29 is the log-linear regression for rent, which has been undertaken in view of the positive skew for rent values. This did not make a great deal of difference to the correlation other than to remove one of the early outliers that was responsible for the positive skew of rent values.

The 'wobbles' of the polynomial line for the period after January 1992 cannot be explained by any known market process, and it is not possible to rule out the explanation that they are just an artefact of the individual data from the curve fitting function that

[33] This is a curved best fit line with 6 possible changes of direction

allowed 6 changes of direction. If a polynomial regression is used to fit a curve more precisely to the data without explaining the 'wobbles' in line that this introduces, the model is only reflecting individual data characteristics rather than representing a general influence of the variable.

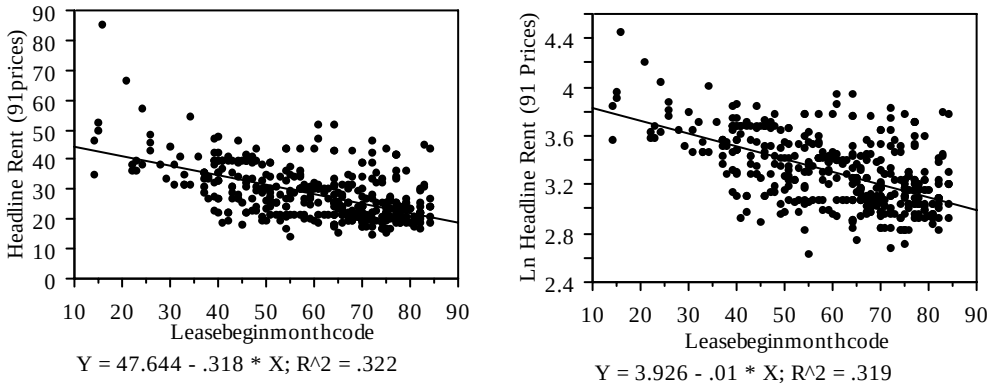


Figure 6.29: Linear (left) and Log-linear (right) regressions for rent against time (1992 to 1997)

A statistical expression of a contract's price relative to the time trend is the residual of the above relationship between rent and time. This has been used as a method of establishing a price relative to the market average, which also takes into account the differences in the number of cases per year. Once a relative price is established, it can be used to display the distribution of rent prices according to location.

6.5.2 Quality of the Premises

This variable was shown to be just significant in the determination of location-blind rent in Table 6.8 above (p=0411). Of more concern was that the sign of the variable in both the correlation matrix and the MRA was *negative* with rent (coefficient=-.063 and the t value=-2.052 in the MRA). Since new-build= 1 in the dummy, this result goes against expectations, as a premium would be expected for new buildings according to both previous research and the property agents reports shown in chapter 4.

The possibility of colinearity with location seems plausible, especially in view of previous studies that showed this problem between indices of building quality and location (section 2.8.3 on page 72 of the literature review). However, unlike previous studies, the fact that the sign is negative implies that new buildings in the sample would be in less prime locations than old buildings. In view of the uncertainties created by this

result and given that the statistical effect of the build quality variable is so minor anyway, it has not been included in the value for the representation of location rent. The role of build quality will be re-evaluated with the location model in chapter 9.

6.5.3 Other Variables

6.5.3.1 floorspace size of the unit

As was discussed in chapter 2, the expected sign for floorspace would be negative, as it might seem plausible to assume that an economy of scale effect would show between unit size and rent, but this did not show in previous studies (section 2.5.2.2 on page 41 of the literature review). No such relation has been found in this sample either. The MRA showed that the floorspace size was not a significant variable in the determination of rent.

The only significant (but weak) correlation with floorspace size of letting was that of lease length: the larger the letting, the more likely it is to be a longer lease. This conforms to earlier studies as discussed in section 6.5.3.1 above.

6.5.3.2 Obligatory lease term

No role for lease length was found in rent determination, mirroring the findings of Brennan (section 2.5.1.2 of the literature review). As has been discussed in section 6.3.3, the length of contract has fallen over time and so a weak but significant correlation with time was shown in the analysis of Table 6.7 above.

6.5.4 Untested Variables

The choice of variables tested in previous studies was discussed in section 2.5 of the literature review (a summary can also be seen in Appendix C). All previous studies have used a necessarily limited number of independent variables but (as was discussed in chapter 2) many have also used proxies for the dependent variable of achieved rent that are quite problematic, such as asking rents.

This study has overcome the problems of the use of asking rent as a proxy for the dependent variable by gaining access to real lease data. However, there are still inevitable limitations on the collection of data for independent variables to be tested.

A number of variables that might potentially play a role in determining rent levels that it has not been possible to test because they were not available in the landlords sample of rent information and the cost of collecting such information in a survey is so high that it would require an additional study in its own right. The landlord's sample did not specify information of the availability of parking facilities (although these are usually rented under an additional contract, they may or may not be available at all). This variable has been dealt with in some way by 5 of the 11 previous studies of office rent outlined in Appendix C. Another group of omissions in variables are those relating the state of the interior fit-out, which can differ in many ways, for example:

- air conditioning and climate control
- provision of computer network support infrastructure
- lighting
- availability of support services
- security of the building

Fit-out variables are also dealt with only patchily in previous studies, although a notable exception is Dunse's study of Glasgow asking rents (Dunse 1996).Many of the fit out variables may be correlates of the building quality variable as newer buildings are likely to have better facilities. There has not really been a uniform approach to building quality measurement in previous studies, as was discussed in section 2.5.2. of the literature review

There are other variables that might be significant in rent differences that it has not been possible to test owing to the limits of the landlords sample, such as those relating to micro-scale spatial questions:

- The internal division of space — This variable is the layout of the unit and differences could be the amount of cellular or open plan spaces in a unit. It is reasonable to suggest that it may have an influence on value although no previous studies reviewed in Appendix C have tested it.
- The flexibility of the building — This variable would be the difference in the extent to which the footprint of the building

	could be adapted to tenants uses such as changes in structural features like the addition of stairs to link floors more. Again, none of the studies in Appendix C tested this either.
• Scope for expansion	This variable could be measured as floorspace per floor. Hough and Kratz tested this variable explicitly and some other studies tested it with proxies, usually by average floorspace per floor. This information was not available for the lease data used in this study.
• Quality of views of the surroundings from the building	This variable has not been tackled in any of the previous studies of office rents. Some work has been done on the quantification of views in the field of architectural research, using the concept of the isovist originally pioneered by Benedikt (Benedikt 1979). However, this technique has never been applied to the valuation of office spaces and it would require a methodology of its own to be developed specifically to tackle questions such as which views should be measured. This is beyond the scope of this study.
• the floor on which the leased unit is situated	As most other studies in Appendix C did not cover individual leased units, this variable has been tested only patchily in previous studies.
• 'Architectural Quality'.	Whereas some of the above factors might be used to quantify the functional quality of the architecture of a building, there is also the question of the role of aesthetic quality. The influence of this variable on the market as a whole is very difficult to measure because it necessitates some method of valuing aesthetic quality. Hough and Kratz attempted this with the

use of architectural awards as discussed in section 2.5.2.3 of the literature review, but none of the other studies have done so.

In advance of testing any of these variables, it is not possible to tell if they could have an influence on value. However, the research question of this thesis is not to provide a general model of rent but to investigate the role of location in rent determination. Although it can never be ruled out, it is hard to see how these micro-scale variables could have a systematic effect on the spatial differences in rent at the city scale.

6.6 Discussion

This chapter has sought to investigate the characteristics of the lease sample to determine whether there are non-spatial explanations for the spatial pattern of rents in Berlin. In doing so, a number of the non-spatial characteristics of rent have been found in the lease sample that were not available for inspection in the published evidence of agents' reports. Whereas the agents reports showed that the recession has led to a decline in rents, the detailed analysis has revealed that the move from a landlords to a tenant's market has affected not just the rent, but every one of the major lease provisions. Leases have changed to the advantage of the tenant both in terms of provisions that have a monetary value and for those of a more general nature. The result is similar to that found in previous studies of recession in other markets (see section 2.5.1 on page 35 of the literature review).

In this chapter, two kinds of *adjusted* rent values (consideration rent and effective rent) were tested against the headline rents in order to evaluate the impact of the changing lease provisions on effective rent value. This revealed a hidden trend in the market: the peak in lease incentives was found to have occurred in 1994, just before the completion of the first wave of supply, not in 1992 or 1993 when rents began to fall. This supports the finding of Webb's outlined in the literature review (page 36 above), that incentives increase before vacancy rates increase and therefore effective rents are forward looking indications of market conditions (Webb and Fisher 1996).

A difference was also found in the impact of lease changes in old and new buildings. Landlords in older buildings appear to have begun offering larger discounts before the major wave of completions. The leases in the few new buildings completed before 1994 were able to hold out longer. However, as the supply of new office space continued to

rise despite inadequate demand in 1995, 1996 and 1997, the effective value of leases in new buildings began to fall.

The move to less standardised lease terms also raises the issue of the extent to which leases are actually comparable as evidence of tenant demand. This issue is critical to the thesis because an analysis of the relationship between urban form and rent values is predicated on a comparable sample of rents. Yet published rent reports from property agents have not even commented on this issue of comparability. The analysis of consideration and effective rent showed that although there is a significant range in the effective percentage of headline rent, the correlation between the two is very good for the sample as a whole. This means that it is possible to use the larger sample of headline rents as an index of the cost of location for tenants.

The analysis of the non-spatial characteristics of leases showed that by far the most important variable in rent determination was time, while it was not possible to isolate a significant role for other non-spatial variables in rent determination. In many senses this result confirmed the analysis provided by the agents reports. Variables such as lease length or unit floorspace size that are not accounted for by the agents in their location rent maps were not found to be statistically significant in location rent determination.

However, this is only the case for the *location rent* measure and it does not preclude the possibility of some of these variables being co-linear with a spatial independent variable. In particular, the fact that building quality was just significant in the MRA and that it had the unexpected negative sign suggests the building quality might be an index of location rather than a truly independent variable. In order to test this, it is necessary to analyse the lease data with independent measures of location. This will be undertaken in Chapter 8.

The result of the investigation into non-spatial characteristics of rent is that it is not possible to rule out a role for the location of a lease in the built environment in rent determination by showing an overwhelming influence of non-spatial variables. This is not to say that lease variables are unimportant and it is of course not possible to make an *induction* from this dataset as to the role of non-spatial variables tested per se. In a real sense, there is no validation of the finding that non-spatial variables tested are not influential in value determination.

Indeed, a deeper understanding of the market has been achieved by looking at lease variables in this study that were previously ignored in published reports. If more

transparency and knowledge in the market is desirable, then this evidence calls for more academic studies specifically focussing on the non-spatial variables and more publishing of indices that describe the other characteristics of a lease (not just the headline rent) by those active in the commercial field.

However, for our purposes, the study of non-spatial characteristics is a precursor to the real focus of the thesis, which is to investigate ways of measuring and modelling the spatial characteristics.

6.7 Summary

This chapter analysed the non-spatial characteristics of the office lease dataset. Each of the main lease clauses was analysed and changes were found that provide evidence of a shift from a landlords' to a tenants' market with the recession. Thus, as well as negotiating lower rents with the recession, tenants were also able to negotiate shorter leases and a number of incentives such as rent-free time during the study period.

Incentive-adjusted rents were calculated for the sample according to the methodology developed in the chapter 3. This revealed a hidden trend in the market: the peak in lease incentives was found to have occurred in 1994, just before the completion of the first wave of supply, not in 1992 or 1993 when rents began to fall. This finding supports the finding of Webb's outlined in the literature review (page 36 above), that incentives increase before vacancy rates increase and therefore effective rents are forward looking indications of market conditions (Webb and Fisher 1996).

The evidence showed a differentiation in the market between old and new buildings for lease incentives as these peaked earlier in the old buildings just before new supply came on-line but later in new buildings as competition increased. This differentiation in incentives between new and old buildings has not been investigated in previous studies. It was found that although individual leases may vary greatly, the sample of headline rents as a whole correlate well with effective rents and the larger sample of headline rents can therefore be used as a proxy.

A location blind multiple regression analysis (MRA) was run in order to isolate the residual that can be attributed to location. The result of the MRA shows that the lease start date is by far the most important of all non-spatial variables and that other lease clauses are not found to be statistically significant within the MRA. The potential for

covariance with the location variable was discussed particularly with regard to the performance of the building quality variable within the MRA. Build quality was just statistically significant in the location blind MRA but its sign was not as expected.