

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

INTRODUCTION

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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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1 INTRODUCTION

The main task of the theoretical social sciences is to trace the unintended social repercussions of intentional human actions.

(Popper 1992)

The ways in which real environments work- either well or pathologically- are as often as not the *unintended* by-products of declared 'purposes' which designers have attempted to realise in a way that disregards morphological constraints and laws.

(Hillier 1985)

1.1 Research Field

Within the field of social science, there are a number of research programmes that look at different aspects of the relationship between society and its spatial structure. Hillier has made a distinction between research into the effects society has on space and the effects that space has back onto society (Hillier 1985; Hillier 1999). The first strand of research inquires into the way in which society creates spatial structures for its own reproduction. Research of this kind seeks to answer questions about the mechanisms and rules by which buildings and cities are created for social needs.

The second kind of research looks into the often-unintended social consequences that these spatial structures then have back onto society. Once a spatial structure such as an urban area has been created, it seems to offer unexpected social potentials and problems. The way that people use an area depends not on what planners or architects might have expected but on these potentials offered by the spatial structure itself. What are the laws that govern the use of spatial structure that we find, however it was created and for whatever original purpose? This is the starting point for a research programme that attempts to isolate the independent role of spatial structure onto the functioning of society, to which this thesis seeks to contribute.

The thesis investigates the effect of urban layout on the pattern of office rent. Urban layout will be defined as the morphology of the street network- the configuration of streets and public spaces. The pattern of rent will be defined as the spatial differences in rents that cannot be explained by intervening variables and are assumed to be a premium for location. Location can justifiably be treated as an independent variable in rent determination because individual tenants cannot be said to change the pattern of streets for themselves by letting office space at a higher or lower rent. There are some interesting theories about long term mechanisms that

condition the layout of streets in response to rent patterns (Ratcliff 1949). However, in the short to medium term any causality can safely be viewed from layout to rent pattern and not vice versa: companies are faced with a series of location choices on the market and they value each through their bidding more or less for each.

For most office-based companies, the question of paying for location is a question of renting, not buying or building space. In the City of London, 73% of firms do not own their own premises (Crosby and Murdoch 1998). A recent US survey in 50 metropolitan areas similarly found that 75% of firms did not own (Wheaton and Torto 1994; Dipasquale and Wheaton 1996). So the relationship under investigation is that between the spatial structure of the street network and the pattern of office rents within it.

1.2 The Case of Berlin

The case study for this thesis is the city of Berlin since reunification, especially the years 1991-1997. Berlin is a particularly interesting case study for the problem of location and rent because of the dramatic transformation of both the city morphology and the property market since the wall fell. The reunification of East and West Berlin presented a unique spatial restructuring of a city. After three decades of physical division, East and West Berlin suddenly formed one reunified urban system. Everyone involved in the property market has had to adapt to this new urban geography. This study uses a method of urban morphological analysis called space syntax to measure the spatial structure of Berlin's street system. In particular, the analysis provides measures of how the reunification of the city changed the spatial structure against which rent patterns can be compared.

Not only has there been a fundamental change in the spatial structure of the city, there has been a profound spatial reorganisation in the property market since reunification. Over 9.5 million square metres of office space were completed between 1989 and 1995. An enormous boom in office rents directly after unification turned to recession in 1992 with average office rent prices being halved between 1992 and 1997.

The most interesting facet of the property market has been its spatial reorganisation in response to Berlin's new geography: there has been a *re-valuing* of locations by the market. Office rent maps have shown two peaks in value, one in the West Berlin CBD and a new one in the formerly Eastern district of 'Mitte'. According to property agents' reports, in the short time since reunification it is this Eastern centre that has become the higher of the two rental

peaks. Mitte has gone from a run-down eastern district hemmed in on 3 sides by the Wall to the area of prime office rents.

The thesis will present an analysis of the relationship between these two fundamental spatial changes in Berlin: the morphological restructuring that has been precipitated by the fall of the wall and the spatial restructuring of the office property market that has followed in its wake.

1.3 Location and Rent: Three Questions

In order to investigate the role of street layout on office rents for the particular case of reunified Berlin, a sample of office lease data has been analysed. This data is linked to the analysis of the configurational properties of street system that are presented in the earlier chapters to test the influence of urban street configuration on rent patterns. The empirical data is a sample of 412 office leases from Berlin for the period 1991-1997. The empirical study of a rent sample seeks to answer the following three main questions:

1.3.1 How much does a tenant pay for location as distinct from other factors?

The first question concerns the technical and methodological problems involved in isolating the *location variable* in rent from a multitude of other intervening variables. How much of the rent on an office space is a premium for location as distinct for the amount paid for other factors such as the quality of the unit, characteristics of the building and provisions of the lease? The literature review of chapter 2 outlines previous research into this problem. One strand of research has been in the field of econometrics, where Multiple Regression Analysis (MRA) has been used to isolate variables involved in rent determination. Another strand has come from the surveying and property research community, which has evaluated the nature of lease contracts more closely to ascertain what tenants are actually paying and under what conditions or terms (Crosby and Murdoch 1998).

The thesis takes its cue from both research strands by using MRA to look at the influence of variables but on a sample of office leases that has been individually evaluated in detail. Chapter 3 presents the methodology used in this thesis to analyse the leases within the context of these previous approaches. Chapter 6 of the thesis then tackles the question of non-spatial influences on rent for the sample of office leases from Berlin, most importantly the factor of time and the difference in building quality. The effect of other variables on rent is accounted for in a location blind MRA, leaving a *location rent*.

1.3.2 What does the pattern of location rents look like?

The second question refers to the spatial patterns that location rent values form in a city. In the literature review of chapter 2 it is shown that a great deal of urban economic theory has involved location rents within a more general model of the urban economy. These theories have posited models in which rent has a simple spatial pattern, traditionally this has been mono-centric (Alonso 1964) but more recent work has aimed to show that rent patterns could be potentially polycentric (Heikkila, Gordon et al. 1989).

The literature review also shows that despite the importance of rent within these larger models of the urban economy, there has been surprisingly little empirical research into the real spatial patterns of rent found in cities. In particular, econometric studies of office rents have presented surprisingly little evidence of spatial patterns against which to test models of rent determination. Of the empirical research that has been undertaken, large differences have been shown in office rents at the street to street scale (Hurd 1903; Brennan, Cannaday et al. 1984) and changes in the pattern of rents have been recorded over time (Anstey 1965; Howes 1980).

Within this thesis, the empirical pattern of rents is considered as an important object of research interest and stands alongside the issue of theory and measuring the location variable. In order to see whether the urban layout has an effect on rent patterns is necessary to measure the pattern of rent within the layout as sensitively as possible. Chapter 5 presents an analysis of the available published material on rent patterns in Berlin and how they have changed since reunification. Published sources show a pattern of rents that is focussed on two centres- the West Berlin CBD and the new Eastern district of Mitte. In chapter 7 this pattern is investigated in more detail using the empirical sample of rents. Taking the location rent values isolated in chapter 6 and using more rigorous data visualisation techniques within a Geographic Information System, representations of the pattern of office location rents in Berlin are created. Street based differences are found and a shift in the global pattern of rents since reunification is represented.

1.3.3 What spatial variables can explain the pattern of office rents?

This question- why the market leads tenants to pay a premium for certain locations over others- requires some measure of each location's position relative to other locations within the city that can be compared to the value that tenants ascribe to it. In the literature review of chapter 2, the various existing theories about the independent spatial variables in rent determination are presented. A historiography of theories that have taken distance from the

Central Business District as the spatial structure of significance to rent patterns is presented. Other approaches that have attempted to measure multiple-destination accessibility and a further approach that measures the configuration of the street grid itself are presented.

The spatial variables used in this study have been obtained using the space syntax analysis of the street system. The methodology this analysis of urban form is presented in chapter 3. In chapter 4 of the thesis the historical development of Berlin's urban morphology is traced to show what kind of a spatial object Berlin was by the late 1980s. The relationship between the spatial structure of the city and the pattern of land use and rent value over time is explored, showing how the complex pattern of commercial land uses in Berlin developed. In chapter 5 the spatial change of occurred with the reunification of Berlin is analysed in detail and the response of the property market is shown from published sources. In chapter 8 the space syntax analysis is linked to the sample data to undertake a more detailed statistical analysis of the role of street configuration in rent determination.

1.4 Hypothesis

The hypothesis to be tested in this research is that *there is* a relationship between street grid configuration and the pattern of office rents. As will be discussed in the literature review, the most common approach in previous studies of rent value has been to investigate the spatial pattern of rents with reference to the pattern of land uses, commonly defined as the distance to a point in the Central Business District. This thesis seeks to investigate whether the spatial configuration of the street system itself can be shown to have a relationship with rent patterns. If there is a functional relationship between the two, then the changes to spatial structure in Berlin (such as those that occurred with reunification) should produce concomitant changes in the pattern of rents.

In order to test this hypothesis, it is necessary to calculate a *measure of location* from the characteristics of the street grid itself that is independent of rents. This independent spatial variable must then be shown to statistically correlate with the empirical location rent values. Chapter 8 of the thesis presents the culmination of this analysis: the sample of office leases is linked to the spatial measures in a Multiple Regression Analysis (MRA) for the determination of rents. In particular, the changes in the spatial structure of Berlin's street grid that occurred with reunification are investigated with respect to the spatial reorganisation of office rents.

1.5 The Scope of the Research

It is necessary at the outset to define the limited scope of this research and also define the limitations of the findings of this study. Firstly, there is an important limitation in the kind of research question that is being investigated with respect to urban configuration and rent patterns. The changing spatial structure of Berlin provides a wealth of phenomena that can be considered effects of society onto spatial structure and would be suited to the kind of research programme that treats urban layout as the outcome of a social process, as described in section 1.1 above. Urban morphology is of course built by society and there is a long-standing debate about how and why society builds urban layouts in the way that it does (Ratcliff 1949; Hillier and Hanson 1984; Batty and Longley 1995; Hillier 1998). In Berlin, the social reasons for the creation of a divided city, the particular spatial location of the wall and the occurrence of reunification of 1989 are legitimate subjects for research. For the period of reunified Berlin one might legitimately also ask why major projects that have had an effect on the urban layout have been planned in a particular way (for example, the Potsdamer Platz redevelopment or the federal government area around Spreebogen).

To tackle such questions about society's effect of spatial layout more than superficially would constitute not just a separate piece of research but a fundamentally different kind of research. This thesis does not seek to contribute to this debate but rather takes the layout of the city as an *independent* variable. Taking layout as independent does not mean that it will be disregarded, on the contrary, much of the thesis is devoted to as clear an analysis of it as possible. Chapters 4 and 5 present a detailed analysis of the historical development and current state of Berlin's urban morphology using the space syntax method. However, the *reasons* for the urban layout having in the shape that it does are not a subject of analysis. Therefore, for the purposes of this thesis, urban layout is taken as given and the huge change in layout (reunification) as something that *just happened* to the Berliners for whatever complex geopolitical reasons. What the effects of reunification on the spatial structure of the city were, and the way that tenants responded to this spatial change is the subject of the thesis.

It is also to be noted from the outset that the thesis is a demand side study, and it is the valuation of location by tenants not by landlords or developers that is of concern. Demand and supply are of course inextricably related and it is indeed an understanding of the mechanisms of their relationship (particularly the *spatial* characteristics of their relationship) that this thesis seeks to contribute to. Of course, it is also necessary to analyse the behaviour of tenants within the context of supply and this is undertaken throughout the thesis. The constraints of supply within which tenant preferences are evaluated both through the

historical development of Berlin's land use pattern in chapter 4 and the recent development of supply in chapter 5. In chapters 8 and 9 conclusions of a theoretical nature are drawn about the role that demand pressures have within the property market and the implications for the supply side to respond to them.

However, it must be recognised that the contribution of a demand side study can only be to clarify the *pressures* of tenants on developers and not to model the actions of developers within their own constraints. A separate line of inquiry could evaluate particular constraints of the supply side that condition their response to demand pressures (for example; planning, the land market, site availability and construction methods). This is not the focus of this thesis. The thesis therefore does not seek to answer questions such as why the planning system chose to allow development in some areas and not others and why developers built where they did. These questions are also recognisably of the society-onto-space kind of research, whereas this thesis seeks to understand the unexpected effects of space back onto society. For this reason, the study focuses on how tenants responded to the supply of office space rather than how developers created it. The focal questions outlined and the hypotheses being tested relate solely to the value of location for tenants.

It can be argued that the study of the demand side of the property market provides a particularly interesting example of the response of society to spatial structure because of the clarity of rent data. According to the theory of utility maximisation, tenants motives to pay more or less for various locations should not be expected to bear any relationship to those of other agents (such as the profit of a developer or the wishes of a planning authority). Tenants should be expected to attempt to minimise their rent cost at the expense of the landlord within the constraints of price-bid competition for the same location by other tenants. Spatial differentials in rent can therefore be viewed as quite direct indices of the value of intra-urban location to companies: when renting a space, tenants are '*voting with their wallets*' on the value of location amongst other variables. The aggregate spatial pattern that this voting leads to is what the study seeks to analyse and explain.

It should also be noted that the focus of this study is an investigation of the role of *location* on rent patterns in which methodological innovations will be suggested and empirical findings from the Berlin case will be presented. The focus of the research is not the creation of a model for predicting rents, as the prediction of rents is far more complex than just providing a measure of location that reflects value differences to some degree. As will be seen in the literature review, capturing the factors that influence rent is a complex research problem and there are a number of open methodological debates about the best way to do so. This thesis

focuses on one factor (the location factor) and looks at ways of creating objective, comparable measures of different locations. An evaluation of the role of other factors in determining rent is necessary in order to see if results that are attributed to spatial factors could actually be explained by the hidden influence of non-spatial variables. But the test of whether spatial patterns in rent can be excluded by reference to other intervening factors is not the same as a test for the significance of all potential variables that may influence rent levels.

1.6 Summary

As part of a wider research programme looking at the effects of spatial layout on social organisation, this thesis looks at the influence of street grid configuration on the pattern of office rents. The case study is reunified Berlin, where fundamental changes in the spatial structure of the street grid have taken place as well as a fundamental spatial reorganisation of office rents. An analysis of the street grid will be presented that provides measures of the spatial changes that occurred with reunification. A sample of 412 office rents will be analysed to test the relationship between the changes in rent patterns and the spatial reorganisation of the street network using multiple regression models for location and non-location variables.