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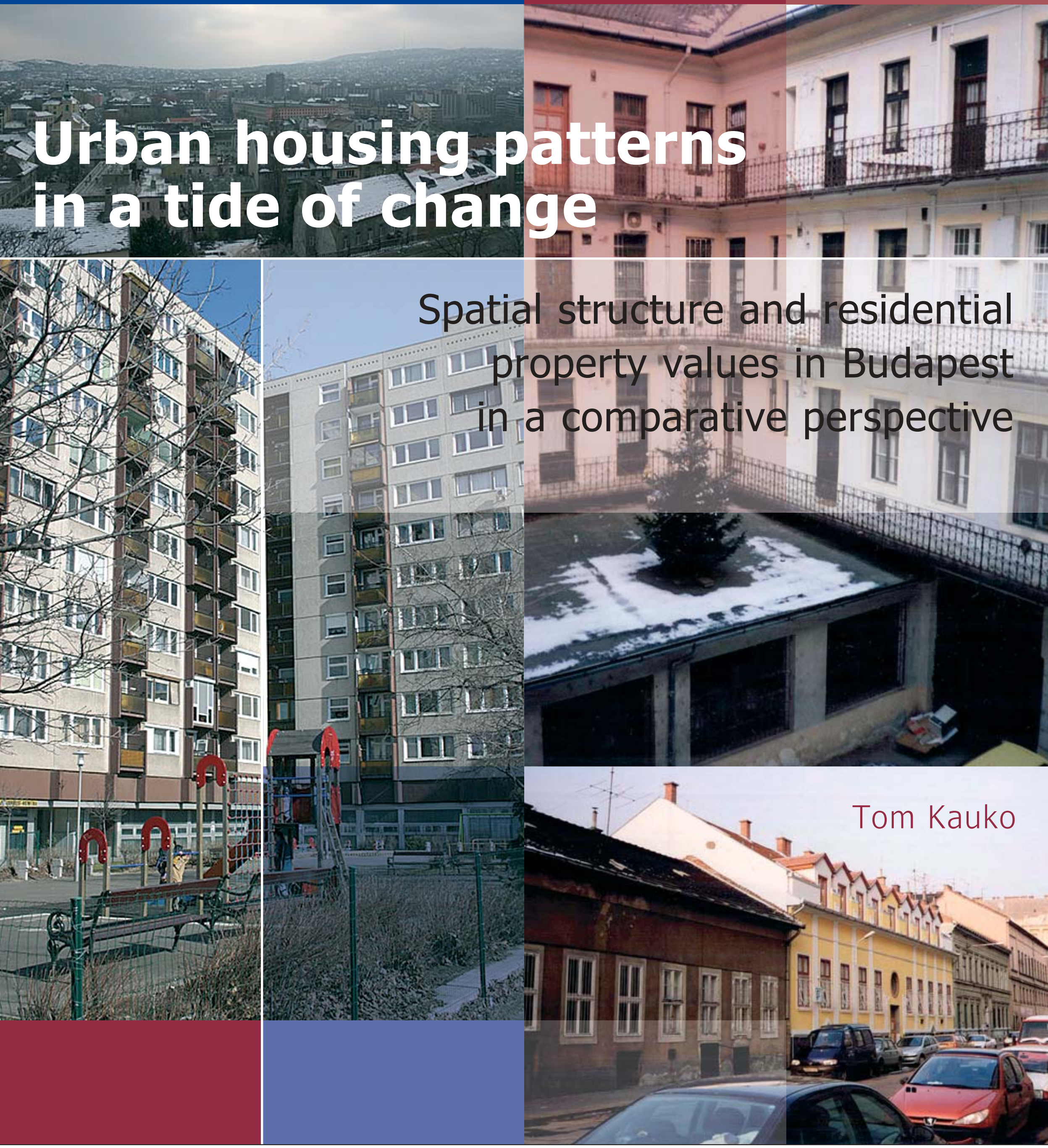

Urban housing patterns in a tide of change

Spatial structure and residential property values in Budapest in a comparative perspective

Tom Kauko

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Preface

This book forms the third part in a trilogy, and thereby completes the comparative research project of OTB Research Institute of Housing, Urban and Mobility Studies which deals with spatial housing market structure, house prices and locational preferences in European metropolitan areas. This project in turn falls under the umbrella of the research programme Sustainable Urban Areas at Delft University of Technology. Moreover, this Budapest part is a follow-up to earlier studies on Helsinki, Amsterdam, Rotterdam and The Hague.
All too often Western researchers express uninformed, biased, stereotypical, naïve or patronising opinions of the post-socialist context. Our Eastern colleagues have therefore every right to be sceptical of studies written by us – we should stick to our own circumstances. But having said that, I really could not resist interfering. In doing so, many local contacts have helped me acquire unique information, and I have tried my best to avoid embarrassing mistakes when offering an outsider's view of this fascinating city and its housing market.
For most of the narratives I am indebted to the Head of Department at the Department of Urban Studies of Budapest University of Technology and Economics, Prof. Gábor Locsmándi, with whom I had several fruitful discussions in 2004 and 2005. Another person to whom I would like to express my gratitude is Gábor Soóki-Tóth, for allowing me to use the datasets, office facilities and professional material of ECORYS Hungary, which proved to be a goldmine for me. I would also like to thank Csilla Sárkány, György Alföldi, Dávid Valkó, Árpád Szabó, Pál Baross, Judit Székely, Zsuzsanna Földi, Attila Fürstand and Prof. Zoltán Kovács for providing their valuable expertise for this project. I remain, of course, solely responsible for any possible misunderstandings and errors in the text. Lastly, I am grateful to OTB for allowing me to spend enough time in Budapest to enable me to process the material this thoroughly, and for allowing me to disseminate the results in international conferences.

Tom Kauko, Delft, May 2006

Contents

1 Introduction

To ascertain location-specific house price development and related features is already part of a long-standing research tradition within housing economics and spatial analysis. One could nevertheless argue that the importance of the topic has recently been accelerated further due to a weakened national/state level and an increased urban/regional level of territorial competition. Increased territorial competition, and how to prepare for it using various kinds of local development strategies, has recently been commented on by various scholars in the disciplines of urban geography (e.g. van Weesep, 2000; Musterd and Deurloo, 2005; Jayne, 2006) and real estate (D'Arcy and Keogh, 1997, 1998; Cheshire, 2005). This discussion loosely follows the literature on institutional and evolutionary economics, and regulation theory, and provides a background against which the relevance of this study can be seen. Here it is assumed, in sharp contrast to fashionable arguments by Paul Krugman and others who deny, or simply neglect, the notion of territorial competition, that, in order to meet the challenges of the new economy, cities do compete more than before, and that they have distinct strategies on how to offer the necessary incentives for prospective firms and consumers. One specific approach to labelling the city focuses on the functioning of the commercial property market (including the residential investment market); another approach focuses on the availability of an affordable and quality-controlled local housing market.

Creating the preconditions for a competitive real estate or housing strategy is of particular interest for this study. In this setting, the relative differences between success stories and failures are determined along dimensions such as house price levels, the physical features of the urban environment, and the people living there. Furthermore, path-dependent processes, or local history, must not be forgotten. In this mode of analysis the novelty is to apply cross-disciplinary methodology loosely related to an emerging paradigm known as heterodox economics. More specifically, in this study certain state-of-the-art empirical modelling approaches and datasets are being applied, and related to an open theory framework of urban housing markets. Finally, the comparative aspect will provide an added element to the study. Here the main research challenges arise from the difficulties of dealing with a Continental European post-socialist context, when the literature on the topic usually deals with Anglo-American circumstances.

Chapter 2 briefly reviews the literature on these cross-disciplinary issues in the framework of flexible and spatial housing market modelling methodology. This is necessary because the study uses triangulation of methods and data. This kind of multi-method is aimed at disentangling housing market segments, house prices and locational choices of housing consumers. In doing so, five themes are interlinked:

1. Quantitative analysis of market outcome data (transaction prices, assessed values). This is carried out in order to provide an overall picture of the

urban housing market landscape. Here the main dimensions are related to segments, prices and various neighbourhood characteristics.
2. Analysis of housing consumption preferences using expert judgements (i.e. a micro-level demand side aspect). This enables ascertaining some more intangible factors and diversification of the results with respect to preference structures, consumption and demand. In this way the quantitative analysis above is validated and complemented.
3. 'Institutional' case studies of property prices in relation to urban renewal – an increasingly qualitative aspect of real estate development and planning (i.e. a micro-level supply side aspect). Here the aim is to add depth to the study by focusing on the production and supply processes of a specific market segment and area under study.
4. Comparison of Budapest with other cases (notably Metropolitan Helsinki and Randstad Holland) based on general factors that shape urban housing markets. Comparative research is a powerful tool to analyse contextual determinants of urban residential patterns, for example related to different institutions, cultures and meanings.
5. Generalisation of the results towards a theory of Continental European urban housing markets, with the application of territorial competition strategies for cities. Here it can be argued that most of the contemporary research in this field focuses on Anglo-American cities and regions.

A firm tradition of urban/housing economic modelling of the relationship between house prices and the housing preferences of households, and local factors that determine the consumer's choice of specific residential environments has existed for a long time already, but there is still a deficit in evidence from mainland Europe – in particular, from the post-socialist context. This deficit is partly due to data availability, and partly due to the particular institutional and geographic context. As will be shown in Chapter 3, aggregated time-series data is often more readily available than data disaggregated by city, region or functional segments; the other reason is the difficulty in applying a mainstream economic modelling framework in analysis of residential location and housing market structure where behavioural and institutional factors are substantial.

While the study focuses on an under-researched topic, it adopts a different framework from conventional mainstream economics. More specifically, it reports findings of multidimensional urban residential location modelling of housing market features using a pragmatic classification approach based on two neural network types: Kohonen's self-organising map (SOM, Kohonen, 1982), and its extension, the learning vector quantification (LVQ). It follows prior studies on Metropolitan Helsinki, Finland, reported in Kauko (2002) and Kauko et al. (2002), and on Amsterdam, the Netherlands, reported in Kauko (2004). Furthermore, nationwide housing market analysis of the three country contexts under study was carried out in Kauko (2005a). As in Kauko (2002, 2005b), empirical modelling based on housing market data and expert interviews provides the substance for the analysis. In Chapters 4 and 5 the two neural network techniques, the SOM and the LVQ, are used for analysing statistical house price and value factor data. With these methods it is possible to obtain information primarily on dwelling prices, locational values and submarkets, and additionally on certain underlying more institutional and behavioural features as patterns that form on the map surface generated by the SOM. The interviews in turn are both quantitative comparisons of preferences (stated preferences), which subsequently are elicited with the analytic hierarchy process (AHP, i.e. the Saaty method of elicitation), and supporting in-depth interviews of the same experts – this is reported in Chapter 6. A further module is the institutional analysis of urban renewal based on market outcome data, which is reported in Chapter 7.

Chapter 8 concludes the study by offering a summary of the results together with a generalisation onto a higher level of abstraction. In Kauko (2005b) the results pointed to convergence when comparing Helsinki with Amsterdam; although, within that convergence, divergence was also found; in particular, if we included the other main cities in the Netherlands, The Hague and Rotterdam, the common national (and regional) context, which was crucially different to Helsinki, was observable across the three cases Amsterdam, Rotterdam and The Hague. This work on Budapest is a direct follow-up to that study. Moreover, it represents, to my knowledge, the first application of the comparative research typology by Pickvance (2001) within housing economics or real estate.

The basic assumption is that different places generate a different outcome in terms of spatial housing market dynamics, locational components of property value and locational preferences. This is on a par with the common guidelines of cross-national comparative research (see e.g. Pickvance, 2001). On the national level of housing market analysis Meen (2001, p.125) distinguishes between fundamental differences and minor differences between model coefficients. This is related to the discussion on contextual, compositional and behavioural characteristics of housing markets.

The first research question then is: how different is Budapest? Which one of the following two findings will be observable: (a) Budapest shows substantially different classification results in terms of urban housing market structure to Helsinki and Amsterdam, in which case the latter two housing markets covered in Kauko (2005b) will after all share the same assumptions; or (b) Budapest shows surprising similarity (given the very different starting points) in the classification results to the other two contexts, in which case we may talk about convergence across all three contexts? Here the divergence view is the initial assumption: as will be shown in Chapter 8, Budapest is assumed to be very different to the earlier cases Helsinki and Amsterdam.

Additionally, some theoretical interpretations for differences and similarities between these cases are sought. The second specific research question therefore is: what kind of theoretical framework is appropriate for this case? This is the justification of the imperative cross-national dimension: to test the theory assumptions in accordance with the principles of comparative housing research (see e.g. Boelhouwer et al., 2000). Given the market failures that are likely to be inherent, how well is the price formation of residential property explainable with the equilibrium model of economic theory, and what is the connection of property value formation to the regulatory system of land and housing markets, land use planning and land ownership circumstances?

The target of the study can then be summarised as a conceptual model that tells us about similar and different findings across the study areas, when the interest is in ascertaining market segments, house prices and locational preferences. The potential contributions to science are to increase our understanding of the contextual, compositional and behavioural factors that determine the spatial housing market structure, property prices and locational preference formation within a residential value and choice modelling setting. This book does not explicitly address policy issues. However, from the point of view of society, the analysis could inform a series of issues, such as property taxation, comparative evaluation of localities for territorial competition and collaboration, allocation of resources and land use in spatial planning, subdivision of plots, site selection for building and portfolio management, to name but a few (see Kauko, 2002, 2005b).

To summarise the outline of the study: Chapter 2 presents the methodology; Chapter 3 describes the study area; Chapters 4 and 5 deal with urban economic residential location modelling of Budapest, Hungary, using a pragmatic neural network approach; Chapter 6 reverts to an expert judgement method focusing on housing consumption; Chapter 7 presents an institutional analysis of urban renewal using market data; and Chapter 8 summarises the study, compares the results with the earlier two cases Helsinki and Amsterdam, and lastly abstracts the discussion to a conceptual level and provides the conclusions.

2 The methodology for analysis of spatial housing market structure

2.1 The generic literature evaluating the urban housing market structure

The four research objectives are (1) to determine spatial housing market structure; (2) to describe and (when possible) explain the distribution of residential property values; (3) to identify locational preferences of housing consumers; and (4) to carry out an evaluation of planning measures in an urban context, with particular regard to urban renewal.[1] When investigating these topics, the described methodological triangulation approach is favoured over a traditional hedonic and urban (land) economics approach insofar as location has a residual, non-linear, fuzzy and differentiated role. Namely, the a priori selected supply and demand proxies for locational influence alone do not usually allow for a complete picture of the processes. Furthermore, compared with the linear relationship between house size and price, the effect of a locational factor is usually discontinuous and non-linear. That the locational aspect in this context may be characterised as fuzzy, in turn, is because of the latent factors that underlie the choices and intentions of individuals. Finally, some buyers may prefer the city core and others the suburbs, even though they may belong to the same socio-demographic group and have similar information about the marketplace.

On an abstract level of thinking, this methodology represents the social economic approach to applied housing market analysis.[2] The crucial theoretical notion here is that, as a consequence of certain supply or demand side features, different buyers face a variety of spatially as well as sectorally distributed dwelling alternatives which may not comprise a single market (Maclennan and Tu, 1996). A further issue pertinent in academic discussions is which is the more relevant discriminating feature for a given spatially and temporally defined housing market context: (hedonic) prices or other objective socio-economic and demographic (henceforth: socio-demographic) or physical partitioning criteria (see Rothenberg et al., 1991; Meen, 2001; Leishman, 2001; Kauko et al., 2002; Jones et al., 2003). The most recent theoretical advances, however, are eclectic attempts to combine the dominant views. Watkins (2001) concludes that submarkets are dependent on both structural (house-specific) and spatial (location) criteria, and may additionally be driven by demand subgroups, hedonic quality levels, or be manifestations of a non-arbitrage situation. Furthermore, he argues that the failure of housing economics to account

1 Throughout the text urban renewal and urban regeneration are used as synonyms, and defined as urban rehabilitation together with new development.

2 Within this tradition, Wallace (2004) categorised the current approaches into four subgroups: complexity theory (applied by Meen), decision theory (following Simon), behavioural finance (following Q methodology) and "Kauko's in-between approach".

for this relationship is unsurprising because of the complex processes of supply side and demand side dynamics involved; that is, how these characteristics influence housing choice and urban form (cf. Maclennan and Tu, 1996; Goodman and Thibodeau, 1998, 2003). These are all relevant points for the analyses performed and arguments developed in the remainder of the book.

The key question is what the relation is between specific spatially identifiable housing market characteristics and house price level. If the segmentation aspect is treated in a primarily economic sense, with the different market segments being separated from each other based on their structural price differences along a quality continuum from high to low, along which there is spatial arbitrage (Costello, 2001; see also Rothenberg et al., 1991), then the different typical combinations of attribute levels with (assumed) internal substitutability may also be approximated as different housing market segments. However, whether this is a realistic approximation is judged empirically based on evidence and pragmatically based on exact purposes and goals of the study – the level one wishes to look at the market.

We may distinguish between a single equilibrium model, where the spatial relations between segments with respect to the price criterion are unambiguously formulated, and a multiple equilibria model, where this is not the case. In the latter case, two locations need not represent the same submarket, although being similarly priced, and having inhabitants with a similar sociodemographic background. Meen (2001) illustrates this by comparing empirical evidence from the London housing market, which is polarised between wealthy suburbs and a poor inner city, with evidence from Melbourne, which showed that wealthy and well-educated households may also be accommodated in the city centre.[3]

A generic literature review of relevant urban housing market modelling approaches was provided in Kauko (2005b, Chapters 2-3). The main point of that discussion was to demonstrate the need to look at the way markets, prices and preferences are modelled, and after that, to show the benefits of applying a set of particular approaches within that domain. To reiterate on this discussion, the SOM approach may be explained and compared with other relevant spatial and clustering approaches using more conventional economic modelling. Within housing economics, relevant spatial and clustering analyses have been carried out by a number of authors. It can be noted, however, that not much work has been conducted as comparisons between two or more urban areas. The following references highlight some of this line of research.

Bourassa et al. (1997; 1999) combined three different statistical methods, namely factor analysis, cluster analysis and hedonic regressions in their study on housing submarkets in Sydney and Melbourne, Australia. Two data-

3 Cf. findings by Ball and Kirwan (1977) from Bristol, UK.

sets were used: one for local government areas and one for individual dwellings. For the results with grouped data, the most important factors were distance location (inner/outer city), the socio-economic factor as an indicator of neighbourhood quality, and the residual locational factor. For the results with individual data, the age of the dwelling and the characteristics of the housing stock also played a role in addition to variants of the three factors mentioned above. Not surprisingly, these results showed that all submarket classifications performed better than the overall market equation. However, the optimal number of submarkets still remained difficult to determine based on the cluster analysis literature. Within this broad approach, other informed studies from different places worth noting include Laakso (1997), Adair et al. (1996) and Maclennan and Tu (1996).

Recent years have of course seen an exponential increase in sophisticated extensions of hedonic/equilibrium modelling that are aimed at quantification of relationships within the urban housing market or a segment thereof. In particular, spatial regression methods have made important contributions. For example, Dubin et al. (1999) emphasise the importance of nearby properties, when the house price estimate is a function of proximity and degree of spatial dependence (see also Dubin, 1992; Pavlov, 2000; Meen, 2001). Wilhelmsson (2002) uses cluster analysis on the residuals of a hedonic model to reduce the spatial autocorrelation, a source for biased, inconsistent and inefficient estimates. He concludes that this method is well suited to exploratory purposes: to find suitable areas for further analysis, and from which neighbourhood characteristics that cause clustering tendency can then be found.

Goodman and Thibodeau (1998, 2003) undertake hierarchical modelling of hedonic house prices using a cross-sectional approach, which allows efficient estimation of components of both housing characteristics (level 1) and submarkets (level 2). The difference between this and a standard single hedonic price equation is that this model allows for the variation in premiums paid for a given characteristic across the set of submarkets (see also Orford (1999) for multi-level analysis of housing markets and for valuation of locational externalities).

Flexible (model-free, non-/semiparametric) regression methods make fewer assumptions of the data than a fixed parameter model and allow for a less restricted functional specification in order to enable a more adaptable model building (Pavlov, 2000; Clapp et al., 2002; see also Bin, 2004). These methods are of three types: local approximations (e.g. locally weighted regression such as splines), low dimensional expansions (e.g. additive models, with both parametric and non-parametric components), and adaptive computation (e.g. neural networks). In these techniques the idea is that $f(x)$ approximates $g(x)$. In parametric multiple regression analysis the variance is low, whereas the bias is high. In flexible regression, in turn, a greater variance is generated but the bias is reduced instead (see Meese and Wallace, 1991; Pace, 1995; Mason and

Quigley, 1996; Verkooijen, 1996; see also Coleman and Larsen, 1991, for a more critical evaluation). According to Kyllönen and Räty (2000), to allow the variable to freely alternate the direction and the curvature of the impact at any observed level is a strength. If the role of theory is restricted only to support a perspective, then these methods are strong while they rely on a depiction of the dataset. This is also an efficient and easy way to visualise any dataset. To give one more example of the state of housing market research, Meen and Andrew (2004) applied two different approaches within a social interaction modelling framework to analyse whether urban out-migration and segmentation is affected by various policy measures. The first was cellular automata, a machine learning technique approach based on complexity theory; the second was discrete choice modelling of location, tenure choice and household formation.

In the framework outlined above attention is paid to non-linearity and the emergence of fuzzy patterns that possibly – this matter is argued to be partly empirical – shed light on the way submarkets are structured location-wise or otherwise. Proposing a bottom-up approach would enable the analyst to ascertain the idiosyncratic aspect that so far has been greatly neglected due to an obvious incompatibility with equilibrium economics; additional input may therefore be sought from behavioural and institutional paradigms, but only to the extent where such enhancement serves a purpose pragmatically. Comparative research may be treated as an option to add further value to this approach.

2.2 Empirical modelling approach applied in this study

Mulder and Dieleman (2002) recognised four trends in current research activity on housing models:

1. Researchers are trying to understand particular groups in detail (immigrants, young adults and single households, for example), and not just the general picture, as was the case before.
2. Choice of dwelling is understood as part of the person's general value orientation, and a deeper understanding of particular living and housing arrangements necessitates more inter-disciplinary work.
3. Choices are strongly dependent on geographical variations in economic, demographic and political circumstances, that is, context dependency.
4. The models can be used for practical purposes as well.

In this study the first three points are essential (and for the fourth point, see the final chapter of Kauko, 2002; and 2005b). The objectives are differentiation of housing market behaviour, the motives behind a certain type of market behaviour, and the extent to which it is tied to local circumstances. These three objectives are mixed and looked at using a multi-method approach outlined below.

Three state-of-the-art computer modelling techniques are applied for the empirical part of the study. The first two, the SOM and the LVQ, are types of neural network modelling. The SOM is a technique aimed at exploring large, disorganised and noisy datasets in two ways: first, by a reduction of dimensions in such a way that the original topology of the dataset is preserved, and second, by providing a flexible clustering of similar items based on these dimensions. The LVQ in turn goes one step further in the sense of providing a more formal classification of the data structure generated by the SOM. These two techniques are applied on market outcome data. The third modelling technique, the AHP, in turn is applied on expert judgements. The aim of this technique is to confirm and animate the results obtained from the neural network analyses. This is possible, as some of the variables applied are the same for the neural network modelling and for the AHP and, on top of that, the AHP enables the use of variables that due to their intangible nature are impossible to record satisfactorily in secondary data sources. Below only a cursory presentation of each technique and the way they are used in conjunction is given. For a comprehensive presentation of the SOM, LVQ and AHP techniques, including the formal underpinnings, see Kauko (2002) and (2005b).

The starting point of the study was to acquire data, relevant expertise and background literature on the Budapest housing market context. The next step was to run spatially identifiable house price data with the classification method based on the two aforementioned neural network techniques: the SOM and the LVQ. The two methods are based on pattern recognition as opposed to hypothesis testing. The SOM is a competitive neural network invented by Kohonen in 1982. Furthermore, the SOM is in fact a type of flexible regression method and also a machine learning technique. The SOM is best defined as a mapping from a high-dimensional data space onto, a (usually) two-dimensional lattice of points (Kohonen et al., 1996a). In this way, disordered information is profiled into visual patterns, forming a landscape of the phenomenon described by the dataset (see Kohonen, 1995).

The idea is to process multidimensional and spatially identifiable housing market data with this technique and interpret possible patterns from the resulting output data matrix. As such, the method can be seen as an explorative and inductive alternative to conventional housing economic equilibrium modelling. Thus, instead of equilibrium economic assumptions an open theory framework based on the metaphor of 'self-organising' is applied for the modelling. Explained in casual terms, the SOM generates an output where differences and similarities between items are visualised across the data structure. The output also enables convenient analysis of the distribution of each input variable, as any resulting 'valleys' and 'peaks' indicate the extreme values of a given variable. Applying the SOM thus involves a more qualitative aspect. The LVQ is a more formal extension of the SOM, and aimed at classification of the SOM output based on selected criteria relating to either the input or to other identification criteria such as location (Kohonen, 1996b).

Another possibility is opened up when we compare the SOM output of successive cross sections – this was dealt with using the method of fixed time windows (Carlson, 1998). This kind of analysis is considered quasi-dynamic in the large-scale modelling literature as the analysis is based on combining two or more cross-sectional 'snapshots' (see for example Wegener, 1994). Such modelling focuses on neighbourhood-specific dynamic price mechanisms. Also in this case the results would be comparable with those using different methods, from other geographical-institutional contexts, including earlier investigations of Budapest.

The results obtained by applying the SOM and the LVQ on two different datasets of property values were then supported by a loosely defined heterodox economics theory framework, which was applied as a contextual background for generalising the conclusions. Abstracting the discussion to the theoretical level using these kinds of methods is considered a necessity – otherwise the analysis would have been deemed empiricism. Such an open theory enables flexible modelling using an inductive research strategy. The transparency between theoretical aims and the modelling results is increased by making use of local knowledge collected through casual observation, expert interviews and discussions, marketing surveys, official statistics and published reports, even if some of this is merely 'circumstantial evidence'.

The SOM technique contributes to our knowledge in several ways, through exploring the multidimensional complex dataset, visualising patterns and clusters, and, based on these findings, classifying potential submarkets. The basic functioning principles of the SOM and the LVQ are described in Appendix 1. The added value of the SOM-based method is its capability to identify submarkets and the idiosyncratic aspect of spatial housing market structure (Kauko, 2002). Furthermore, the inductive approach based on the feature maps generated by the SOM may help us analyse possible residual aspects of the spatial price formation structure. A further advantage over hedonic regression is its capability to generate a fuzzy and partly qualitative outcome.

There are however a variety of problems with the SOM as used in this application. These concern the pre-processing of the data, especially how to determine the optimal field range of a given variable ('scaling', cf. 'assignment of attribute weights', McCluskey and Anand, 1999), and the selection of optimal network parameters, which might also have a substantial effect on the outcome (e.g. Kohonen et al., 1996a), and the size of the dataset and the repeatability of the results.

On the other hand, the results of the SOM analysis are also comparable with those obtained with conventional methods referred to above. While the SOM-based approach is partly an alternative to the partitioning approach to hedonic price modelling and other more conventional approaches, the similarities to the combined factor analysis, cluster analysis and hedonic regression modelling approach applied by Bourassa et al. (see Section 2.1.) are notable. The only crucial difference between the SOM and k-means cluster analysis is the 'neighbourhood' concept of the former technique, that is, the node that gives the closest response to each observation vector (the 'winner' node) with its adjacent nodes (see Openshaw et al., 1994).

For an illustration of the possibilities of the SOM, the reader is advised to consult the textbook by Deboeck and Kohonen (1998) where the method is presented as a sophisticated alternative to traditional methods for clustering and visualisation of data, and as exploratory data analysis aimed at extracting new knowledge from the results obtained with an algorithm for pattern recognition, machine learning or multivariate analysis. A few recent applications that have some relevance for housing market modelling may be noted: in population geography, work by Openshaw et al. (1994) on classifying residential areas, and related work by Hatzichristos (2004) on delineating demographic regions; and in property valuation, a number of contributions, inter alia Lam (1994), James et al. (1994), and Jenkins et al. (1999). The housing market segmentation aspect is a close relative of the more pragmatic residential valuation aspect (e.g. Adair et al., 1996; Jenkins et al., 1999); therefore, it is logical to extend the applicability of the SOM-based method towards modelling spatial housing market structure.

In an evaluative sense the SOM-based method could be described as a multidimensional method of analysis, which enables us to obtain implicit information about the dataset – in this case, the housing market. The strength of this method lies in its ability to generate contextually significant patterns and clusters. The functioning of the SOM-based method to submarket classification could be described in stages as follows. Firstly, the mechanic SOM processes multidimensional data into a 2D projection. This outcome can be looked at either layer by layer when each layer corresponds to an input variable, or as a composite of all layers in one projection. Secondly, visually discernible patterns may emerge on one layer, or in all layers, as similar categories of observations, which are clearly different from others form 'patches' on the map surface. Thirdly, these patterns may show outliers or clusters, which in turn may reflect idiosyncrasies and 'hidden dimensions' based on combined effects across the dataset or the layers (i.e. the dimensions of the input variables). Fourthly, the method is validated based on theory and expertise so that the clusters may be interpreted as submarkets. Then, the question arises: what are the determinants/criteria for discrimination that is submarket formation? Is it any of the input variables (price, house type, locational aspect, etc.), or is it an unanticipated combination of variables, in relation to location? With the SOM alone, only a rough classification is obtained. For a more formal testing, a further processing with the LVQ is undertaken – the fifth stage of the analysis. The point to make is that this method offers both an alternative and a supplement to modelling house prices the more conventional way.

There are two further considerations:

1. The level of analysis: instead of accurate estimates for an urban area as a whole, the focus is on relative differences between (exactly) specified bundles of attributes or locations.
2. The geographical and institutional context: unlike most of the US-based studies, where well-functioning markets enable equilibrium modelling, in this context – as will be shown in Chapter 3 – the inefficiency is substantial; therefore a more open theory framework is proposed. Applying this framework necessitates empirical grounding, which is why the housing market area under study is discussed in detail in the next chapter.

Later in the study the results are triangulated with an expert interviews approach. The interviews are both quantitative comparisons of preferences (stated preferences) by selected real estate and planning professionals, which are subsequently elicited with the analytic hierarchy process (for a general demonstration see Saaty, 1990; for an application in housing choice context see Ball and Srinivasan, 1994), and supporting in-depth interviews of the same experts. Why do we need such an approach? It can be noted that studies on housing market segmentation conducted in various housing-related disciplines differ with respect to the definitions and methods used (cf. Monk and Whitehead, 1999; Bourassa et al., 1997; Grigsby et al., 1987; Rothenberg et al., 1991; Whitehead, 1999). The main difference in these perspectives lies in the assumed effect of preferences, behaviour and institutions: in the purely economic approaches they are given exogenously, whereas in the more behavioural and institutional approaches they are allowed to vary. The essential question is whether the reasons behind segmentation are 'objective' criteria or socio-cultural factors and human behaviour. Using a statistical approach, submarkets may be based on price differentials, or if prices are constant, on other characteristics (institutional, socio-demographic and physical) that are not constant. Such an approach restricts the analysis to determining an objective[4] criteria as opposed to looking for more behavioural reasons behind submarket formation in an urban context. Therefore the AHP is applied as a supporting tool together with expert judgements – qualitative as well as quantitative (see Appendix 2).

On the other hand, planning and policy effects cannot be modelled without

4 The 'objectivity' in this case pertains to a special case of housing market behaviour, uniform preferences among individual residents.

a temporal (and arguably also a qualitative) perspective focused on processes. Therefore, a case study was carried out on two adjacent neighbourhoods in the inner city of Budapest, involving urban regeneration. This part comprised the third empirical approach used for this study. The same approach was earlier tested on comparable Amsterdam data, and documented in Sluis and Kauko (2003).

To summarise the argument so far, housing market segmentation has been studied using statistical techniques in various urban contexts around the world. We can conclude from the literature that while there is already a rich tradition of housing market modelling exercises the SOM enriches it further. The way the SOM together with the LVQ is applied in spatial housing market classification offers a middle-level approach between quantitative analysis and qualitative analysis, in the sense that the modelling framework from pattern recognition allows identification of combined effects of the input variables as opposed to looking at each variable in isolation. The essence of the SOM is not to explain the price as a dependent variable, but rather the ability to ascertain and visualise the differentiation/divergence of the total effect in relation to all items, as well as in relation to each input layer separately. One of the input variables may of course be the price variable; if this (or any other) layer has a special interest for us, it will be selected for closer scrutiny. Applying this framework necessitates empirical grounding, which is why the housing market area under study will be discussed in detail in the next chapter. The empirical modelling based on the AHP and the case study on urban regeneration, respectively enhance the width and depth of the study further. These modules are aimed at illustrating the micro-locational housing market effects of urban neighbourhoods with regard to the dynamics of the demand side (AHP) and the supply side (case study).

It can be said that the general framework for the empirical modelling carried out in the Chapters 4 to 7 is behavioural-institutionalist: in between old institutionalist specificity and neoclassical averaging. The connection between decision-making (micro level) and market outcome (aggregate level) is a key issue in the study. How do individual decisions accumulate into an aggregate outcome? Another key issue is the connection between locational determinants of house prices and the institutional environment in question. How do (informal and formal) institutions impact on location-specific attractiveness and price potential? In order to place the findings in a broader picture, a heterodox theory framework will be applied: an open theory which enables flexible modelling using an inductive research strategy. Another issue is that the comparative dimension is largely absent from the urban housing market modelling carried out. Rectifying this deficit is a second purpose of the analysis (see Chapter 8).

3 An inventory of the Budapest housing market

3.1 Housing in Budapest – a general background

According to Kiss (2002), the Hungarian capital is one of the most economically dynamic Eastern European capitals. Furthermore, when looked at from a national perspective, the pole position of Budapest in economic and socio-demographic terms cannot be overstated: per capita GDP was 186% of the country average and comprised 34% of the whole country; in 1998, the share of the Budapest population (almost 2 million) was 18% of the country, and the number of active enterprises 30% of the country in 1998. It is safe to say that among the twenty administrative spatial units of Hungary (counties, see Fig. 3.1) the role of Budapest as the economic and cultural centre of the country is undisputable (see also Therborn, 2006).

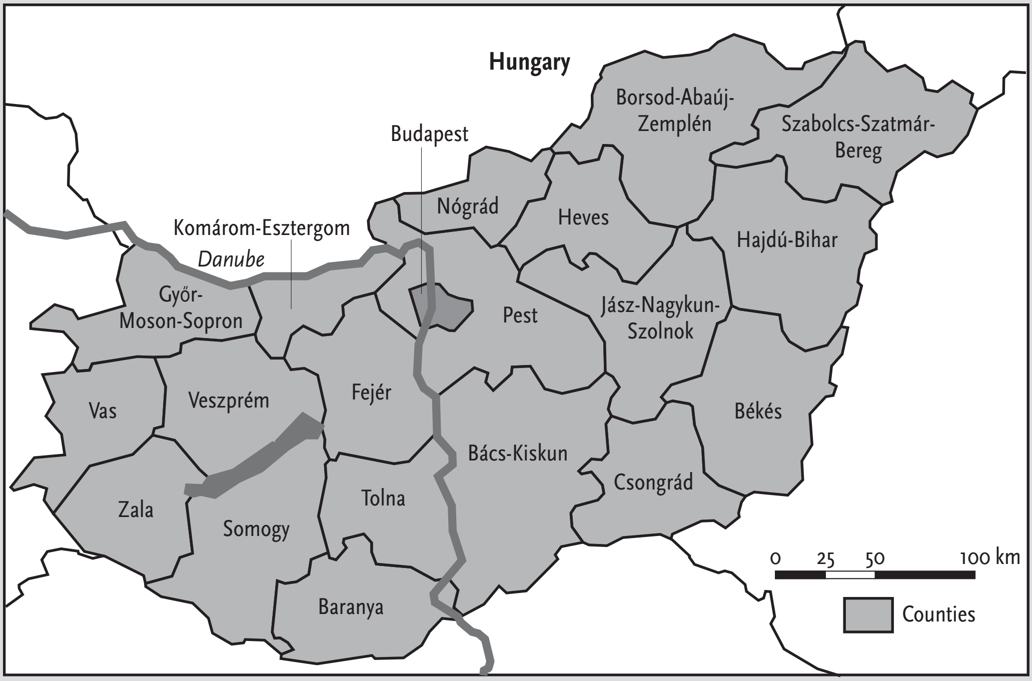
On the level of whole country and sub-national markets (1990s data) the most appreciated segments in Hungary are the Budapest segments[5], but what is interesting is that – at the country level – Budapest also has some relatively low price segments, when micro-data is used (Kauko, 2005a). This observation of extreme price variations together with the significance of physical and socio-demographic characteristics of the actual housing stock and the surrounding residential environment is relevant for the SOM-LVQ classification reported in Chapter 4. The aim of the following discussion is to describe the residential and housing patterns (past, present and future tendencies) within the city of Budapest following the available literature and discussion with local experts.

When a group of architects investigated the residential areas in the 1980s using pragmatic calculations ten different house types were identified within Budapest. The worst types of residential micro-locations were the tenement buildings situated in the inner city along the Grand Boulevard, and just outside it. For these dwellings all three factors are correlated: low dwelling quality, high area density and low socio-economic indicators. Two decades later, these types of dwellings and housing environments still remain at the bottom of the market.

Another account can be given about the categorisation of the modern housing areas. About one third of the housing stock in Budapest is prefabricated high-rise, yet there are differences in the prestige of the building types, and these differences coincide with the era in which they were built. Since the first estates were constructed in 1949, four main waves could be distinguished during the next forty years until their mass production ceased (for recent work on modern housing estates see Egedy, 2000, 2001; Kovács and Douglas, 2004):

5 Like with the Helsinki segments in Finland, where the most valuable land by some distance is in the centre of the capital.

Figure 3.1 The division of administrative spatial units at the countrywide level



- 1950s and early 1960s: the 'Stalin baroque' or 'social realism' style, comprising small blocks of low density (3 or 4 storeys high and usually green areas in the vicinity); these are traditional buildings adjusted to the urban environment. These were of brick construction and of good quality (for example, part of József A. telep in the 9th district).
- Late 1960s: the first prefab projects, comprising still relatively small, low-rise blocks without elevator or central heating, often surrounded by open space; these were allocated based on merit.
- 1970s: the Soviet-style, high-rise giant estates with 5,000-15,000 flats, lift and central heating, often built in peripheral locations with poor infrastructure; the welfare aspect in their allocation caused stigma and today these are the most problematic estates.
- 1980s: the elite housing estates; these are of better quality, and private capital played a bigger role in their construction. At the end of the period some lower density projects, which were the last housing estates constructed in Budapest.[6]

Kovács and Wiessner (2004) noted that the restructuring of the Budapest housing market is a spatial matter: areas are differentiated in terms of price levels and social standing. While Kovács and Wiessner recognise problems in

6 The last generation of panel housing had only three or four storeys; they were perceived to be of the highest quality, and built at the end of the 1980s.

the inner city and the most monotonous housing estates that need to be addressed by urban policies, they nevertheless offer optimistic prognoses for the city as a whole. Using these observations as a background, the physical, socio-demographic and price structures of this housing market are described as follows.

The physical structure of the older housing stock is in general poor, and problems persist in accessing funds for refurbishment due to financial and legal problems for the condominium management. Nevertheless, individual flats have been refurbished. Moreover, residents are still more satisfied with prefab than with the inner city tenement buildings. People do not want to be associated with the 1970s type housing stock, which is seen as a market dead end. In order to avoid association with the worst category, those living in the 1960s category might even emphasise that their building has only four storeys and no central heating or lift.

The socio-demographic paths have also been varied: in the beginning the housing estates contained a varied population. However, the current situation is about somewhat lower groups, and again it is the 1970s estates that house the problem groups. On the other hand, Ladányi's (1989; 1993) results on residential segregation in Budapest showed how the areas of the higher echelons in society were more homogeneous internally, whereas the areas of the lower classes were dispersed all over the city. According to Ladányi, the upper-market areas situated in downtown Pest and on the Buda side were also larger and continuous, whereas the deprived areas were smaller and formed a fundamentally patchier structure. (This observation of heterogeneity is good to keep in mind until the results of the modelling are interpreted in Chapter 5.) The reason for this separation of the upper classes lies in the agency relations; these groups had certain privileges in the bureaucratic and market process of obtaining housing. The ethnic segregation of Roma families, however, is the exception; Ladányi clearly showed how this minority group was spatially concentrated to certain areas in the city (in particular, on the Pest side along and outside the Grand Boulevard). Thus, while the spatial mix of socio-economic groups was better at the bottom than at the top of the housing market, the segregation of Roma inhabitants was significant, and thereby radically different from the general situation of those living under unfavourable conditions in various parts of the city. (This issue is revisited when explaining the results of Chapter 6.)

In a subsequent comment Ladányi (1998) claimed that extremely unfavourable tendencies had begun to develop and the increasing tendencies towards 'ghettoisation' were expected to continue to grow, while the government had no resources to counteract such tendencies. However, he was not able to foresee the urban rehabilitation programmes currently underway in these inner city areas. Segregation is not as severe today as Ladányi feared. This issue of whether the dynamics of certain inner city neighbourhoods is moving

Table 3.1 Mean selling prices 1989-1991 in selected Budapest districts

District	1989	1990	1991	% 1989-'91
IX	24,600	25,800	30,800	+ 25.2*
VIII	24,200	25,300	27,500	+ 13.6
V	26,500	30,600	48,000	+ 81.1
XII	28,100	28,000	50,900	+ 81.1
X	29,100	32,400	26,800	– 8.5
XI	38,100	38,200	35,500	– 7.3

* This is ostensibly partly due to the effect of the regeneration process of the case study area of district IX, where the first high-quality new build dwelling blocks were about to be completed.

Source: Kovács (1994)

towards a more or less homogeneous spatial urban housing market structure is highly relevant for the modelling of the target areas in Section 5 of the paper.

The mean price levels in the prestigious and hilly Buda side districts II and XII were already by the early 1990s three and a half times higher than the mean price levels of the working-class areas of Pest (Kovács, 1994). The cheapest areas were situated in districts X, XX and XXI in polluted housing estates with poor service provision and a 'lower class' image. Mean selling price levels (forints, HUF) and their variation between 1989-1991 in selected Budapest districts were reported by Kovács (1994) (see Table 3.1).

We can see that the highest increase in mean selling price levels (HUF) during 1989-1991 in Budapest occurred in districts V (Downtown) and XII with increasingly popular locations. While the greatest decrease occurred in districts with a substantial share of unpopular housing estates, the worst slums were situated in districts VII and VIII in the 19th-century multi-storey tenement blocks (Kovács, 1994).

According to De Jong-Douglas (1997, pp. 80-81), housing prices in Budapest deviated greatly from 1989 to 1995, after a period of more congruence. He noted that location, physical structure and social image, often interrelated, mattered for price dispersal. For example, smaller estates built in the 1950s and early 1960s had preserved their value best, and 1980s estates were also not bad in this respect. The worst were the estates of the late 1960s and 1970s, as these are massive high-rise estates in peripheral or environmentally negative locations – a market 'cul-de-sac', caught in a vicious circle of declining market prices and social decline.

Based on these sources, the already good districts appear to have increased their price difference to the already bad districts. Moreover, today the price levels of the housing estates are varied, but typically on the lower side of the market. In ordinal terms, the price relations among these four age and design categories are as follows: 1. 1980s; 2. 1950s; 3. 1960s; 4. 1970s. All these are priced higher than the turn-of-the-century tenement blocks in the inner city, however (see also Egedy, 2000, 2001). A notable new feature is the development of 'residential parks' from 1999 onwards – these are modern, guarded condominium buildings of two to three times higher market price than the average (Kovács and Wiessner, 2004; see also Therborn, 2006).

Overall, the main features of the Budapest housing market can be categorised based on this information about the character and density of the built

Table 3.2 Main product groups in the Budapest owner-occupied housing market

Type of house and environment	Intra-urban situation	Market position	Era of construction
(1) Családi ház (CH): single-family housing.	Mostly along the outer ring of the town.	Including all price categories.	Mostly self-help housing built since WW2 for inmigrating workers as a substitute for housing estates in order to ease the housing shortage; some pre-war villas; new luxurious homes.
(2) Zöldövezeti társasház (ZT, garden city, green city): low density multi-storey housing.	Zugló (and the transitional zone that used to be reserved for industry and public buildings), some neighbourhoods close to the Danube, and most areas in the Buda Hills.	At the higher end of the market.	Mostly built in the 1950s, but also recent developments.
(3) Városi társasház (VT, old urban): high density multi-storey housing.	In the old inner city and its later extensions.	Mostly at the middle and low end of the market, but partly appealing to wealthy gentrifiers.	Pre-war areas, with some recent developments for the upper/middle class.
(4) Lakótelep (L, prefabricated, panel): high-rise blocks of flats.	Mostly in the outer ring, but also in more central locations, where (2) and (3) dominate.	Usually at the middle and low end of the market; depending on the period: 1970s is worst, early 1960s is best, 1980s is also relatively good, but this building type has high running costs.	Built in four different waves from the early 1960s to the late 1980s.

environment (dwelling format, building efficiency and 'general prestige'), typical intra-urban location, price level and social standing, and history, as shown in Table 3.2.

Apart from the more scientific analysis based on physical, socio-economic and price indicators discussed above and to be reported in the next chapters, purely casual observation supports the notion of extreme heterogeneity. Even in the 'worst' districts there are higher priced dwellings than some of the dwelling stock in the 'best' districts (for example, Moscow Square is a bad location, albeit on the Buda side).

According to Kovács (1994), the privatisation of property brought serious problems as the rapid transformation of the economy reshaped the city structure (see also Hegedüs et al., 1996; Kovács, 1997, 1998a,b; Székely, 1998; Kovács and Székely, 2004; Kovács and Wiessner, 2004). At the time, Kovács (1994) wrote of concerns about who would replace the poorer city centre tenants when rents and values escalated, and what the outcome would be. These areas are still the greatest challenge for city policymakers today. Further problems were caused by recent damaging changes to the mortgage system when interest rates almost doubled and other limitations for loans were introduced. As a consequence of the changed circumstances, inequality increased and affordability problems grew worse. Below, a brief description is given of how the Budapest housing market structure became differentiated in the course of the transition.

3.2 Distributional and spatial consequences of the transition

This context has indeed been subject to scrutiny in various studies applying the approach of social area analysis (e.g. Kovács, 1998a,b). Kovács and Székely (2004) and Kovács (1997) argue that Eastern European countries are of general interest due to the dramatic changes made from communist-type welfare systems to a free market system. The allocation principle shifted from merit (agency involved) to market (transaction costs involved). The housing policies implemented in these countries have contributed to the increasing social polarisation of these societies (see also Therborn, 2006).

However, compared to the rest of these countries the private sector has always played a dominant role in the Hungarian urban housing market. The ownership of private property was actually tolerated from 1963 onwards, even in multi-storey housing. Furthermore, the government granted permission for exchanges of the tenancies of state rental housing. In such informal transactions the price of a tenancy was agreed to be half of that of market transactions[7] (see Hegedüs et al., 1994). According to Hegedüs and Tosics (1994), privatisation of state rental was theoretically possible from 1969 onwards, but only from the mid 1980s onwards were regulations lifted and subsidies offered in the form of massive price discounts. Douglas (1997) observed that during the housing privatisation of 1982-1990 state dwellings were sold for 11% of their market value and the regulations on housing market transactions were eased (pp.74-75). According to Hegedüs et al. (1994), in the early 1990s the owner-occupied sector already stood at 50%. In 1997 the share of the three main housing forms was as follows: owner-occupied ca. 87% (and rising); private rental ca. 2% (and declining); public rental 11% and declining – Locsmándi (2004) evaluates that the situation in 2004 is around 7%.

Due to inefficient management and maintenance by the state-owned local management companies (IKVs), the state-owned housing stock deteriorated badly. The case of Budapest highlights the problem of how unlimited privatisation increases the unfavourable tendencies of polarisation and segregation of social groups (Kovács, 1998a).

7 In addition, there was also a cooperative housing form for the workers of a state-owned company.

In the socialist policy housing was proclaimed to be a universal right. When the welfare system collapsed, a 'giveaway' privatisation occurred instead. The upper and lower socio-economic strata privatised most actively; the latter out of fear of rent increases. Subsequently, poor new homeowners were unable to renovate their flats. The better quality flats (albeit not those built in the 1980s) were privatised first (Székely, 1998; see also Kovács and Székely, 2004). Unsurprisingly, the best parts of the city (inner Buda) were clear leaders in the privatisation race (Hegedüs and Tosics, 1994).

Since the late 1990s, affordability problems have been experienced by the vast majority of dwellers, and first-time buyers in particular. Furthermore, a shortage of new housing has occurred as the housing construction volume in Budapest has shrunk. On the other hand, gains from the informal economy were being invested in real estate so that new apartments were of higher quality and larger than existing ones. On the Buda side, 'leapfrog' speculative sites emerged as the result of the soft regulatory discipline of the 1990s. Further observations about the housing market dynamics are an increasing share of single-person households in relation to families, and more expatriates staying for the long term (Kolpron Consultants, 1998).

As a result of the social and economic changes, residential segregation patterns have emerged. Kovács (1998) has noted that during the first five years after privatisation the income inequality increased in Budapest so that approximately one third of the population was living below the poverty line. At the other end of the spectrum lies Buda Hills – the area covering district XII and parts of other Buda side districts with a varied architectural character including 19th century villas and modern single-family homes. This area became the stronghold of the 'new middle class', most of whom made their fortune rapidly after the political changes of 1989 (Kovács, 1994).

Furthermore, the socialist middle class had experienced downward mobility, but in contrast, the very narrow top strata had managed to increase their incomes substantially. Kovács maintains that in Budapest the basic ecological structure coincides with the physical geographic features: high status areas are traditionally situated near the River Danube and in the hilly Buda side in the west and in the centre of the city, with concentrations of low-income households on the outskirts of the city (see Fig. 3.2). The traditional view is that the eastern part (Pest) is bad and the western part (Buda) is good (e.g. Kiss, 2002), and that, after the giveaway privatisation (1990-1994), there were even more pronounced differences between the good and bad areas (cf. Kok and Kovács, 1999).

According to Ruoppila (2004), the legacy of the Budapest housing market has a number of peculiarities, even in relation to other socialist cities. To start with, three phases of inequality each generated its own characteristic residential patterns: (1) the old system, where the high status areas were located in the inner city, and later in the Rózsadomb villa areas and extensions of the

View of Buda from the Castle Hill

Riverfront of inner-city Pest

inner city such as Lipótváros and Lágymányos; (2) the communist system, which first alleviated the old differences through allocation of high-quality existing housing to the upper ranks in society (1950s), then created new differences (1960s), and after that mitigated some of the differences (1970s), and (3) finally, the post-communist/transitional system, with an explicit stimulation of competition and deregulation.[8]

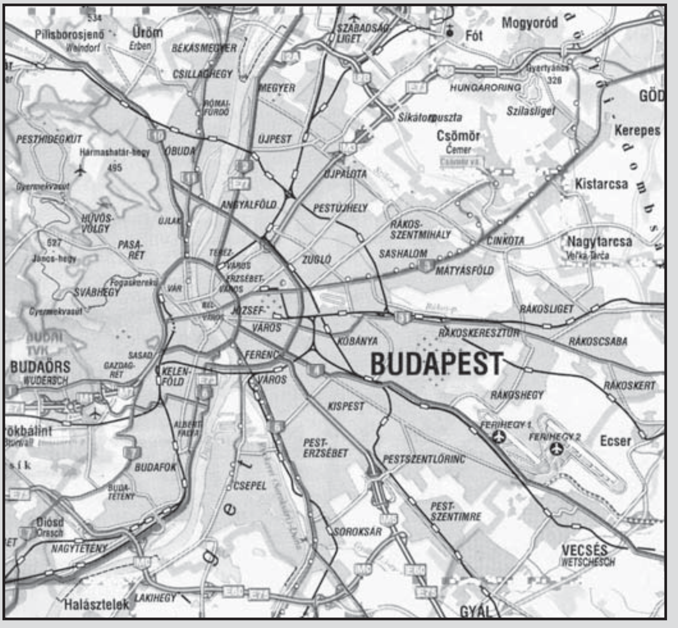
Following Ruoppila (2004), further observations may be noted as follows:

- A large share of old buildings as 74% of the residential building stock in the city had survived bombing in the Second World War.
- A large share of multi-storey buildings; small proportion of single-family homes; terraced housing was almost missing.
- The peculiarity of the Budapest housing markets was that the 37% share of owner-occupied housing included a small second-hand market.[9]
- The large-scale housing estates constructed in the 1960s were for the higher echelons of society and of better quality, whereas those constructed in the

8 Douglas (1997, pp. 205-206) arrived at the same conclusion. There is a history of poor quality housing in Budapest, from the tenement buildings of the early 20th century onwards; since the 1990s privatisation this quality problem has been exacerbated. Thus three stages of housing inequality creation can be distinguished: first, that of the pre-war Budapest; then, the new inequalities created by the social housing system; and finally, the further inequalities which the new market system has created (and continues to create). According to Douglas: “different neighbourhoods within districts will have very different futures”.

9 This was not the case in other socialist countries, and also initially the Hungarian system only allowed one type of private housing development: self-construction of single-family homes (as mentioned above).

Figure 3.2 The city of Budapest and its road network



The Grand Boulevard forms a circle around the city core. The old inner city is in the middle of the map. The Buda hills are on the left, Pest suburbs on the right. In between these areas is the transitional zone including green city areas.

1970s had a welfare aspect and were of poorer quality. After 1983, substantial reductions took place in public housing construction, but private housing construction was not encouraged either.

- In the 1940s-1950s the most prestigious houses and quarters were found in the inner city, in the 1960s in the modern housing estates, in the 1970s-1980s in the new owner-occupied flats and villas in the suburbs.
- Like elsewhere in Eastern Europe, mobility was low compared to Western Europe, and further declined after 1990.

Douglas (1997, p.123) noted that there had always been segregation in Budapest (like in other Eastern European cities); however, the segregation was lesser than in many Western cities. Douglas means that the difference between wealthy and poor households was smaller in the East than the West. This is a general argument based on socio-demographic household characteristics.

Ladányi (1998) painted a rather pessimistic picture: after a period of decreasing segregation, under socialism extremely unfavourable tendencies have begun to grow in recent decades, and the increasing tendencies towards ghettoisation are expected to grow to the point that inner-city Budapest becomes a third world zone, while the government has no resources to counteract these tendencies. However, he was unable to foresee the urban rehabilitation programmes currently underway at present in these inner city areas. In fact, segregation today is not so severe as Ladányi feared.

When observing the present area density and quality levels of the existing dwellings in the old tenement blocks inside and around the Grand Boulevard (see Fig. 3.2), all kinds of densities are associated with high and low quality inside the inner city area of Budapest.[10]

10 For example, low building efficiency along Váci út (district XIII) is associated with poor quality, along Városház utca (V) with average quality, and on the Castle Hill with relatively good quality. For this I am indebted to Gábor Locsmándi's collection of planning-related data from Budapest.

According to Locsmándi (2004), the main spatial characteristics of the Budapest residential patterns are the following (see Fig. 3.2):

- Proximity to the Danube, the main traffic arteries, squares and parks, and in a negative sense, proximity to heavy industry sites, are factors that heavily influence prices and rents.
- Buda is considered more attractive than Pest; within Pest, Zugló (district XIV) is more attractive than the rest of Pest; in general, differences across sectors with boundaries as lines 'radiating' from the city core.
- How many times an area is rebuilt, and in particular whether the new housing is prefabricated or not, as well as the social composition of the tenants living there.

In the most general sense, the spatial structure or functional distribution is modelled as follows, following Bedőcs et al. (2001): I. Inner residential area and CBD; II. Transition zone including the outer residential areas; III. High-prestige green residential areas of Buda Hills; IV. Peripheral districts. Using this categorisation as a basic means of guidance, further observations regarding the urban morphology can be made as follows. The inner city is inhabited by the middle class as well, even if housing is largely of poor quality (Locsmándi, 1996). The transitional zones outside the inner city have added to the spatial patterns of the residential structure. The pattern is not a mirror image on both sides of the Danube, however, primarily because of original differences in topography, and secondarily, because of historical differences: the development of Buda was more complicated than the development of Pest. A further issue is that high-quality residential construction or regeneration pushes away old industry along the Danube to the north (Óbuda, Újlipótváros, Vizafogó and Angyalföld) and south (Kelenföld, Ferencváros, Józsefváros) (cf. Kiss, 2002). Outside these areas – the inner city, the transitional zone and the garden city neighbourhoods – the suburban belt begins. These neighbourhoods are of two main types: prefab housing estates and single-family housing areas.

Thus it may be summarised that the residential areas are structured as three concentric circles comprising the inner city, the garden cities adjacent to and in the middle of the transitional zone, and the suburban belt (see Fig 3.2). On top of this, three notable idiosyncrasies prevail: (1) in the Buda Hills there is no transitional zone, because traditionally these areas were independent villages; (2) Ferencváros has small-scale, gentrified neighbourhoods and is not a substitute to other areas, even in the inner city – perhaps apart from the adjacent Józsefváros in the near future; (3) residential use replaces industry and sprawls along the Danube, thus there is an ongoing trend towards residential (either the outwards-expanding inner city or garden city) development instead of the traditional transitional zone.[11]

Another very general way to look at the Budapest housing market structure is to form a variable based on the dwelling format, building efficiency and 'general prestige'. This is a measure of intra-urban location and density: either single-family or multi-storey dwelling; then within the latter group either low density (high-prestige) or high density (all kinds of prestige); and within this latter group either inner city (all kinds of prestige) or suburban prefab (middle-low prestige). This would comprise the following segments: (1) családi ház (CH): single-family housing including all price categories, mostly along the outer ring of the town; (2) zöldövezeti társasház (ZT, garden city, green city): low density multi-storey housing at the higher end of the market, comprising Zugló, some neighbourhoods along the Danube and most areas in the Buda Hills; (3) városi társasház (VT, old inner city, old urban): high density multi-storey housing, mostly at the middle and low end of the market, but partly attracted by wealthy gentrifiers; (4) lakótelep (L, prefabricated, panel): high-rise blocks of flats in the outer ring, usually at the middle and low end of the market (see Table 3.1).

We may conclude that segregation of social groups existed in Budapest and other socialist cities, and that this was also measurable on the spatial level between areas, nonetheless, this segregation has been growing since 1989. Today a variety of spatial zones, temporal phases and exceptional institutional conditions characterise the idiosyncratic Budapest housing market. Nonetheless, being such a unique case does not deny many of the same basic relationships that are found elsewhere: premiums for low and high density, good traffic connections, and certain neighbourhoods that are very specific and for various historical reasons are considered more attractive than others, even in close geographical proximity. The most attractive housing locations are the modern, garden city type multi-storey areas on the Buda side. The least attractive locations are the turn-of-the-century tenement buildings situated on the outskirts of the neighbourhoods of the inner city. Such complex and evolving residential patterns were partly the result of institutional, and partly economic reasons.

3.3 Housing market processes

As discussed above, policy changes of various kinds have played a crucial role in this housing market context. As with all post-socialist urban housing market contexts, the Budapest housing market is all about change.[12] For example,

11 KSH conducted some research into housing markets and merged districts into four zones, one of which was the 'elite' inner city area comprising district V and the Buda Hills; another was the intermediate zone, and one was the outskirts (Székely, interview).

12 Ott (1990) for example concludes that this category of cities have some general "lasting spatial effects of transition", namely the 1990s increased suburbanisation trend, together with some attempts to revitalise the inner city areas, and anticipations about substantially higher impediments for market processes than in Western Europe.

the change in the most common type of newly constructed dwelling has proceeded stepwise from state and individual housing, to centralised state provision, and then to private construction (Locsmándi et al., 1993, p.12). At least three waves characterise this evolution:

1. The mixed economy period: the increasing market orientation that began in the late 1970s. The past system of the 1960s and early 1970s was characterised by the existing pre-war and early post-war city structure; construction of prefabricated (i.e. panel) housing estates; and self-help single-family homes to meet the demand of in-migrating workers from the countryside (cf. Kok and Kovács, 1999).
2. The transitional period: the fundamental changes of the 1980s, such as mass privatisation, the construction of high-quality single-family homes for the affluent new suburbanites, and the plans for urban renewal of the inner city. The transitional system from the late 1970s to the early 1990s may be characterised by an informal market of owner-occupied and state-owned rental apartments; and the last programmes of construction of prefab estates. During the transitional period, the owner-occupied sector comprised two segments: informal, self-built housing (the prevailing form of single-family housing, see above), and formal, privatised property (the new form of housing). The rental sector, in turn, was partly composed by the latter, private rental market (very marginal share), and the remaining traditional, informal, state-owned rental housing sector, where tenants had certain ownership-like rights. However, the share of the state-owned housing was vanishing rapidly because almost no new social housing was built immediately after the transition (Douglas, 1997, p.202).
3. Present: the anticipated trends of a future system, where the privatisation is completed, and optimistic views are presented following Hungary's accession to the EU in the spring of 2004. The current system of the 1990s and early 2000s may be characterised by the absence of social housing programmes; instead, a new system of housing subsidies was launched in the year 2000; piecemeal redevelopment of inner city sites; and luxurious housing construction in certain locations for the most affluent buyers. In the future system it is predicted that middle-class buyers, too, will be targeted for high quality houses or apartments. Continuing the urban renewal further will be increasingly difficult due to predominantly private ownership and other factors; a small amount of new public rental housing construction is anticipated.

A short account of planning-related processes is given in Appendix 3. Below, the relevant market processes are explained with regard to the recent trends and spatial features.

Migration

Soóki-Tóth et al. (1999) and Soóki-Tóth (2002) observed that until the 1980s a population increase occurred in the city when populations moved from the small towns and the countryside. From the 1980s onwards the tide turned: a population decrease took place in the city as the population moved from the city to the conglomeration and the suburbs. In other words, since the early 1980s the city has had a negative migration balance.

According to Kovács (2004):

- The city of Budapest suffers from a loss of population, partly because of natural reasons common to the country as a whole, but also because of out-migration to the surrounding areas.
- Vacancy rates are high in Budapest due to functional conversion of dwellings into offices.

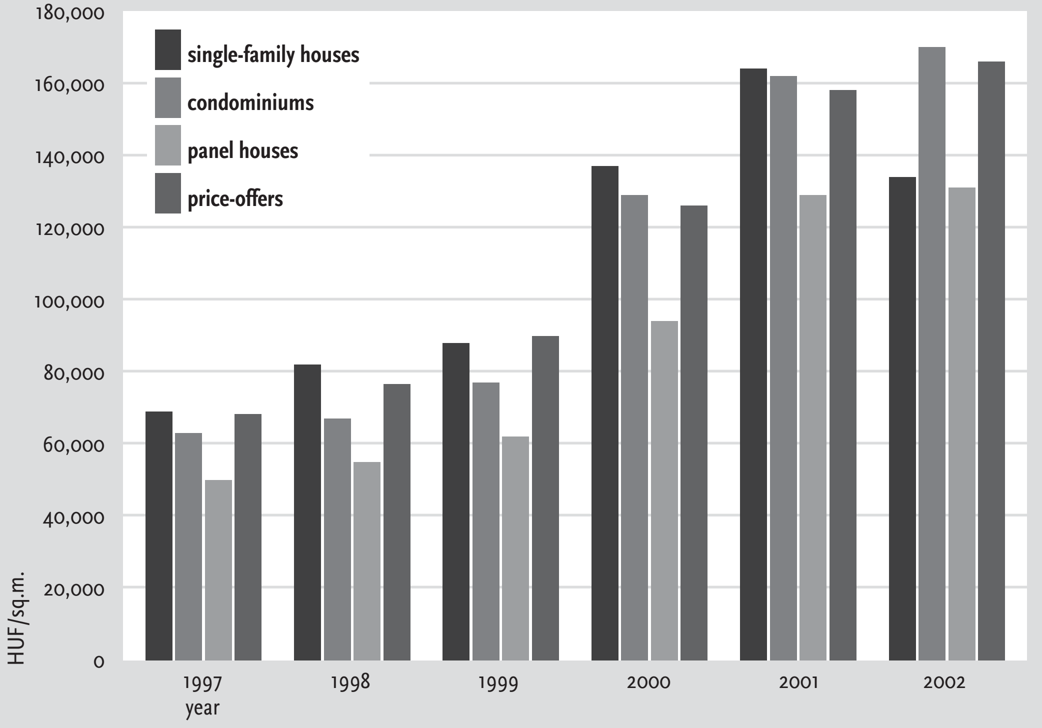
Demand for existing dwellings

When mortgage conditions changed in 2003-2004, housing market activity also lost viability. However, when looking at the demand distribution broken down by size and price categories for new dwellings, the difference in demand between the situations before and after the change is seen on the Pest side only, where only the demand for smaller and cheaper dwellings increased, whereas the demand for larger and more expensive dwellings slowed down. Buda was unaffected, with demand for larger and more expensive dwellings than for those situated in Pest, where the investment was affected by the changes. This is because Buda is traditionally more prestigious than Pest and the demand structure is not dependent on the mortgage system. In Pest the environment also decreased in significance compared to number of rooms and transport connections, which are usually seen as more basic housing attributes (Dávid Valkó, discussion and descriptive statistics by Otthon Center). Thus there was no difference between Buda and Pest in the target of investment during the favourable mortgage system, but after its abolition, and when at the same time other conditions for borrowing worsened significantly, the effect was that the situations are now different.

The increased demand for smaller dwellings is to some extent confirmed by summary statistics of the acquired dataset over the city as a whole (Ingatlanadattár CD, compiled by the Central Statistical Office, KSH).[13] As shown in Figure 3.3, the square metre prices of condominium dwellings in 2002 exceeded the prices of single-family homes, when the case from 1997 to 2001 had been the opposite: single-family homes being more expensive in square metre terms. The condominiums are typically smaller than single-family houses,

13 Note that on a city level the stock of Pest is larger than that of Buda, and therefore market changes in Pest have a greater weight in the aggregated statistics than the stock of Buda.

Figure 3.3 House prices in Budapest by year and house type, and price offers



and the smaller the dwelling, the higher the price per square metre. Furthermore, since the 1990s couples who are at the beginning of their housing careers often demand small old dwellings at the middle of the price continuum (Földi, interview).

Development of sales prices and price offers

Fig. 3.3 shows the trends of average price levels for Budapest during an observed six-year period of data collection from 1997-2002 (KSH, 2003). The price increase was steady for condos and panels as well as price offers, but for single-family houses the prices rose only until 2001; as already noted, in 2002 the prices of condos exceeded the prices of single-family houses. The biggest increase in price was between the third and fourth year (1999-2000) for all categories.

New construction

Sóki-Tóth (2002) observed that new construction is favoured over constructing in existing buildings. New-build dwellings have on average less floor space than existing ones and the figure has decreased each year (a drop from $100m^2$ to $93m^2$ since 1999); on the other hand, new housing is of a smaller size but better quality than the existing housing stock (cf. KSH, 2004). According to Sóki-Tóth (2002), due to problems in attracting investment, excessive construction costs and low affordability, the volume of new housing construction is lagging behind Western European levels, although the worst drop in levels is still over. On the other hand, on the Buda side there are plenty of feasible opportunities for the high-income groups (luxury and upper-middle class locations), which is reflected also in the pace of development of the traditionally less prestigious Buda districts III and XI, which are becoming part of the same market as I, II and XII.

Micro-level market dynamics
In the future there is a lesser role for macro-location due to regional policies, but more of an emphasis on micro-locational differentiation, according to Kovács. Therefore, the market dynamics and socio-demographic characteristics are also relevant to look at in a more spatial and disaggregated manner. The first relation to note is that prices of newly constructed dwellings are lower in Pest than in Buda. On the Pest side the highest output of construction and sale was in districts IX (Ferencváros) and XIV (Zugló). On the Buda side, this was in districts II (Rózsadomb and neighbouring areas) and XII (the Buda Hills), and there are expectations that this will spill over to the adjoining districts III (Óbuda) and XI (Kelenföld), as developers will increasingly look for more reasonably priced alternatives in these districts. In 1997 the costs for land and new housing construction were still so high that new houses could only be marketed towards the highest income groups. The prediction was however that as the demand of these groups was satisfied, and as the demand was growing among the upper middle class, the developers were to change their strategy.

Sóóki-Tóth and Gerőházi (2000) compared the marketability prospects of two Buda side districts, XI and III. They found that district XI has better status and bigger price differences across dwellings, as low density here means single-family homes. District III in turn has the better quality of building, more families without children, older people, higher average prices, and more ‘entrepreneurial’ households; low density here means small condominium buildings. According to the findings, in district III single-family and multi-storey dwellings in garden city surroundings were substitutes, whereas in district XI they were not. Moreover, in both districts people expressed their intentions to stay on the Buda side. People were satisfied with what they possessed, except for the price and the quality of construction. People wanted green and peaceful environments plus a well-designed layout in their flat. On the other hand Bedőcs and Sóóki-Tóth (2000) concluded that district III is extremely heterogeneous as it comprises all kinds of areas: inner city, (traditional or luxurious) garden city, single-family, prefab and industrial.

This example shows the similarities and differences between two Buda side districts with seemingly similar morphology: district III may be divided into three submarkets based on house type, as multi-storey garden city and single-family housing comprise one and the same segment; in district XI, however, this is not the case, and four submarkets exist. The similarity is the affinity to remain on this side of the river, satisfaction with dwelling and dissatisfaction with certain price and quality characteristics.

This comparison is indicative of substantial intra-city differences in housing market activity. For example, the annual turnover (i.e. the sales volume per total housing stock) is highest in the Pest inner city districts VI (Terézváros) and VII (Erzsébetváros) at 6.3%, and lowest in the peripheral southern Pest side district XXIII (Soroksár) at 0.5%. This is a more than twelve-fold difference, and measured on a very coarse spatial district level! The districts selected for case study are in-between areas in this respect: in district IX (Ferencváros) this figure is 4.2% and in district VIII (Józsefváros) 3.2%.

3.4 Urban renewal areas of districts IX and VIII

The qualitative investigation on districts IX and VIII pertains to one urban renewal area in each (see Fig. 3.4):

- Ferencváros (IX) is considered a 1980s and early 1990s success story, and
- Józsefváros (VIII) where projects commenced only recently, from the late 1990s onwards, and the results are still speculative.

Both areas have undergone dynamic market and institutionally embedded processes in the recent past (cf. Kiss, 2002). While the two areas under study, middle Ferencváros and middle Józsefváros, are adjacent and share the same history of lower-class neighbourhood image and, more recently, anti-privatisation municipal housing policy, the differences between them today are large.[14]

The rehabilitated part of district IX

According to Locsmándi (interview), middle Ferencváros represents a unique environment, with closed courtyards dating back to the 19th century. The courtyards block out the noise of the inner city. Furthermore, to prohibit unwanted entry the residents have in some cases blocked the pedestrian walk within the courtyard by erecting fences. In other environments the idea was to create a transferable building design. For these planners the post-modern district IX design is ‘old-fashioned’ (Locsmándi, discussion).

For middle Ferencváros, some figures illustrate the starting point of the rehabilitation project (1980 data): the building density was 0.95m² gross floor space/site-m² (cf. highest figures in Budapest were 4.5); the residential density meas-

14 Inner Józsefváros (also known as the Palace Quarters) and Inner Ferencváros were at the end of the 19th century inhabited by aristocrats, who had gardens. Hence, this part was an upmarket area already at that time, in sharp contrast to the case study areas situated in the outer part of the inner city.

Figure 3.4 Üllői út – one of the main arteries of Budapest leading from the centre towards the airport and south-east of the country. The area north and northeast of it is district VIII; the area south and southwest of it is district IX

ured on average 20.8 net m²/ inhabitant (cf. Budapest average was ca. 23, with variation of 10-30 across the whole city); flats with bathroom 43%; average size of flats 44.5m²; active population with academic degrees 8.5%; untrained blue-collar workers: ca. 25%. The share of industrial areas in district IX was more than one quarter, when the same figure for district XIII (Újlipótváros), which is also a traditional industrial zone, was only one fifth (Kiss, 2002). As these figures show, the area was disadvantaged but built with low density in relative terms at the start of the rehabilitation project, and a social and physical upgrading was the goal.

When the completed dwellings in district IX were sold for the owner-occupied market, the profits enabled the local government to collect their finances by selling their building land to private construction companies (see Locsmándi, 1996).

The programme of the middle part of district IX (Ferencváros) is considered "the greatest success story of the urban renewal process in Budapest". In 15 years nearly 1,400 new homes were built, 40 condominium houses were renovated and 800 homes were demolished; 900 municipality homes were also renovated. Furthermore, the resulting land use was multi-functional. For instance, a park was developed in the place of a complete building block. The area comprised a well-balanced mix of 3-4 storey buildings, which is unusual for the city as a whole. Old designs were either demolished or made anew, or new buildings were fitted in within the block so that the original design or character was restored at large. All this created a peaceful atmosphere.

The rehabilitation of district IX began in the mid 1980s. Today the private/ public investment ratio in the area is already 5/1, which is considered a clear sign of marketability and attractiveness potential. This success has partly to do with favourable physical circumstances. Egedy (2004) notes that in Ferencváros the share of dwellings with a bathroom and three or more rooms has been raised. Furthermore, the population has become more homogeneous as new, better-off residents have moved in. The key to success was the establishment of the SEM IX joint stock company based on the French model (municipality has 51% share), with the task of selling construction-ready plots to builders. Houses of artistic value were kept while the others were demolished; some municipal housing tenants were permitted to return. This had positive and negative outcomes. The project is ongoing and will last until at least 2018.

According to Locsmándi, the planners were taken by surprise when the 'heretic' plan was approved. The main reasons for a smooth procedure were that the calculated ratio between demolished and newly built dwellings was the lowest in the city, and because there were no privately owned dwellings in this area that would have entailed troublesome eminent domain processes.

Middle Ferencváros was originally developed on arable land parcels. As the long parcels were cut into two by a street, the plot boundaries continued on both sides of the street in a parallel pattern. Today this pattern is a defining physical feature, as can be observed from the map shown in Fig. 3.4. Further outwards, public buildings were built. The area was subdivided into smaller parts and the private investor accepted that some investments were in public areas and that there were buildings that required demolition and works that had to be carried out. When the first dwellings were completed in 1992, it provided by far the best quality housing in the whole of Pest, and a unique niche market with small-scale, 'neo-traditional' housing blocks with closed gardens for the higher urban middle class population, without substitutability with any other location in Budapest.

Szabó (interview) points out that the pace of change is quick in the district IX urban renewal area; the new building sites are being privatised and built towards the south-eastern edge of middle Ferencváros (cf. Kiss, 2002). The strategy of the developer Quadrat is not to build rental flats but simply to reinvest the income from the sold dwellings into new construction. On the other hand, the main idea of the district council was that, by selling construction-ready plots for building, it could at least recoup enough income for renewal of new homes, allocation of the displaced residents of the old stock, and provision of infrastructure. Nevertheless, the construction company was totally private.[15] Since 1992, the price increase in selling prices of newly built flats was only corrected for inflation between 1993 and 2000 – yet it seems extraordinarily steep, as the following figures show (Locsmándi, 2001):

- 1993 50,000 HUF/m^2
- 1994 90,000 HUF/m^2
- 1997 120,000-130,000 HUF/m^2[(16]
- 2000 195,000 HUF/m^2
- 2004 ca. 300,000 HUF/m^2[(17]

15 There are still some public low-rent buildings, which are a different matter altogether; however, these too can in principle be privatised in the near future.

16 This figure is obtained from ECORYS Hungary, formerly known as Kolpron Budapest.

Hence an almost four-fold price increase (+300% change) in the first eight years and a six-fold price increase (+500%) during the observed twelve-year period!

Finally, some criticism has been levied towards the full benefits of the rehabilitated part of Ferencváros. According to Soóki-Tóth (interview), three kinds of problems put the future of the area's development in doubt: first, the rehabilitation of certain buildings with low density that were in extremely inferior condition was economically inefficient; second, traffic congestion, lack of parking space and pedestrian streets, and in general the traffic arrangements are poor; third, the social aspect, as the area renewal was essentially a government-subsidised gentrification.[18]

The rehabilitated part of district VIII

The programme for the middle part of the adjacent 8th district (Józsefváros) is considered a less promising venture. It indeed represents a great challenge, as the substandard buildings are extremely dilapidated, and the density is loose due to the high number of vacant and single-storey houses.

The urban renewal of Budapest actually started in the middle part of district VIII in the late 1970s. However, unlike the case of district IX, both economic and aesthetic problems emerged: too many buildings were to be demolished in relation to the ones to be retained, and new buildings could not be fitted to the old ones. The project did not, therefore, move beyond the planning stage.

The strategic development plan for Józsefváros (15-year district development strategy, Józsefváros 15 éves kerületfejlesztési stratégia) partitions the whole district into 11 quarters, six of which are in the middle Józsefváros area. In this district the municipality rehabilitation and land holding company Rév8 sold all its land shares in 2003 to Corvin Rt., a privately owned development company founded for this purpose. Here a 'sense of community' will be utilised. The majority of dwellings are still owned by the district authority (municipality), which does however have very limited resources at its disposal (Egedy, 2004).

In Józsefváros, the renewal area is divided into two action zones: one area will be completely demolished (slum clearance) and the sites sold to private investors. The rehabilitation of the other area will then be financed mainly from this income in a step-by-step process so that the original tenants and

17 This is an estimate, given by Locsmándi (interview).

18 This is exactly the type of unjust "design-led approach to promote 'livability' and recapturing middle-class households" that Atkinson (2004) fears is the case with Britain's Urban Renaissance. For the American experience, in turn, gentrification may not be a problem as the displacement of disadvantaged residents is relatively minor (see Freeman and Braconi, 2004, on New York City).

Table 3.3 The common characteristics of each area

Location	Image, dominant ethnic group
(1)	Favourable
(2)	Potential for upgrading
(3)	Unfavourable; Chinese
(4)	Unfavourable; Romas
(5)	Unfavourable; Romas
(6)	Unfavourable; Romas
(7)	Favourable

homeowners will remain in the buildings. In district VIII, too, the majority of the flats were to remain in public ownership during the renewal process. If the project development manages to impose a quality control, in two to three years the quality of this housing is expected to reach the same level of quality as neighbouring middle Ferencváros, so as to form part of the same market (segment) that is different from the rest of the city (and different from the rest of inner-city Pest). There are however worries as the renewal process started too late. The idea was to sell a huge area to a private investor with a contract (instead of subdividing it into smaller parts as with middle Ferencváros), where the share of responsibilities was not good. Consequently, investors stepped back. Another problem was that during the delay Roma inhabitants moved in with a rental contract, and the district was unable to evict them. All in all, the view held by Locsmándi is that, in district VIII, too much was decided by the district council, so it will take some time to reach similar quality results as those of district IX.

Whereas the middle part of district IX is casually observed as a relatively homogeneous and small area, the contrast with the adjacent area is huge. The middle part of district VIII is composed of at least seven distinguishable areas, as follows (see Table 3.3):

1. Centre of Józsefváros[19]; the best part, but also a very old part (mid-18th century buildings). Horváth Mihály Square is an organic centre, which is exceptional on the Pest side neighbourhoods. Apart from that, another feature that contributes to the relatively good quality of the location is the presence of public buildings, for example the most prestigious high school in Hungary.
2. The quarters between Horváth Mihály Square and Üllői road; part was destined for radical redevelopment, because no renewal operations were made. Then planned to be rebuilt and gradually transformed. A square-like street may be built from Corvin Point outwards, which may improve the image of this area to the level of that of Ferencváros. Along Üllői road new buildings were built after 1965.
3. The new housing area across Baross Street, on the two sides of Szigony Street. An unattractive street, popular among the Chinese. Some early 1980s (10-storey) and 1970s (12-16 storey) housing blocks.

19 The differences in definition between the middle and the centre of this district has to be noted: the former means the wide area situated in between the inner and the outer parts of this district; the latter means the historic core of the district, which also constitutes the centre of the middle part. None of the other Pest inner city districts has an organic centre in the similar sense (i.e. being separate from the downtown).

4. A mixed area in the eastern corner, with narrow courtyards around Diószeghy and Illés Streets, around Kálvária Square. The bordering Orczy Gardens and ELTE university buildings were used for gardening; later military and hospital use. These areas however do not increase the attractiveness of the area.
5. The low-status area between Tavaszmező and Népszínház Streets. When moving outwards, there are more and more Romas.
6. Népszínház Street in itself; the inner part is a high-rise area and a concentration of the more well-off Romas – my own observation is that it is not such an unpleasant area after all.
7. The area around Köztársaság Square is in comparison a better part of the case study area.

The worst areas are situated in the ghetto of Orczy (location 4) and Magdolna (between locations 4 and 7), but the best locations in this area have already begun redevelopment (Sárkány, interview). New housing development has begun in the Csarnok quarter around Déri M. Street (location 5) and the Corvin ar-

The streetscape at location 4 in middle Józsefváros

The streetscape between locations 4 and 7 in middle Józsefváros ea (location 2) in middle Józsefváros. In the Népszínház quarter (locations 6 and 7) there are no empty spaces, therefore only little rehabilitation is possible. In the Szigony quarter (location 3) there is very little potential for such, but it is done nevertheless.

A common feature of both areas is that, at the time of construction, no dwellings were permitted on the ground floor according to a city-wide regulation. Consequently, architects created this floor space for retail use in these areas. However, one ought to consider the historic heterogeneity of the housing stock in the middle part of district VIII.[20] The centre of the area was initially developed in the early 19th century, whereas nearby locations had to wait until the 1940s before being developed.

Market implications of urban renewal in the two areas

On a general level, the street- and district-wise aggregated dataset (KSH) tells us that, for panel buildings, the prices in district VIII exceed those of the adjacent district IX, but that for condominiums (VT in Table 3.1), prices in district IX far exceed those in district VIII. The latter house type comprises the majority of the dwelling stock.

When looking at the determinants of prices, changes in two fundamental variables are of interest here: land ownership patterns during development and the effective land use regulations.

1. Land ownership: from the 1980s onwards the land was state-owned but managed by the district councils, until in the 1990s the land was given to the local governments in stocks. The strategy was to sell the land to private developers (and in district IX also to builders) for profit. The Housing Act of 1993 further accelerated this development in the ownership. A small portion of social housing remained in public ownership.
2. Land use: the block structure was fundamentally different in the areas, which has to do with the past. In district IX the share of agriculture was always lower than in district VIII, and as a consequence it was the working-class residents who were subject to the conversion in district IX. In district IX three types of policy were implemented:
   1. To keep the existing block, but refurbish the apartments and the facades, and landscape the area within the block.
   2. To demolish and build (or leave open, as was the case with the block which was converted to a park) in accordance with rather decorative 'post-modern' design principles.
   3. To construct completely new buildings and fill in the vacant space within the blocks.

20 Traditionally, in district VIII there were stalls for horses and more small-scale private land use structure within the blocks.

The potential problem with this market segment (i.e. middle Ferencváros potentially together with its counterpart, middle Józsefváros) is that in the future the prices will go up because of scarcity; the reason is that the proportion of the urban middle class is growing in Hungary and this kind of renewal cannot be done anywhere else other than in districts VIII and IX, because the privatisation process was blocked in these two districts alone. Anywhere else in urban Budapest radical reorganisation of the stock would be impossible because the areas are too dense and there are too many owners.

To underline some general similarities and differences between middle Ferencváros and middle Józsefváros, the two urban renewal areas are adjacent, and share the same history of lower-class neighbourhood image and, more recently, anti-privatisation municipal housing policy.[21] Yet the differences between them today are like that of night and day. The former is considered a success story. The latter faced and still faces four kinds of problems – external as well as internal:

1. The area is originally (but no longer, as concluded in Chapter 5) much more heterogeneous and much bigger than neighbouring middle Ferencváros.
2. Regeneration began only recently, and since the consensus of the eighties and early nineties transition period the times have changed so that the economic and political preconditions have become unfavourable.
3. The public sector is not a 'welcome' nor trusted party in partnerships at the moment, yet it ought to be involved in urban development projects on moral and rational grounds, which causes tensions.
4. The image of the area is most unfavourable, although it is anticipated to change eventually, as was pointed out in the previous two chapters.

3.5 Preconditions for statistical research

As a case study, Budapest has its benefits and drawbacks: the time period required to monitor socio-spatial changes does not have to be very long because, as shown above, the tide of change is intense and fast: on the other hand, the data infrastructure and research culture is still underdeveloped (compared for example with Helsinki and Amsterdam, from where the author has earlier experiences). In Budapest, socio-economic and environmental data aggregated on a district level is easily available, but the same data aggregated on a smaller census district (i.e. neighbourhood) level is more difficult to acquire due to the underdeveloped system of data management and lack of motivation for widespread or standardised data collection. A relatively

21 For a more thorough description of the social, ethnic and housing quality aspects in this part of the town, see Kovács (1998a, pp.72-78).

small sample of data was used compared to earlier analyses of Helsinki (two cross sections: 18,000 and 19,000 observations) and Amsterdam (a panel set of 46,000 observations) reported in Kauko (2005b).

According to Locsmándi (2004), in Budapest some aspects of this research have been covered in early studies. Tosics, Hegedüs and Ekler (1980) in particular carried out a socio-ecological analysis of housing quality and neighbourhood characteristics in Budapest using maps and census data from 1970. After this work was criticised by Ladányi for lacking in detail, a follow-up was carried out by Locsmándi (1989) in an attempt to classify the residential environments of the city for urban regeneration purposes. In these works the indicators of the housing stock and environment were aggregated on the smallest possible level: districts based on the four-digit zip code. On this detailed level the reliability of the data is considered to be of a substantially higher quality (as it is raw data collected by researchers) than that aggregated on a grainier (district) level – such data is however not as easily accessible as the readily made statistics prepared for year book use.

For the analyses reported next an individual level dataset of 215 mortgage valuations from Budapest including basic house descriptor variables and time of sale was acquired courtesy of ECORYS Hungary (formerly known as Kolpron Budapest). The small data size in the first study poses limitations for the modelling, because we cannot generalise for all nodes in the SOM output (according to rule of thumb, twenty observations per node-with-neighbourhood is required), and there is not enough data to split the set into a test sample, which is often recommended. (This is not a completely representative sample of Budapest, however; it covers largely a middle and upper-middle market range.) However, this data is of good quality and it contains a sufficient variation.

In order to increase the validity of the results, another larger but poorer dataset was also used. This was a more generally available dataset of aggregated transaction prices (the Ingatlanadattár CD) based on the stamp duty calculations of the National Statistical Office of Hungary (KSH). From this nationwide database more than 2000 recorded observations fall within the boundaries of the 23 districts of Budapest (in the year 2002). The amounts recorded are the average price of the street, and the same figures disaggregated for three different house types: single-family, condominium and panel, and the price offers for the street on average. There are also another five variables for the volume of recorded transactions per street for each of these variables. Both datasets were eventually linked to district-wise aggregated indicators compiled from the statistical yearbook (KSH, 2002).

Székely (interview) clarified that, due to problems with access, costs and publicity, data is unreliable everywhere, for example, the net household average incomes reported are very low: 112,000 HUF/year would be an impossibility. However, this problem is lesser for the social indicators than for macro indicators. The KSH database (Ingatlanadattár) is also considered poor – it is nevertheless the best there is available for the time being. In the future there are expected to be better spatial datasets as the National Housing and Building Office (OLÉH) is showing strong support. Some private actors already have good collections of prices for certain areas and for certain submarkets.

The discussion in this chapter showed that the Budapest housing market is very fragmented with respect to location; several different house types, age categories and price levels, as well as micro-locations, are to be found side by side. It is an extremely patchy and multi-faceted setting; the next question is how to approach such a complex and fragmented objective. The overall idea of the documentation in this chapter is that running the data with the proposed neural network classifier together with supporting methods based on expert interviews and more qualitative case studies will shed some light on the degree to which the market is affected by physical and socio-demographic characteristics, price and regulation. As explained above, two datasets on Budapest with different levels of aggregation are employed, and expert interviews and more qualitative material is provided to complement this.

4 Classification of the Budapest housing market structure

4.1 Classification using individual data

Data issues

As explained above, the data comprise mortgage valuations between May 2001 and January 2002: in total, 215 transactions with dwelling variables and coarse locational identification (district and street). This is obviously a small set by Western standards, but a reasonable one in this context for the reasons mentioned above. As for the measurements of each dimension all neurocomputing requires numerical values that indicate at least ordinal relations between items. The description of the variables is as follows:

1. Market value (total price in HUFm): 2.0-85.4 (EUR8,000-345,000)
2. Collateral value (total price in HUFm): 1.1-69.2
3. Age of building (years): 0-300
4. Dwelling format and density: single-family/multi-storey (two values: 50 and 400)
5. Dwelling format, density and general prestige: 1.CH, 2.ZT, 3.VT, 4.L (four values: 100, 200, 300 and 400)
6. Size (m²): 24-369
7. Inflation effect (time of sale): 11/5/2001-31/1/2002

label 1 district 1..23
label 2 street

This set is conveniently linked with district level data from the statistical yearbook of KSH (2002). From this source eleven variables were added as follows:

8. Park area per capita, m²: 0-39
9. Retail shops (N): 349-2,702
10. Change in dwelling stock: (built - ceased)/stock in district (1/1000s): –0.84 -+13.96
11. Population per km²: 510-29,724
12. Resident population per 100 dwellings: 149-277
13. Population 0-18 years/total district population: 0.121-0.216
14. Population <60 years/total district population: 0.16-0.34
15. Migration within the city/total district population: –0.01-+0.01
16. Active enterprises (N): 1,937-21,749
17. Mean sales price, 1000 HUF/m²: 101-262
18. Dwelling transactions/stock: 0.01-0.06.

An examination of the dataset tells us that the most expensive areas are the single-family areas in district II, both measured by market value and collateral value; the cheapest areas are also single-family areas: in district XVIII measured in market value, and in district XV measured in collateral value – in both cases the cheapest dwellings are in relatively old buildings.

The SOM analysis

As already explained, the main idea of the SOM is a compression of the dimensions in such a way that the topology across the dataset is retained. This occurs through a transformation into a matrix of neurons (nodes), the number and shape of which is pre-specified by the analyst. This makes the SOM a feasible tool for exploring complex datasets. Explained briefly, each observation is 'won' by one of the neurons (nodes) of the map – the one it resembles most, when the measure of similarity is the Euclidean distance between the vectors of observation and neuron in an n-dimensional space (see Deboeck and Kohonen, 1998; Kauko et al., 2002). In this application of the SOM, the original dimensions are transformed into a matrix with two dimensions together with the numerical values of each node – the third dimension (see Appendix 1). In this way, the SOM generated a landscape of the Budapest housing market structure based on the 215 observations assembled by ECORYS and the 2400 observations defined based on the Ingatlanadattár database respectively. (The first of these exercises will be reported below, and the second will be reported in Section 4.2.)

The SOM was run using the following parameters: seven input variables; the map size is defined by the dimensions x (horizontal) 12 nodes, and y (vertical) 8 nodes (thus 12 x 8 = 96 nodes); the shape of the lattice is defined as having a hexagonal topology; the neighbourhood function is of the 'bubble' type, where only the nearest nodes (i.e. the neighbourhood) have an impact on the outcome and this neighbourhood decreases so that in the end it only comprises seven nodes: the node itself together with its immediate neighbours; the running length (i.e. the number of iterations of the whole training sample) is 4,800 for the initial run and 48,000 for the fine-tuning run; the area affected by the training, the learning rate (alpha), is 0.05 at the initial stage and 0.02 at the fine-tuning stage; and the initial radius of the area affected part of the map 10 (initial) and 3 (fine-tuning). Moreover, transformation into roughly equal field ranges is recommended for the neural network processing in order to avoid producing maps where one dimension would dominate others with regard to the organisation of the map.

The output of the processing, the map, comprises N-layers. Each input variable corresponds with a map layer. For the interpretation of the results the important property of the SOM is that the position of the nodes is fixed across all map layers. This enables visual analysis of the map, layer by layer, and within one layer, across the nodes that produce the most interesting patterns from the point of view of looking at potentially overlapping effects and contextual relations between the input variables. The output matrix demonstrates similarities and differences between typical cases: the closer two nodes are to each other, the more they share similarities in variable levels. The other information concerns the intensities of the variables across the nodes. As demonstrated below, the most convenient way of interpreting the differences in variable levels across the map surface is to use greyscale definitions for relative intensities: dark colour represents low values and light colour high values for any given map layer.

To reiterate the interpretation of the map, the nodes represent characteristic combinations of attribute levels and their intensity with respect to the map layer under investigation visualised in greyscale. As for the spatiality of the Kohonen Map, the issue is to use location as an identification label – regardless of whether any locational variables were fed into the system for the computations. Whether that is spatial enough really is a matter of definition. As housing market segments can be both aspatial and spatial, the same applies for the SOM output, which means that the logic of the segments formed on the map are also valid depictions of the real segments.

The appendices 1A, 1B and 1C illustrate the outcome of three different SOM runs graphically. For each layer, the nodes are illustrated as circles of different shading: dark shades represent low values and light shades high values for that particular indicator. The text or code inside the node is a label for enabling identification of the node in question based on the location or other relevant information of the dataset. Furthermore, the nearness of any two nodes indicates a similarity in terms of one or more of the input dimensions.

In two different runs two different maps were generated using the dataset labelled by two kinds of locational identification: one based on the district (model 1, with labels ker1-23, see Appendix 1A) and the other based on street name (model 2, with ca. 200 labels, see Appendix 1B). The two maps are not identical with respect to the typical values of the neurons, but they are similar in qualitative terms: the visual patterns are the same in both feature maps. In order to clarify how the map should be interpreted, the map in Appendix 1A serves here as an example. The position of the upper left corner neuron is defined as (0,0) and labelled based on observations representing district III. We also see that this district label appears in several other neurons, which indicates a relative heterogeneity in the type of dwellings (as measured through levels of the seven input variables) in this district. The nodes (3,1) and (2,2) are more similar to (0,0) than is (9,0), because they are situated closer to it. The fourth neuron left from the bottom right corner (8,7), which is also labelled based on this district, is completely different to the other cases although representing the same, district-specific class of observations. Suppose we now want to know in what sense the neurons are similar or different? Then we need to look at the intensities of all seven layers and see how the property data varies across these nodes.

When we look at the structure of the data, layer by layer, and observe the labels based on location (street and district), we note the following:

- Only high price (i.e. value) levels are found in the Buda districts I (Vár – the Castle District – and Víziváros on the river), II Rózsadomb (under communist times the most prestigious area), and the Pest district XVIII (Pestszentlőrinc or St. Laurenz single-family area).[22] Both high and low price levels are found in neurons labelled after Buda districts III, XI and XII, and the upgraded Pest district IX (Ferencváros). The Pest side inner city district VI is represented by two relatively different neurons in terms of value levels.

- The old age of the building is shown in the upper-middle cluster of neurons with light shading (these also happen to be cheaper areas as can be seen when comparing layers): districts I, II, V, VI, VII, VIII, IX and XIX in particular. In district VIII two neurons indicate a very old stock. The new stock is seen in the corners and on the right side of the map (partly expensive areas); partly the same districts as the ones with old stock (incl. VIII and IX).
- Dwelling format in the sense of density (two values): single-family dominance on the left side of the map: districts III, XVI, XXIII, XVII (five neurons with this label!), XX, XIV, X, II, XXII, XII, XV and XI. The rest is multi-storey (but no multi-storey housing shows up in districts XV, XVI, XVII and XXIII.
- Dwelling format in the sense of prestige and density together (four values): the single-family suburban area covers the left side of the map (and logically overlaps with the two-valued format indicator above). The suburbs with predominantly housing estate character are captured on the right side of the map: districts XI, XXI, IX, XIV, XIII, XIX, IV and X. In between these blocks of neurons are the neurons with dominant urban inner city and garden city area character: in the middle of the map, and partly indistinguishable from each other. The upper-middle part neurons are more of inner city character: districts VIII, VI, VII, XIII, V, IX and I (to some extent also XI). The rest of this middle block of neurons then are more of garden city character (slightly darker shade and districts further off the centre): these are labelled by districts II, XXII, XX, XVIII, XI, III, XIX, XII, X and XIV. We knew beforehand that the new multi-storey housing areas on the slopes of the Buda Hills (in districts II, III, XI and XII) comprise the single most common type of expensive locations in the city. Appendix 1A now shows that when comparing the map layers for (market or collateral) value, (four-valued) format and building age, these cases are identified as neurons in the lower middle part of the map (districts XI and II), and in the middle-right side of the map (districts III, XI and XII).
- Size matters, but to a lesser extent than the indicators above: based on the labels captured by the map, large houses are found in the lower left corner in particular: in districts II, XI, XV, XVII, and to a lesser extent in districts III, XVI, XXIII. Small houses in turn are found elsewhere on the map, and on

22 This observation is idiosyncratic, and does not lend support from any aggregated datasets: Pestszentlőrinc, close to the Ferihegy airport, is in fact a relatively cheap area. A closer examination of the other map layers reveals that this case represents new, relatively small multi-storey homes in a garden city environment, which then explains this finding well.

the right side in particular.

- Time of sale matters to a small extent for the structuring of the map: the most recent sales are found on the upper side, and also more of them on the right side, the most recent sales being labelled by districts XXI, XI and III. The sales from the summer of 2001 are found on the lower side, with more on the left side of the map as well.

We see that all twenty-three Budapest districts are represented (i.e. these labels show up on the map, see Appendix 1A). The problem with this labelling is that most districts are very large areas and contain locations and housing stock of very different character.

The problem with the streetwise labelling is that the same street may cut through two or more districts, or there may be several streets with the same name (e.g. Nádor u. and Baross u.) in districts with completely different characters. For the streetwise labelling the situation is as follows (see Appendix 1B):

- The most expensive streets are found on the Buda side and comprise new buildings (in districts II, III, XI and XII).
- Old buildings are found in the lower middle cluster with the labels for Andrássy út (district VI), Szilágyi D. tér (I), Szondi u. (VI), Murányi u. (VII), Thököly út (VII), Üllői út (IX/VIII), Haller u. (IX), Budaörsi út (XI), Budafoki út (XI), Szív u. (VI), Kiss József u. (VIII), and Ezüsthegy u. (III). Some of these streets are situated in the inner city and others in the northern and southern suburbs of Buda.
- For the two-valued dwelling format, the left side captures one third of the structure with single-family character; the multi-storey housing comprises two thirds of the structure, and includes the streets with the old buildings above (except Ezüsthegy u., which has single-family character).
- For the four-valued format, the urban inner city neurons are most of the old buildings above. The upper-right side of the map is covered by neurons labelled as low priced housing estates, such as Hatház u. (X), Páskomliget u. (XV; this district is however single-family based) and Igmándi u. (XI).
- Size is not a sharp discriminant in this feature map either: the neurons indicating large houses are situated more on the left side, and these are single-family and new units, labelled after addresses on Panoráma u. (XXII), Klapka György u. (XV; this fits well with the findings of the map shown in Appendix 1A), Csarnóta u. (XVIII; this appears to be a rather mixed district), Zsolt Fejedelem u. (II, Ófalu in the northern part of the Buda Hills), Kolozsvári u. (III, Csillaghegy), and Csermák Antal u. (III, Mocsáros). These are all suburban locations.
- Because of the short time period of the dataset, inflation is not an important discriminant: the neurons indicating the latest sales are situated partly in the lower left corner and partly on the right side, for example in the streets Páskomliget u., Böszörményi út (XII), Tátra u. (XIII) and Szüret u. (XI;

this supports the findings of Appendix 1A with respect to the same layer).

An interesting finding was that some of the locations in district XI (southern and central Buda) show a spread between market and collateral values: these are Brassó út, a very long and winding street in the neighbourhood of Sashegy in model 1, and Bánhida utca in Kelenvölgy as well as Szüret utca in Gellérthegy in model 2 show rates of 23% to 27% difference between these two price estimates. This may be due to the fact that this district contains a wide range of locations: both prefab (i.e. panel) housing estates and the up-market Gellért Hill, which can make in-between locations notably risky cases if considered for investment. The situation is much the same in district VIII, where one quarter of the neurons that indicate old stock and low collateral values show a relatively high market value.

While distinct clusters were found on the two feature maps above, nothing comprehensive can yet be said about the specific dimensions of segmentation. Thus, we ought to look for clusters of homogeneous areas that are different to other clusters in terms of the input variables. This is never a straightforward task based on the visual analysis of the maps alone, and with this dataset it is especially difficult, because, as the analysis above demonstrated, almost all districts represent more than one different type of house with surroundings.

The LVQ analysis

The next procedure was to determine the relative strength of each feature for classification, with a special focus on the locational factors: Buda or Pest, central or peripheral districts/streets, or other meaningful criteria. Formally, the basis for this evaluation is obtained by computing a classification accuracy for the data with the LVQ. As explained in Chapter 2, this technique is an extension of the SOM, where the input and output vectors are approximated as classes based on the identification labels, and compared for all observations in the samples. Where the SOM helped us determine where the clusters are, and what seem to be the differences between them, this technique tests for these potential reasons for the suspected differences. The same input variables and other labelling criteria make convenient dimensions for the LVQ testing too.

The classification accuracy figures reported in Table 4.1 are calculated based on the percentage of correctly classified observations, when the input and the output of the SOM are compared with regard to the variable levels (codebook vectors) and classification labels over the whole sample. Each observation has an n-dimensional codebook vector and a predefined label. The same is the case with each node in the map. The meaning of the labels can thus be traced back to the input data. If the codebook vector of an observation is similar enough to the codebook vectors of a node with the same label, and different enough from the codebook vectors of the nodes with different labels, the

Table 4.1 The classification accuracy of the Budapest housing market structure using the LVQ and 215 observations

Buda or Pest, 2 labels	82.33%
Buda, Inner city Pest or suburban Pest, 3 labels	78.14%
Market value: < or ≥200,000 HUF/sq.m., 2 labels	90.23%
Market value: < 150,000 ≥150<250,000 or ≥ 250,000 HUF/sq.m. (1,000 Euros), 3 labels	78.14%
Market value: < 150,000, ≥150<250,000, ≥250<350,000 or ≥ 350,000 HUF/sq.m., 4 labels	77.21%
Collateral value: < or ≥160,000 HUF/sq.m., 2 labels	93.49%
Collateral value: < 135,000, ≥135<225,000 or ≥ 225,000 HUF/sq.m., 3 labels	79.07%
Age of the building: 0-34 years or > 34 years, 2 labels	95.81%
Age of the building: 0-20 years, 21-61 years or >61 years, 3 labels	85.12%
Format: single-family house or multi-storey building, 2 labels	100.00%
Prestige and format: single-family and garden city or old urban city and prefab housing estates, 2 labels	95.35%
Prestige and format: single-family, garden city and old urban city or prefab housing estates, 3 labels	99.53%
Prestige and format: single-family, garden city, old urban city or prefab housing estates, 4 labels	94.88%
Size: < 80 sq.m. or ≥ 80 s.qm., 2 labels	88.37%
Size: < 49 sq.m, 50-149 sqm or ≥ 150 sq.m., 3 labels	81.86%
A posteriori clustering based on house type (single-family/multi-storey) and size roughly +/- 100 sq.m., 2 labels	100.00%
Kerület, 23 labels	44.19%
Age of the building, 23 labels	55.35%
Size 23 labels	48.84%
Collateral value, 23 labels	49.77%

classification is successful and obtains the rate of 100%. However, if an observation with a label A in terms of codebook vector most resembles a node labelled B, the classification is failed (0%). When this is computed over all observations in the sample the total accuracy is obtained as in Table 4.1. Based on the intrinsic properties of the method it is expected that using a smaller number of classes obtains a better accuracy. Here the classification is performed for 2, 3, 4 and 23 label solutions. Optimally, this procedure should be run out with a set-aside sample, but here the small data size did not allow such a split into separate samples for training and testing.

In this case, the classes used were district and convenient (as objective as possible) approximations of the variable field ranges. As shown in Table 4.1, of the a priori selected labels the house type (two labels), the prestige of the stock (the two label classification of house type), and the age (two to four labels) generated the best results in terms of classification accuracy. Furthermore, the a posteriori classification, which indicated an interaction effect dummy indicator of two labels: small multi-storey and large single-family dwellings – thus an interaction between size and type of house – also generated a high accuracy result.

Overall, the most important a priori selected discriminant of the dataset is the format as indicated by the 100% accuracy. This means that all input labelled ‘single-family’ correspond with nodes also labelled ‘single-family’, and all input labelled ‘multi-storey’ correspond with nodes also labelled ‘multi-storey’. However, in some cases the single-family and garden city types are substitutes (for example, in district III, as already noted), as seen from the high accuracy obtained with a two-label solution of prestige and format (also density) together. It is even more remarkable to find that the three-label solution between single-family, garden city and other (higher density) types obtains a better accuracy than the two-label solution. Thus, it is more meaningful to discriminate the data structure using the extra information about density and prestige (see earlier explanation of this indicator in Section 3.2) than merely using the division between 'low density high prestige' and 'high density low prestige' areas.

The results show that the other important discriminants of the dataset are the age of the building, collateral value and market value, and size of the house (floor space). For the solutions with two, three and twenty-three labels the result of the classification accuracy in terms of order among these criteria is the same: the age obtains the best result; then (either market or collateral) value and size; whereas location performs worst. While the value and size indicators give roughly equal accuracies, the collateral value gives slightly better accuracy than the market value label.

Finally, and perhaps most importantly, the results confirm what could already be suspected based on the visual analysis: that district location is not an important discriminant of the dataset.

The new analysis with eleven district variables added (making a total of 18 variables) did not add new information, at least not any evidence in favour of a segmentation based on district location. Rather, the opposite happened: when these variables were added, the previous results which had been relatively logical and supported the initial knowledge of the context were distorted. The most important (and not illogical) of the findings are listed as follows (three of the map layers are shown in Appendix 1C):

- The market value is not a strong discriminant, which can be seen from the organisation of the map as the whole data structure is evenly mixed in relation to the price classes:
  - two mutually different clusters with higher priced neurons only, including one cluster with three neurons; four mutually different clusters with lower priced neurons only; one cluster with both high and low priced neurons (the largest cluster); two neurons on completely different sides of the map are labelled after the eleventh district;
  - the highest prices are found for the neuron labelled after district II; relatively high prices are found for the neurons labelled after districts VIII, IX, XI (the one on the lower side of the map), and XVIII; relatively low prices are in turn found for the neurons labelled after districts XI (the one on the upper side of the map), XII (this is a surprise, but also with only individual data cheap cases were found in the twelfth district – a symbol of affluence and luxury), and XVII (a peripheral area with poor transport connections).

- The change in the dwelling stock:
  - Most in district VIII;
  - Least in district I.
- The population per km²:
  - Most in districts VIII and XI (upper side of the map, which was also low-priced);
  - Least in district I.

In order to save space, the remaining 15 map layers are not shown. To briefly report the findings:

- The collateral value shows much similar organisation and clustering as the market value; however, the associations between the two price indicators differ remarkably: now the highest priced neurons are labelled after districts XII and III, whereas the lowest priced neurons are labelled after districts VIII (old buildings, as seen from the analysis with individual level data too) and XVIII (another peripheral and poorly connected area).
- Age is also not important; the cluster with the three neurons (VIII, XVIII, XI/lower) with high market value are also 'old'; oldest areas have low collateral values; only in district II is there a full overlap with the analysis with individual variables.
- The format is also not important; there are most single-family dwellings in districts XI (both types), XVII and XVIII; most multi-storey dwellings in districts VIII, IX, XII and XIV; the clustering related to the four valued format (prestige and density) indicator is very invalid (whereas the original analysis with the individual data generated a reasonably valid clustering).
- Size and time are also not important; no large houses are identifiable on the labelled neurons; most recent sales are old single-family houses with high market value but low collateral value.
- Park coverage is also not an important feature overall, and there is almost no relation to market or collateral value (the exceptions: district XIV includes the city park and has high value; district VIII has very few parks and has low value).
- The other eight indicators did not bring up any important additional information.

A number of interim conclusions can now be made. First, incorporating the district level indicators has distorted the 'original' picture of the SOM analysis based on individual data only. Consequently, there is also less correspondence between 'reality' and the six house attributes than in the original analysis including only individual level variables. Secondly, it is not possible to identify any location-based, smooth dispersion and clustering in the 'fill' of the map, but rather a sharp on/off effect. Thus only a small fraction of the neurons actually 'win' observations. Getting such uninformative maps is always a disappointment when running the SOM. Thirdly, there are no discriminating features across the eighteen variables. The eleven district-specific indicators simply depict too different dimensions to be able to produce visible compound effects across one or more map layers. That no such 'boundaries' emerge implies that the importance of the house (including the building and its immediate surroundings) over the district location prevails. Fourthly, the relations across neurons and map layers can be partially linked with reality (if not to the input variables) after this analysis too. However, the many 'new features', i.e. patterns that indicate combined effects across the input variables, cannot be fully defined based on the available input data and domain expertise. The interpretation of such manifestations on the map is too difficult given this output.

4.2 Classification using aggregated data

Data issues

The analysis reported above demonstrated how almost all districts represent more than one different type of house with surroundings.[23] Related to this finding, the results also suggested that the type, age and size of the house and its immediate vicinity matter more than the location per se. From this it could then be concluded that there is no notable association between price level and district location. However, the dataset used in the previous exercise was too scarce to treat this as a definite conclusion. Therefore, a new SOM and LVQ analysis was performed using the larger sample mentioned in Section 3.5.

The new analysis with the SOM and the LVQ was carried out using a transaction price dataset based on the stamp duty calculations of KSH (Ingatlanadattár CD, 2003). From this national database 2,087 recorded observations fall within the boundaries of the 23 districts of Budapest (in 2002). The distribution of observations per district is listed in Table 4.2.

Here the transaction price and the seller's price offer is aggregated by street and Budapest districts, wherever at least tree transactions per street have occurred during one year. The five recorded variables related to price are the average price per street, this figure disaggregated for three different house types: single-family, condominium and panel (i.e. prefab housing estate), and the price offers for the street on average. There are also another five variables for the number of recorded transactions per street for each of these variables. These variables are used as proxies for the market situation for a given street (and year, in Section 5).

23 Claims of many areas being homogeneous enough in this respect cannot be supported when using the larger dataset for the SOM analysis. As can be seen from the discussion below, only districts XXIII and XXI may be sufficiently homogeneous.

Table 4.2 Districts of observation according to SOM/LVQ analysis based on stamp duty calculations of KSH

I	64
II	162
III	143
IV	122
V	81
VI	57
VII	65
VIII	96
IX	69
X	88
XI	170
XII	139
XIII	122
XIV	173
XV	82
XVI	85
XVII	38
XVIII	70
XIX	69
XX	77
XXI	63
XXII	42
XXIII	10
Budapest	2,087

The variables are different to those of the previous study: the age and size variables are missing, but price offers are included. The data is aggregated on street level, and is probably less reliable than the dataset of individual mortgage valuations used in the previous analysis. The benefit of the new dataset is nonetheless that it allows for relating the offered prices with actual prices, and also observing the price variables alongside the trading frequency measured as the volume of turnover for the street. The fact that it also allows disaggregation of the actual prices and volumes by three main house types: the single-family, the condominium (i.e. the inner city and the garden city types in the first study) and the panel type, also has to be considered a strength.

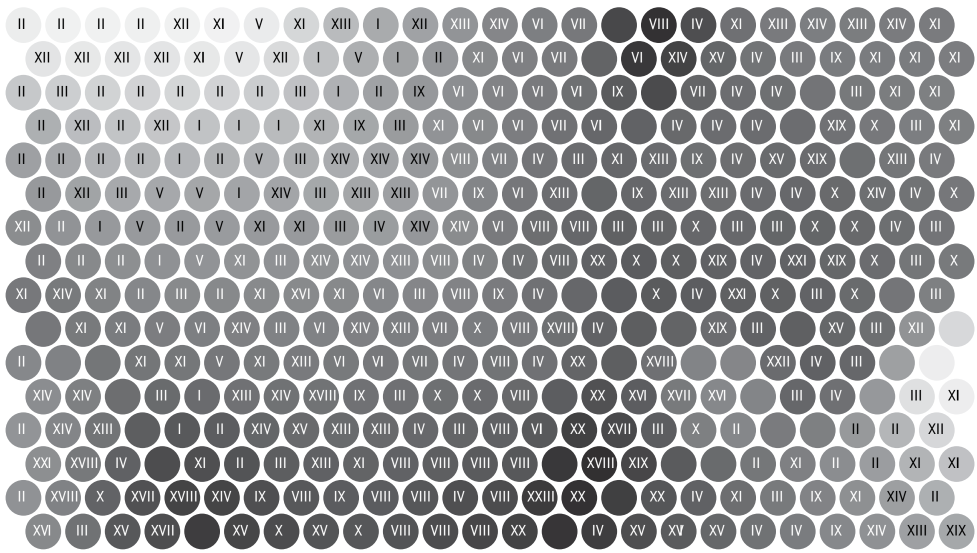
The data is recorded for the year 2002. The data comprises prices and volumes aggregated as means and sums per street, per district. The prices are recorded per square metre instead of by total selling price, as perhaps is more common in this kind of analysis. (As seen in the description of the individual dataset in Section 4.1, the variations in square metres of floor space are large, and as this dataset does not record size at all, this is the only sensible solution.) The following street level variables were used:

1. Mean price of all dwelling sales: 0-473,000 HUF/m² (0-1,900 EUR/m²)
2. Volume of all dwelling sales: 3-193
3. Weighted mean of price offers during the first and second half of the year: 0-355,000 HUF/m²
4. Volume of price offers during the year: 0-625
5. Mean price of single-family houses: 0-372,000 HUF/m²
6. Volume of single-family house sales: 0-176
7. Mean price of condominium dwellings: 0-473,000 HUF/m²
8. Volume of condominium dwelling sales: 0-179
9. Mean prices of panel dwellings: 0-224,000 HUF/m²
10. Volume of panel dwelling sales: 0-176.

This set is conveniently linked with district level data from the statistical yearbook of KSH (2002). The district level data is the same as in the previous study. From this source eleven variables were added as follows:

11. Park area per capita, m²: 0-39
12. Retail shops (N): 349-2,702
13. Change in dwelling stock: (built - ceased)/stock in district (1/1000s): –0.84 -+13.96

Figure 4.1 Feature map layer of run 2 indicating the dwelling price level for total house prices per streets: the lighter the shade, the larger the value



dark = low price; light = high price

14. Population per km²: 510-29,724
15. Resident population per 100 dwellings: 149-277
16. Population 0-18 years/total district population: 0.121-0.216
17. Population <60 years/total district population: 0.16-0.34
18. Migration within the city/total district population: –0.01-+0.01
19. Active enterprises (N): 1,937-21,749
20. Mean sales price, 1000 HUF/m²: 101-262
21. Dwelling transactions/stock: 0.01-0.06.

The SOM analysis

Also before this analysis the reported field ranges were adjusted as roughly equal so that no variable would dominate the organisation of the map too much. In order to see how the outcome is affected by including additional input data, the exploration was carried out in three stages as follows: run 1. with only variables 1 to 4; run 2. with variables 1 to 10 included; run 3. with all 21 variables included. This strategy of stepwise analysis was also applied in the analysis reported in Section 4.1. The question is now: do the location-specific identification labels change when new information is accumulated into the system? The map size was selected as 24 x 16 and kept constant in all runs.

Much similar results were obtained as with the smaller sample: the distribution of district labels is mixed across the map. Both market situation and dwelling format indicators were the more substantial determinants of prices and segments based on the visual interpretation of the feature maps, when the output using grey levels shows the variation in the numeric values of the neurons across the whole feature map, and for one input dimension at a time.

Table 4.3 Result of the classification accuracy for Budapest

No. of labels and criterion	Labelling criterion	Classification accuracy
stage 1: 2xprice + 2xvol. = 4 variables		
3	Average sales price per street (uniform ranges)	96.70%
3	Sales price divided by offer price, measure of market tightness (uniform ranges)	93.82%
3	The share of condominium sales in all sales (also single-family and panel houses sales)	83.52%
4	Macro-location: Buda, inner Pest, outer Pest	66.81%
36	Market tightness	63.98%
36	Price	58.29%
23	District	35.54%
stage 2: 5xprice + 5xvol. = 10 variables		
36	Price	59.87%
36	Market tightness	59.48%
23	District	36.78%
stage 3: 5xprice + 5xvol. + 11 distr. vars. = 21 variables		
23	District	25.14%

One selected map layer of run 2 is shown in Figure 4.1 (in order to save space, the other map layers of any of the three runs are not displayed here, but these are obtainable from the author by request).

Runs 1 and 2 showed logical results, whereas the extra variables incorporated into run 3 much distorted the picture, just like in the previous analysis based on individual data (see Section 4.1). It can be seen from the map layer and run depicted in Figure 4.1 that the district labels of the most expensive neurons are not very informative as they are scattered all over the structure. It is clear that the other factors, namely price, volume, house type and street matter for the organisation of the map, and thus for the housing market segmentation. The conclusions about a modest role of district location in this respect can be maintained after this analysis too. The street level was more important than the district location, as it pertains to a more immediate scale of location.

The LVQ analysis

The next stage was to compute a classification accuracy for the data with the LVQ. In this case, the classes used were district, whether the case is a market hotspot or bargain (sales price divided by offer price), price/m^2, and the volume of condominium sales in relation to all sales.[24] The results of the classification are shown in Table 4.3.

Two conclusions can be drawn from the table: (1) in neither the four nor ten variable model is district location important in comparison with price or market tightness, or the dominating house type in the four variable model; (2) the result worsens when variables are added. On the basis of these results it can

24 When assigning the classes it should be noted that, within this dataset, there are no single-family sales in about 95% of the streets and no panel house sales in about 90% of the streets.

be confirmed that including district variables leads to less valid results than using only streetwise aggregated market and house type indicators (sales price, market tightness and share of condominium dwellings).

4.3 Conclusions of the classification

The rough classification of housing and location bundles together with price estimation on the overall city level was based on the visual interpretation of the SOM output, and further classification was conducted with the LVQ. Based on the evidence of the analysis with the individual dataset, the most attractive housing locations are the modern, garden city type multi-storey areas on the Buda side. Furthermore, many districts have very mixed housing stock in terms of value, type and age, and others involve a notable spread between the low collateral value in relation to the market value. The most important criteria for segmentation are house type, together with building age, size and (collateral) property value. However, adding eleven district variables only distorted the picture, which suggests that location is not an important feature of housing market structure, when measured on a spatial level as coarse as the district.

The subsequent evidence obtained with the street- and district-wise aggregated dataset of Budapest also showed that the dimensions of housing market segmentation are very nuanced and do not correspond to districts. This analysis showed further evidence about the balance between physical and socio-demographic characteristics, price and regulation that affect the local housing market.

When relating these findings to what we knew beforehand (see Chapter 3), some plausible explanations of the patterns found may be sought. Two conclusions can be made, firstly about what affects the segmentation, and secondly about what affects the house price (or more exactly, property value) levels. For the first conclusion, the pattern in relation to price and quality on the micro-locational level is mosaic-like; not just in the poorer area (as suggested by Ladányi, 1989) but in the whole city's housing market there is substantial heterogeneity. The house type, age, price and size of the house and its immediate vicinity really matter more than the location per se. Most (if not all) of the Budapest districts contain dwellings and housing micro-locations of all possible types.

From this observation the second conclusion can be made: there is no notable association between price level and district location. House prices depend to a much larger extent on all the characteristics mentioned above than on the district in question. Even the worst districts possess some relatively attractive places, and also some expensive small dwellings in modern/modernised, non-panel buildings; likewise, even the best districts possess dwellings that are typically cheap because of one reason or another.

5 Analysis of the dynamics of two selected neighbourhoods

5.1 Data, setup and expectations

The analysis reported in the previous chapter pertains to the city as a whole. Within the general features of the Budapest planning and development context, the next task is to ascertain certain local processes and key relationships involving market and land use regulation of various sorts. The analysis is therefore deepened by focusing on a smaller area within the broader Budapest housing market, where the processes evolving are put under scrutiny. In this chapter the analysis is zoomed in to involve the dynamics of two selected inner city neighbourhoods: the middle (i.e. the outskirts of the inner city and transition zone) areas of districts VIII (Józsefváros) and IX (Ferencváros). As described in Section 3.4, these areas in the south-eastern part of the inner city have both received attention as subjects for substantial rehabilitation in recent decades. The two districts are adjacent but different: the former is stigmatised in all discourse although it comprises a great variety of micro-locations and also housing stock; the latter district in turn is perceived as a more homogeneous, partly gentrified area and undoubtedly the most dynamic neighbourhood in the city with the best quality apartments on the Pest side.

The aim here is to see how physical and socio-demographic features as well as price levels overlap, particularly in the context of urban regeneration. This applies for a selected sector 'slice' of the inner city area. Here, outliers and idiosyncrasies will not be overlooked, and as much spatial detail as possible is included. The analysis is reported for a subset comprising the two target areas, for each cross section from 1997 to 2002, using the method of 'time windows' developed by Carlson (1998). According to Carlson (1998), only by organising the data from a real world perspective can we understand the market behaviour. Here the challenge is to incorporate the dynamic dimension. If time is one variable among others, then the rigid map cannot adapt new observations. Carlson, however, proposes two solutions to this problem:

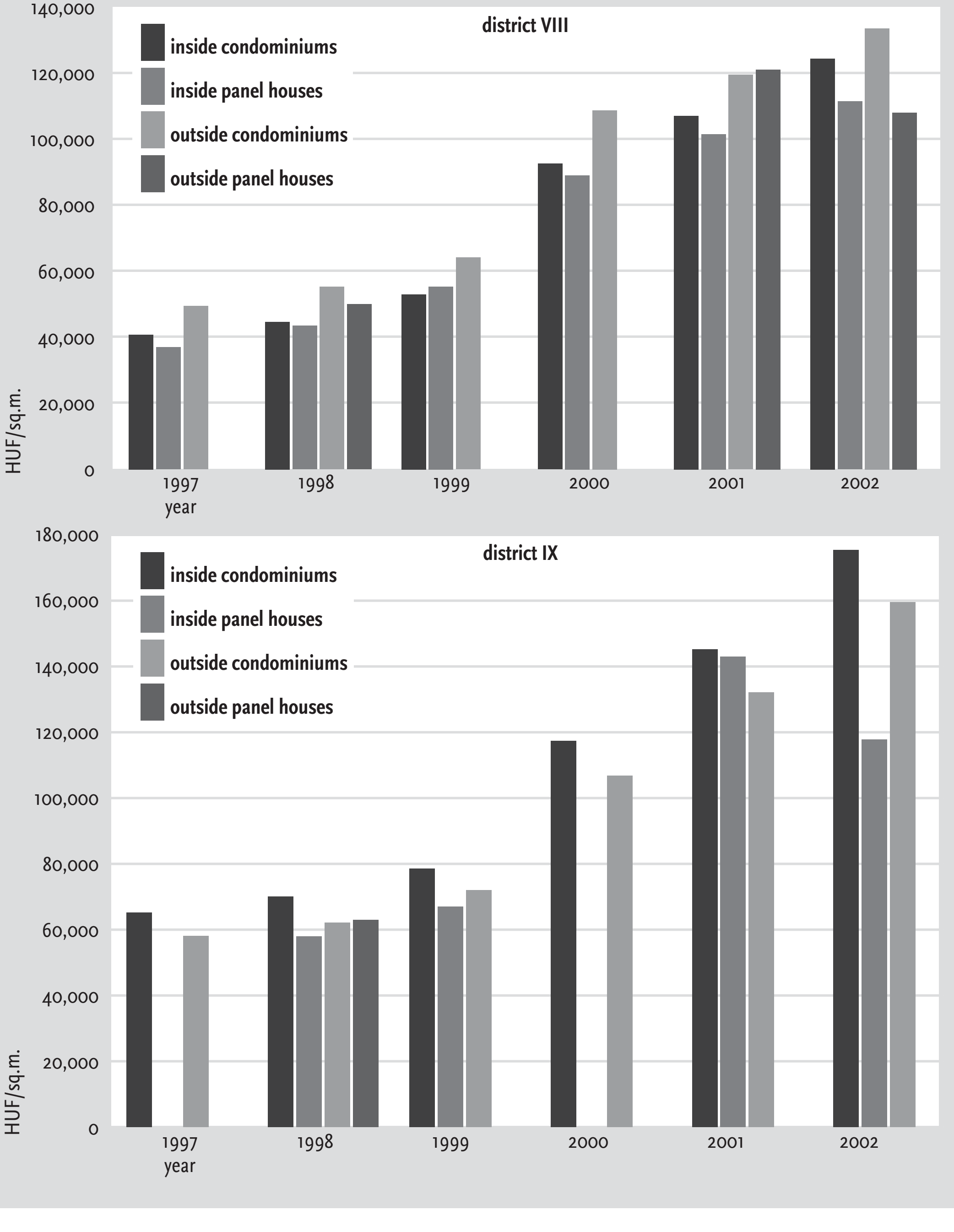
- solution 1: using fixed time windows, without time of sale as a variable; this way, structural changes and price changes are seen; thus the price of the 'portfolio' is computed using successive maps/time windows (this is the research strategy applied in this chapter);
- solution 2: to detect market changes, each new observation is compared with the values of the best-matching neuron in the existing map, thereby enabling monitoring up- and down-signals of the market (an alternative strategy).

The analysis reported in Chapter 4 demonstrated how there is no notable association between price level and district location. This finding about heterogeneous districts in terms of housing market structure provides the background hypothesis for the dynamic analysis of the targeted neighbourhoods that follows: it may be expected that adding the temporal dimension shows an even greater heterogeneity in the various spatial housing market patterns.

Here, the idea was to run cross sections for each year from 1997 to 2002, and from the resulting feature maps identify changes in both the price trend and structures that affect the property value (fundamentals). The task was to model two neighbourhoods of Budapest with respect to the same street-level indicators as above, but this time for the six cross sections. The aim was to take a closer look at the market dynamics when looking at house prices, sales, sales offers and the share of each house type: condominium and panel. With the SOM it is possible to identify which typical observations – here labelled based on the location – have undergone a change in dominating house type (condominiums or panel) on one hand, and a change in market situation (increases in price level, sales volume and also in the level and volume of price offers) on the other. When this outcome is related to what we already know about the two target areas, it may be possible to see whether an increase in prices is caused by fundamental improvements in the current quality of the dwellings or the vicinity (i.e. fundamental price determinants), or by expectations about the future evolution of the markets and the quality in the neighbourhood (Huston et al., 2005). Thus, two findings are expected to be revealed with regard to the market dynamics: one, the component of fundamental improvement in current quality for district IX; and two, the expectation-based future price evolution component for district VIII (which, given Ladányi's predictions discussed in Chapter 3, could be a negative component). It has to be noted that all the levels refer to relative levels compared to the locations outside the middle parts of each district. This kind of split of the housing market activity into two components is non-standard in traditional urban/housing economic modelling of residential location.

With the basis in the analysis of the total Budapest market above, six of the ten variables, aggregated on the street level, are used as input: price level and volumes of transactions for condominium and prefabricated dwelling types, and two similar variables for price offers: the weighted average for the year and the number of offers. These indicators are expected to have some interpretations when relating them with the development of the two different areas as already explained in Section 3.4. The middle part of district IX has undergone rapid and fundamental upgrading and consolidation since the 1980s. The first new dwellings were completed in the early 1990s, and these dwellings and their vicinity represented very high quality. The set of development projects is still going strong; private investment flows into the area, which is far from completed. One would therefore expect the quality increase to be captured fully by the modelling of the time period 1997 to 2002, and possibly, at least for the latter cross sections, also a more speculative component of price could be ascertained. The middle part of district VIII in turn has not seen (yet, at the time of writing) any fundamental changes, so in this case it is expected that any positive price changes have to do with expectations

Figure 5.1 Price increases in the target areas of districts VIII and IX



about the market potential and future quality improvements. However, here the price and quality changes may also be expected to be negative, such is the stigma of this part of the inner city. Furthermore, the dataset includes a share of observations outside these neighbourhoods but still within districts IX and

VIII. These are used as counterfactual cases; in other words, comparable locations to determine the spatial extent to which these changes are manifested, and also whether market changes have in fact occurred regardless of any urban regeneration measures.

Before reporting the SOM analysis, the key features of the local housing market dynamics must be noted. The graphs depicted in Figure 5.1 show the nominal price increase in each of the districts, disaggregated for two house types (panel and condominium), and for two spatial categories (inside or outside the middle part of each district). When looking at the condominium prices inside the target area, it can be noted that the change in price from 1997 to 2002 has been substantially greater in district VIII (more than three times increase) than in district IX (roughly two and a half times increase) although in the former area the project had not even begun during this period. Furthermore, it can be noted that the difference in price between areas inside and outside the target areas is substantially larger in district VIII (the prices outside are on balance higher than the prices inside the target areas of this district) than in district IX (the prices outside are lower than the prices inside) during this period. (More or less the same applies for the volume of sales although this is not shown here.) We cannot make definite conclusions for panel houses as the amount of these observations is insufficient in district IX.

Based on this data it can be concluded that, while actual levels are still somewhat behind those of district IX, price development has accelerated suddenly in the target area of district VIII. Furthermore, for the years 2000 to 2002 the presumably dilapidated condominium house type had higher mean prices than the more modern panel type, and within the condominium segment (2002), the stigmatised inside of the target area in district VIII had only marginally lower mean prices than the more neutral and in some cases even prestigious locations outside the target area. Already based on these descriptive statistics it can be concluded that the price development of condominiums has experienced a substantial increase in the target area of district VIII.[25] The next modelling exercise concerns the idea of comparing different results based on successive cross sections – this is referred to as 'quasi-dynamics'.

25 When pointing this out to Csilla Sárkány, a professional of the municipal development corporation, she confirms the trend and explains that the reasons for this relatively strong acceleration of the price development in the target area of district VIII is completely due to speculation; because of the policy of the district strategy investors started to believe in the potential of the area (Dávid Valkó of Otthon Centrum agrees). Discussion with Judit Székely from the Hungarian Statistical Office confirms this state of affairs. However, she points out that this dataset tells us nothing about the size of the apartment; thus it is plausible that here is a systematic effect, if the dwellings that are sold later are smaller than the ones being sold earlier, which would be an additional reason for the high price increase. Unfortunately, we cannot say anything definitive based on the available information.

5.2 The 'quasi-dynamic' results and their interpretation

The outputs of the SOM analysis may be displayed in various ways. One option is to visualise the Euclidian distances in the input dimensions between reference vectors of neighbouring map units using grey levels (Kohonen et al., 1996a). This is in a sense a measure of homogeneity of certain subsets within the total data structure, but only with respect to the combination of input variables: in this case prices and price offers, volumes and dominant house types (condominium or panel). The darker shade indicates a close proximity between the observations for that part of the data structure, whereas the lighter the shade, the greater the difference between typical observation categories. These are here approximated through the location and classified into four spatially contiguous areas: either in or outside the targeted areas (labels in/out), and either one of the administrative districts (labels VIII/IX).

The resulting six feature maps are discussed below, one by one (see Figures 5.2-5.7). These graphs show how the housing market composition of the neighbourhood (or to be more exact, the node representing similar observations approximated with a label related to the four neighbourhood classes above) has changed in terms of the input variables used: either (1) various quality and functional indicators, or (2) the property value level only. For each feature map, two map layers are depicted: first, for the typical situation in relation to the renewal area and district in terms of homogeneity of the data structure as explained above[26], and below that, for the map layers for price per m^2 for condominiums, using the same visualisation procedure as with Appendices 1A-1C and Figure 4.1 earlier. The labelling is the same as in Chapter 4, and a node is calibrated based on the typical label of the observations it has won. Here the discussion of the feature maps pertains to two issues within the data structure that are potentially intertwined: the homogeneity with respect to the input variables and their latent combinations, and the price differentials across the locations inside and outside the target areas in the two districts.

Looking at the greyscales and the labels of the neurons, a variety of observations can be made. The key is the situation in terms of homogeneity and price levels of the items captured on the map surface, in relation to the definitions of the targeted areas. Below, each pair of map layers is analysed in relation to the position of the labels and the intensity of the greyscales.

In 1997 the most homogeneous data structure is found typically inside the target area in district IX, and more specifically on Mester Street and other lo-

26 The typical street location is also used as a label, but in order to avoid overcrowding these maps are not displayed in this space.

Figure 5.2 Feature map presentations of the homogeneity (top), and the map layer for condominium prices (below), for a one-year cross-section from 1997

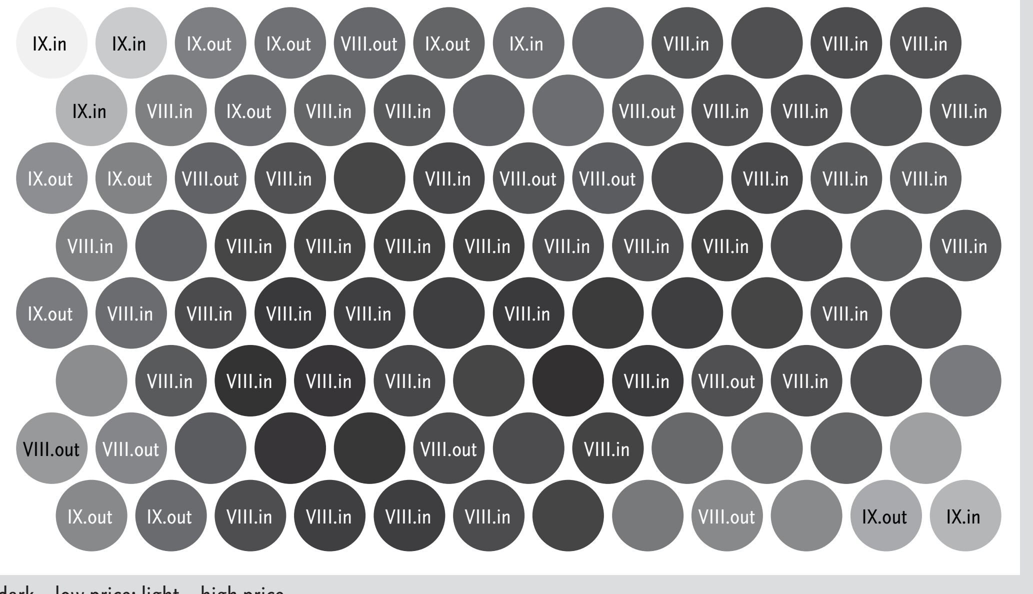
dark = homogeneous structure; light = heterogeneous structure

dark = low price; light = high price

cations resembling it (see Figure 5.2). This is not a particularly expensive location, rather the opposite. The other three area categories (i.e. IX/outside, VIII/inside and VIII/outside) are more heterogeneous in this respect. However, not all of the data structure labelled after target areas inside district IX are that homogeneous, and some locations outside the target area in this district are

Figure 5.3 Feature map presentations of the homogeneity (top), and the map layer for condominium prices (below), for a one-year cross-section from 1998

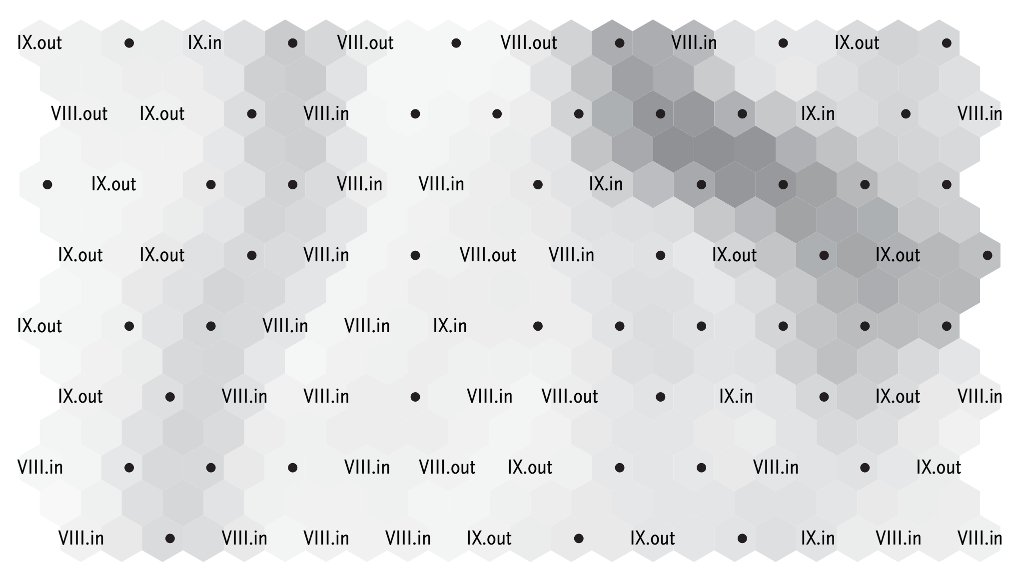
dark = homogeneous structure; light = heterogeneous structure



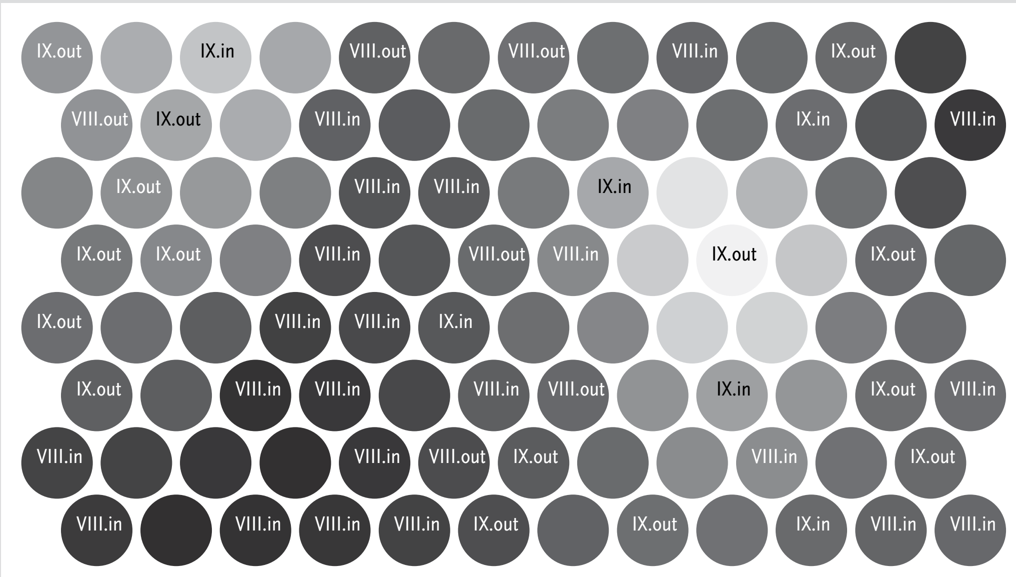
dark = low price; light = high price

also relatively homogenous. These are also higher priced. The highest price levels (per m², for condominiums) are typically found in district IX, close to the city centre, but outside the area targeted for renewal (typically, Boráros Square); relatively high prices are also found in certain locations inside the target area in both districts (typically Páva, Angyal, Berzenczey, and Bokréta

Figure 5.4 Feature map presentations of the homogeneity (top), and the map layer for condominium prices (below), for a one-year cross-section from 1999



dark = homogeneous structure; light = heterogeneous structure

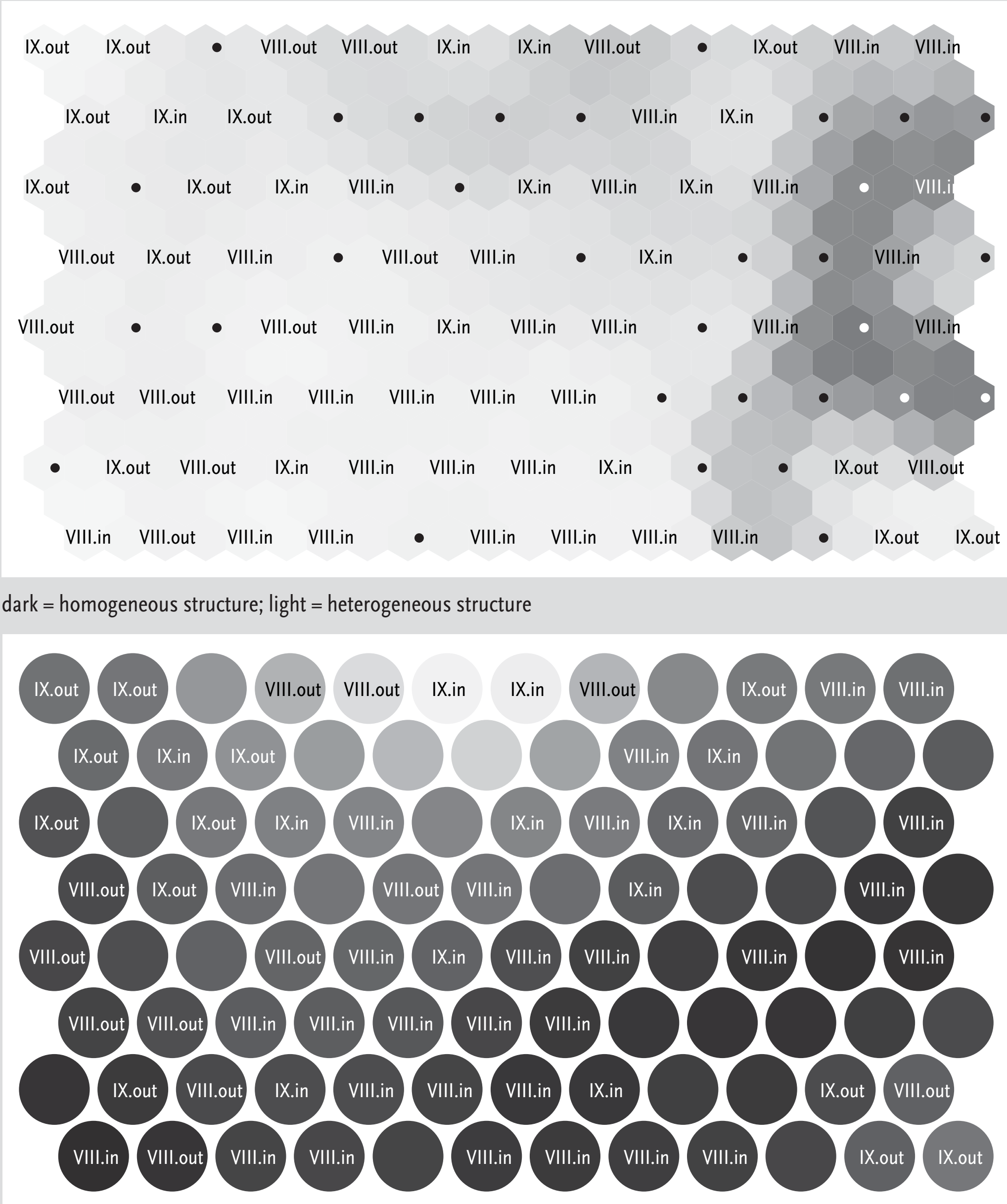


dark = low price; light = high price

Streets in district IX; Rákóczi Road in district VIII).

In 1998 the most homogeneous data structure is found typically outside the target area in district IX, and more specifically in the area closer to the city centre (see Figure 5.3). The same observations apply as with the year before: not all of this area is homogeneous, but the other three areas are more heterogeneous.

Figure 5.5 Feature map presentations of the homogeneity (top), and the map layer for condominium prices (below), for a one-year cross-section from 2000



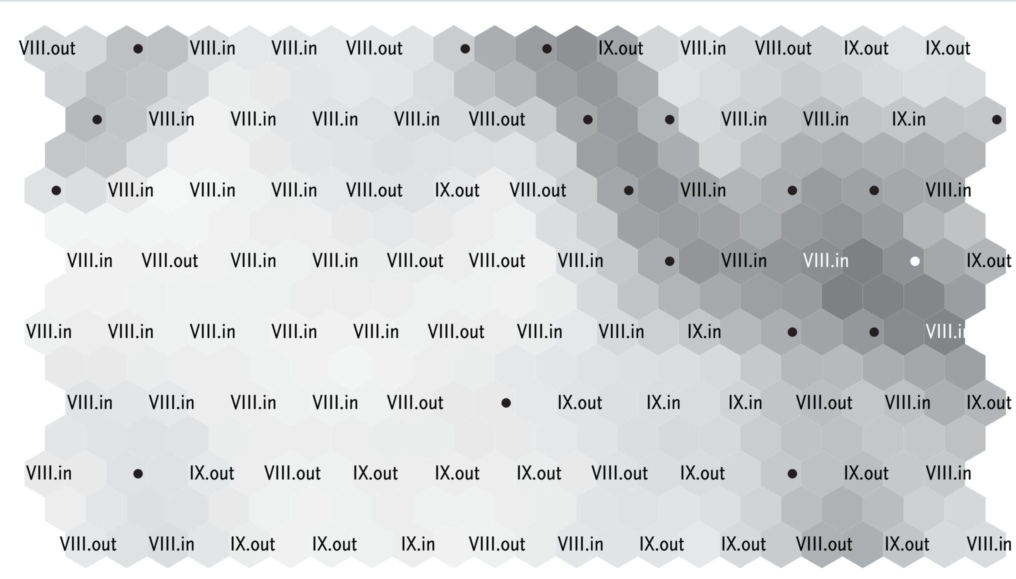
dark = homogeneous structure; light = heterogeneous structure

dark = low price; light = high price

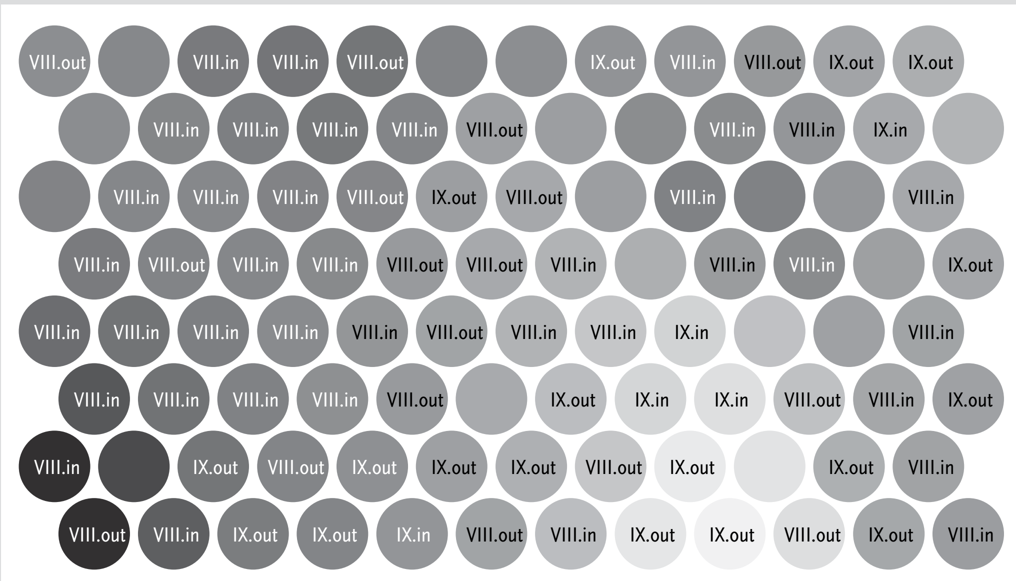
Furthermore, some locations within the same district inside the target area (typically, Angyal Street) are also relatively homogeneous. While the most homogeneous locations represent average price levels, the most expensive locations are found inside the target area of district IX (typically, Berzenczey Street).

In 1999 no particularly homogeneous nodes are found, but relative homo-

Figure 5.6 Feature map presentations of the homogeneity (top), and the map layer for condominium prices (below), for a one-year cross-section from 2001



dark = homogeneous structure; light = heterogeneous structure

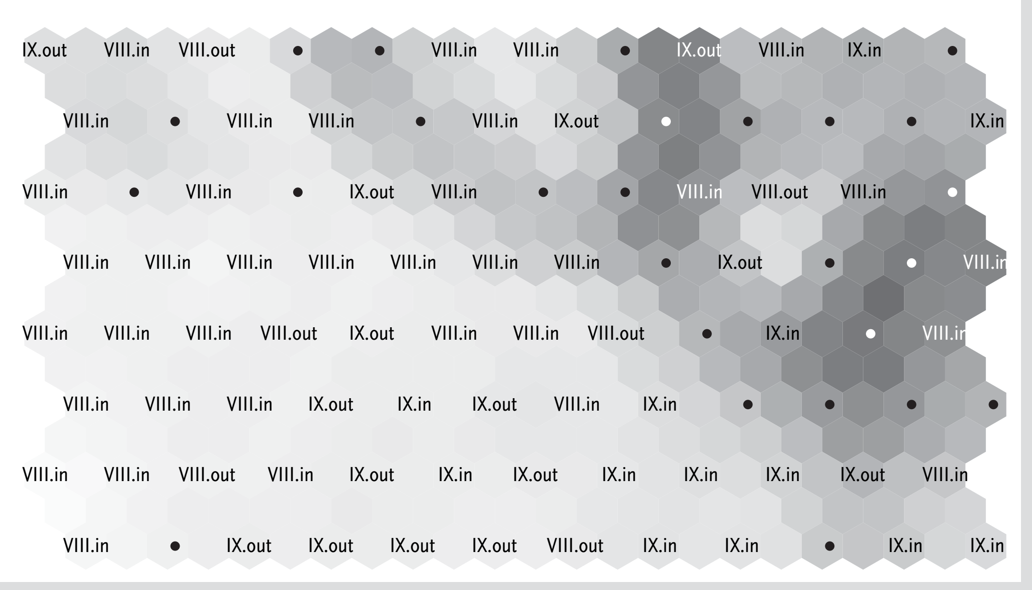


dark = low price; light = high price

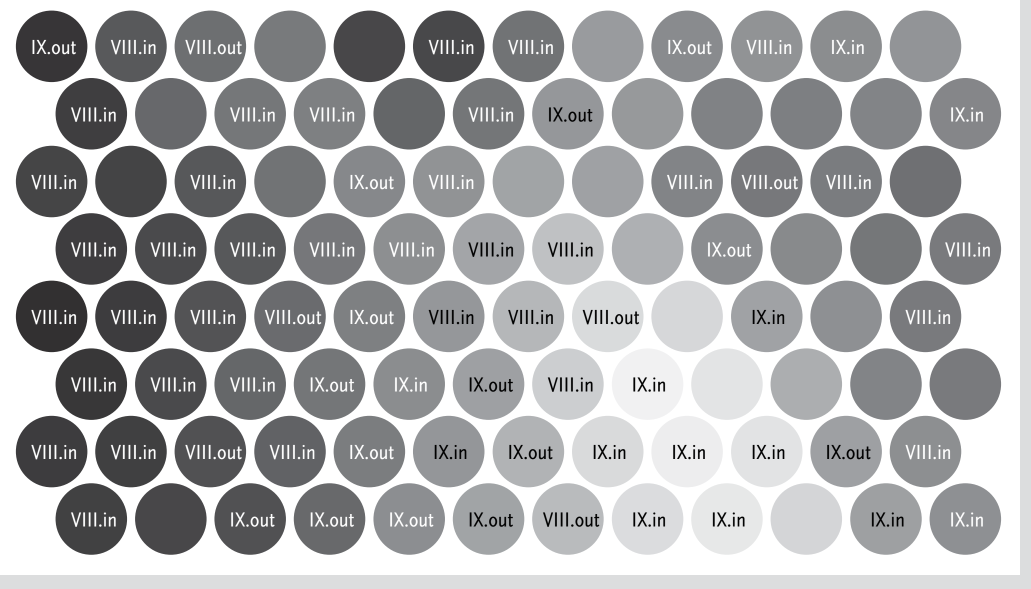
geneity can be identified in district VIII inside the target area (Baross Street, low price), and in district IX both inside (Telepy Street, high price; and Üllői Road, low price) and just outside (Boráros Square, the highest price) the target area (see Figure 5.4). Great heterogeneity is found in all four areas.

In 2000 and 2001 the most homogeneous data structure is found typically

Figure 5.7 Feature map presentations of the homogeneity (top), and the map layer for condominium prices (below), for a one-year cross-section from 2002



dark = homogeneous structure; light = heterogeneous structure



dark = low price; light = high price

in district VIII inside the target area (in 2000: Baross Street, low price; in 2001: Baross Street, now average price; and Szigony Street, low price), although for both years this area also contains some of the most heterogeneous addresses (see Figures. 5.5-5.6). In fact, considerable heterogeneity is found in all four types of area. In the feature map for 2000, the most expensive locations are found inside the target area of district IX (typically, Berzenczey and Liliom Streets), whereas in the feature map for 2001 these are found in the same district but locations just outside the target area closer to the city centre (typically, Közraktár Street and Boráros Square).

In 2002 the most homogeneous data structure is found typically in several locations (see Figure 5.7): outside the target area in district IX as well as inside the target area in district VIII (Leonardo da Vinci and Baross Streets; and the Grand Boulevard). What is common for all these locations is a relatively low price level. Furthermore, in this feature map too considerable heterogeneity is found in all four types of area. Finally, the price differentials across the map are sharper than in the previous maps: particularly high prices are to be found in several locations in district IX both inside (most expensive in Ferenc Square; next comes Berzenczey, Bokréta, Liliom and Angyal Streets), and outside (Boráros Square) the target area. On the other hand, these areas also contain some cheap dwelling stock. It can also be noted that in 2000, 2001 and 2002 some typically moderately high priced locations are also identifiable inside the target area in district VIII. This is a relevant observation, as it does not support the notion of a recent downgrading of the attractiveness of this area.

We can now make the connection to the two hypothesised effects: one, changes in actual quality-related fundamental price determinants; and two, changes in price based on future expectations, without an actual change in these determinants.

1. Changes in actual quality as a determinant of the value

On the whole, the spatial organisation of the map is mixed with respect to districts IX and VIII, and the areas inside and outside the targeted belt. No clusters can be visually identified based on these labels. The 1997 modelling shows very clearly that the greatest homogeneity in offer and actual price levels and sales volumes, and in the distribution of typical dwelling type, was inside the target area of district IX. However, whether the area was in or outside the targeted zone did not matter much in this respect. The greatest heterogeneity in turn is in district VIII, as expected. This situation is the same in 1998 and 1999: the more homogeneous areas are situated in district IX, whereas the most heterogeneous areas were situated in district VIII. Interestingly, in the year 2000 the situation changed, insofar as the greatest homogeneity was now in the target area of district VIII. The situation remained the same in 2001 and in 2002, although for the last year the most homogeneous structure was also found in district IX outside the target area.

The explorative method applied does not enable further analysis of what the causes for this change in differences in the measured dimensions across the data structure may be. However, given the expert knowledge of the processes and areas under study, we may speculate about it. This complete change may be explainable by three forces: (1) the increasing functional and price-based differentiation between the various blocks that had taken place in the target area of district IX in the late 1990s (as a result of the economic, social and physical development described in Chapter 3) has increased the differences within the housing stock and across micro-locations in this area; (2) the stigma effect that had pertained to certain 'islands of hardship' within this – ostensibly heterogeneous – part of district VIII long before the regeneration process had even been initiated (as a combined effect of decayed building stock and the high amount of Roma inhabitants, see Ladányi, 1998), had to a considerable extent already disappeared at the time the rehabilitation project was begun (in 2003); and/or (3) building of an all-levelling, spatially and functionally extensive price bubble based on future expectations in that district has reduced differences within the housing stock and across the street locations in the targeted part of district VIII (see above). The first explanation is undeniable, in the sense that the area has been subject to actual and substantial quality change, whereas the second and third explanations are more speculative as no such changes had taken place in district VIII during the period under study.[27] In particular, the third theory requires some further elaboration below.

2. Changes in market value of dwellings based on future expectations and without actual quality changes

Instead of greyscales, the actual numerical values of the neurons in the map may also be displayed. Some typical values for certain arbitrarily selected categories of observations are reported in Table 5.1 using the street as identification label. It can be observed that a steady increase in price took place in the price development of condominiums throughout the six-year period (1997-2002) for both districts VIII and IX. Nonetheless, for the targeted area in district IX prices have rocketed for some streets in absolute and relative terms (annual average increase 10% to 40%), and the same goes for the locations outside the target area situated closer to the CBD. The relative changes are even higher in district VIII (annual average 20% to 50%) due to the much lower starting point price levels in 1997.[28] From the output values of the SOM mod-

27 For the second theory, Ladányi's (1998) predictions about large-scale ghettoisation could have been of course correct, had the prices of the areas not experienced any upswing. The homogeneity could have been due to a further spatial extension of the stigmatised areas, in other words negative development trend. In the light of the evidence such an explanation for the observed homogeneity in the target area of district VIII does not seem likely now. In principle, when a disadvantaged area improves, it becomes more homogeneous, until a threshold is reached after which differentiation of product groups and buyer preferences kicks in, as was the case in the 9th district.

28 The annual increase in house prices is as high as 25% in the whole country since 1999 (KSH, 2004).

Table 5.1 Development in typical condominium values (1,000 HUF/sq.m.) inside the target areas and in locations around them as estimated by the SOM (u.=street; kör.=boulevard; t.= square)

		1997	1998	1999	2000	2001	2002	average %/year
I X								
Inside	Mester u.	51.1	55.0	60.8	106.3	150.5	154.3	33.7
	Haller u.	44.9	49.6	54.1	100.1	144.0	151.6	39.6
	Márton u.	45.8	41.1	-	85.6	114.1	99.5	19.5
	Páva u.	103.0	93.9	82.4	110.9	138.6	166.0	10.2
	Liliom u.	70.5	82.9	114.0	174.5	195.7	211.0	33.2
	Angyal u.	81.8	76.9	96.6	119.4	202.4	203.8	24.9
	Ferenc kör.	48.8	55.0	62.0	112.2	132.6	164.5	39.5
City-core	Ráday u.	47.8	55.0	62.1	115.0	136.2	139.1	31.8
Riverfront	Soroksari út	95.7	59.2	78.2	103.7	107.3	136.3	7.1
Housing estate	Aranyvirag u.	60.0	63.3	-	103.1	149.1	149.1	24.8
V I I I								
Inside	Hórváth M. t.	32.5	46.1	-	90.1	-	117.3	43.5
	József u.	40.5	42.1	43.4	94.6	-	97.5	23.5
	Práter u.	47.0	47.0	44.9	85.7	143.1	139.8	32.9
	Füvészkert u.	46.3	46.8	47.8	83.3	-	179.9	48.1
	Kőris u.	-	42.1	-	86.4	97.0	102.9	*)28.9
	Diószeghy u.	40.6	47.0	46.7	88.9	91.7	117.4	31.5
	Dobozi u.	38.4	46.4	44.5	87.7	97.0	109.8	31.0
	Déri M. u.	38.1	43.5	-	83.3	34.9	117.3	34.6
	Népszínház u.	47.8	49.1	58.9	114.5	138.4	152.9	36.6
	Köztársaság t.	40.9	48.4	73.3	90.4	107.7	117.4	31.2
City-core	Horánszky u.	42.9	42.8	-	104.7	138.6	142.7	38.8
Garden city	Delej u.	40.9	47.2	45.0	89.9	127.8	137.3	39.3
	Stróbl u.	42.1	43.1	62.1	92.6	138.6	159.0	46.3

* 1998-2002

elling we can see that everywhere in the middle part of district VIII cases have experienced drastic price increase until the end of the period under examination. However, little if any actual rehabilitation has taken place during this period, which means that the price increase is only based on expectations about future market changes, in other words, speculation about future quality improvement and price increase (as explained above). In district IX the situation is different, as the most substantial quality-related price increase in fact took place throughout the 1990s, and the increase was not so steep during the period 2000-2002.

To sum up the analysis, the targeted areas were modelled using the SOM for each cross section during the observed six-year period from 1997 to 2002. Two types of dynamics could be identified, as the housing market dynamics in the selected 'slice' of the urban area has differentiated the micro-locations in terms of actual changes in the housing quality and urban structure on one hand, and in terms of house price escalations that are not related to fundamentals on the other. The evidence thus points to a double effect that took place during the period under study in the two target areas that are/were subject to urban rehabilitation and new development. On one hand, the urban housing structure has changed in the various locations under study in terms of physical and social indicators of quality: to much better in some micro-locations, to only slightly better (but probably not to worse) in others – this trajectory was more present in district IX. On the other hand, a separate trend is notable: market prices have suddenly escalated and market activity has increased. This latter effect is surely to a large extent a self-fulfilling prophecy and seemingly unrelated to actual change in the quality of the built environment – this was largely the observation in district VIII. Above all, the evidence reveals how the housing market development is related to the most localised processes of social and physical upgrading taking place in an urban setting. The next two chapters continue the investigation of these processes, by breaking them up into various elements related to demand (Chapter 6) and supply (Chapter 7) dynamics of the inner Pest housing market.

6 Expert elicited residential location quality profiles for the inner Pest market

6.1 The aim of the interviews of experts

To be able to investigate the more intangible and diversified aspects of property value formation requires an interview-based approach (Kauko, 2002). The role of locational quality in housing consumption is an increasingly important research objective given the demand-side considerations stemming from socio-cultural changes in the population of urban and metropolitan housing market areas. In circumstances involving diversified demand, the consumption pattern comprises a set of different preference profiles. From an operational point of view, such outcome can be generated through ranking locational attributes with respect to their relative importance for the homebuyer or renter. This procedure may, for example, be based on pair-wise comparison of attributes based on expert judgements and the analytic hierarchy process (AHP). While not sufficiently robust in itself, this information is suitable for enhancing the housing market analysis by confirming and animating the findings obtained by larger scale models based on market data reported in Chapters 4 and 5.

In this chapter I report findings concerning housing consumption in inner-city Budapest, more specifically, on the Pest side of the River Danube. For this selected supply side segment, one aggregate model and a few disaggregated models (i.e. demand sided segments) of preference profiles were generated based on expert judgements and the AHP. The broader context of this research project involves triangulation with prior analyses of the same city based on market data, as well as comparison with two other city case studies investigated in prior research:

- to confirm and to animate the findings obtained from two prior housing market analyses of Budapest based on market data (reported in Chapters 4-5);
- to make a comparison with the findings from AHP-elicited expert interviews from Metropolitan Helsinki (Kauko, 2002, 2004, 2006) and the Dutch Randstad (Kauko, 2004, 2006).

These studies provide a platform for this exercise on Budapest – a very different housing market context. In the city as a whole the market for private dwelling construction is very marginal; of 800,000 units the output over the past ten years has been ca. 5%, which is the share of those households who are ‘in the market’. Within this group, the target is the segment which comprises households who move to the outer part of inner-city Pest, that is, neighbourhoods in the following Pest side districts (clockwise from north to south):

- Újlipótváros XIII (best image)
- Terézváros VI
- Erzsébetváros VII
- Józsefváros VIII (worst image), and
- Ferencváros IX (rehabilitated).

There are no large differences across the micro-locations within this 'zone'. This area is characterised as transitional zone or potential renewal area. It is assumed that the move takes place from outside this belt, and that the movers are not interested in price or subsidies – only the amount of space and the quality of the dwelling, and the quality of the location.

As for the methodological argument, methods based on stated (as opposed to revealed) choices allow us to identify consumer choice and property value empirically using semi-structured interviews. This is what the AHP technique is about: given a defined set of attributes and a set of respondents it enables profiling the demand side into a certain combination of attribute levels. The data constitutes measured judgements and was collected by the author through face-to-face interviewing sessions with local housing market experts. The measurement of each attribute is based on the difference between maximum and minimum values across the study area defined above. The relative importance of each attribute was then elicited using the standard scale, of AHP, where a high score indicates strong importance and a low score low importance for the individual's housing consumption choice. Additionally, more open in-depth interviews were carried out on the same respondents, in order to find out the logic of the elicitations generated by the AHP. A brief description of this method is given in Appendix 2.

To repeat, a number of conclusions could be made from the prior studies indicated above. For the idiosyncrasy of the Budapest housing market, the documentation in Chapter 4 showed how the spatial housing pattern in relation to price and quality on the micro-locational level is mosaic-like; not just in the poorer area (as suggested by Ladányi, 1989) but in the whole city's housing market there is substantial heterogeneity. The type, age and size of the house and its immediate vicinity matter more than the location per se. There is no notable association between price level and district location. Even the worst districts possess some relatively attractive places, and some expensive small dwellings in modern/modernised, non-panel buildings as well; likewise, even the best districts possess dwellings that are typically cheap because of one reason or another.[29]

6.2 History of the development

At present, there is no direct influence between the government and the housing market in Hungary. However, indirectly, changes in the mortgage sys-

29 Part of the explanation for this still lies in the exceptional institutional conditions that evolved throughout local history. In the 'old circumstances', the system of (re)distribution and specific inertia had a far stronger impact than the real attractiveness potential of places.

tem affect the marketplace, and when mortgage conditions worsened in 2003-2004, housing market activity also lost viability.[30] However, when looking at the demand distribution broken down by size and price categories for new dwellings, the difference in demand between the situations before and after the change is seen on the Pest side only, where only the demand for smaller and cheaper dwellings increased. On the Buda side the demand was unaffected and buyers still look for larger and more expensive dwellings. This is because traditionally Buda is considered more prestigious than Pest and the demand structure is not dependent on the mortgage system (data by Otthon Center).

The segments for the AHP analysis were selected based on expert knowledge and the feature maps of the analysis found in Kauko (2005a) with regard to attractiveness of residential environments in Hungary. The segments that belong to the middle-to-upper market, that is, over 220,000 HUF/m² (EUR900/m²), are the following two or three segments:

1. suburban low density areas, that is, single-family (1a) and garden city (1b), these are earlier sales, or
2. the refurbished inner-city flats in the old historical centre; these are later sales.

Note that, in sharp contrast to Western Europe or the United States, where the majority of housing market activity takes place in the suburbs, in Budapest the role of suburban housing areas is minor; segment (1) is thus less important and less interesting than the urban renewal segment of the inner city (2). Therefore, this latter segment has been selected for this analysis.

Nine selected experts agreed to participate in this exercise: a manager of a large development firm, a manager of the land management company of one of the district governments, a real estate agent, a real estate consultant, three planning consultants, a statistical officer, and an academic, who also worked as a planner.[31] Compared to earlier exercises in Finland (22 respondents) and in the Netherlands (17) the number is small, which is largely due to language barriers experienced in this context.

30 The personal view taken in this paper (not a view of OTB) much laments the abolishing of the short-lived mortgage system as it improved the affordability of home ownership for middle-income starter households. So why did it happen? While the official reason concerns budget deficit, we also have to note the dramatic change in the policy agendas of the Hungarian government as a result of the 2002 parliamentary elections that had resulted in a narrow victory for the socialist-liberal coalition over the previous centre-right coalition. The mentioned mortgage system was in fact entirely a creation of the latter.

31 A few more discussions were undertaken but without any kinds of elicitations.

6.3 The results of the semi-structured interviews using the AHP

A short description of the AHP technique is provided in Appendix 2. For each of the attributes listed below, some logical relationships for the elicitations were possible to isolate (whether they were important or not, and in what kind of particular circumstances):

Accessibility and proximity: distances to work and services (–) and the level of the public transport system (+). This factor was not particularly important in three of the four profiles:

- This is a 'given'; public transport is good everywhere within the study area: 5 to 10 minutes' difference in distances makes no difference.
- In particular, for the young upper classes who are mobile this is not important.

Social factors of the neighbourhood: socio-economic status (+) and externalities caused by social disturbances (–). Social factors were considered unproblematic in one of the four profiles:

- However, there may be a large variation within the same quarter (e.g. Népszínház, in district VIII).
- This is worst in the outer parts of district VII and parts of district VIII – but consumers do not really care.
- One comment emphasised the effect of noise, vandalism and other disamenities (nuisances) caused by services (see below) that are against residential use.

Service infrastructure in the neighbourhood: availability and level of all kinds of public and private services (+). This factor was not important in any of the four profiles, albeit for different reasons:

- All areas were considered unattractive in this respect – only the big streets have good services.
- People are concerned about schools, but they are also mobile and do not need one in the vicinity.
- Services are good everywhere (thus a contradiction).

Physical environment, two types:

1. Hard/tangible factors: density, that is, per m² building efficiency. In this context housing consumers prefer high densities, that is to say, the closer to the Grand Boulevard the better;
2. Soft/intangible factors: 'pleasantness', visual factors, greenery, etc. are secondary factors; for example, a park (Orczy kert) in district VIII has a problem with ownership: it is owned by the state and is protected, there is a wall around it and it requires renovation, which is why the location has not

fulfilled its attractiveness potential. Furthermore, the image implies, among other things, that the particular history of a neighbourhood may be an issue of relevance: for example, to move or not to 1970s housing estates such as Szigony utca (VIII).

This factor was considered unimportant in three of the four profiles:
- The physical environment has deteriorated in most of this part of town; it is especially bad everywhere in middle Józsefváros and Erzsébetváros.
- According to surveys, this is not of high importance, but it is becoming more important.

Municipality (kerület): whether the municipal image and local government policy, including social policy and the right to set taxes[32], matters to the decision. This factor was not particularly important in two of the four profiles (and especially unimportant in one of them). The comments however unveil some interesting spatially diversified and conditional effects related to images and policies:
- The image of district VIII is considered bad and worse than the reality. However, this is about the thinking of the people, and this thinking has begun to change. New residents who come from the countryside do not have a problem with the image of the district. Young people tend to have higher tolerance for districts VIII and VII.
- Policy does not matter so much to ordinary households. However, the most passive municipalities in this respect are VI and VII.[33]

The original research design included a sixth attribute, the possibility to obtain subsidies for rehabilitation. The presumption was that in Budapest the issue of attracting rehabilitation subsidies is crucial. A system of subsidies is available for both local government and household group initiatives, and the actors are expected to actively acquire government subsidies (Urban Renewal Fund, 1994). However, it became obvious that this attribute is not at all important – all areas can obtain a subsidy easily or not easily, depending on whether one goes through the correct administrative processes. There are no major differences across districts. Therefore this attribute was subsequently dropped as it failed to connect to the objective.

The final comparison was on a higher level in the hierarchy between the composite locational quality, i.e. all the locational attributes above taken together, and the house itself.

32 Property tax is possible to set but the districts do not use their right.

33 According to one respondent, policymaking in district VII is particularly hopeless: it is a completely run-down area with listed buildings. Lots of rules for these buildings, and a civil organisation has protected the whole area.

Table 6.1 Location vs. house

	Location	vs.	house
1.	80	-	20
2.	40	-	60
3.	50	-	50
4.	20	-	80
5.	60	-	40
6.	No comments		
7.	60	-	40
8.	70	-	30
9.	90	-	10

- location: range 20...90; median 60
- house: range 10...80; median 40.

Thus on balance, location is more important than the house. However, here at least three different viewpoints could be distinguished behind these scores. First and foremost, like many other cities, Budapest was also perceived as a fairly segregated city, and the more segregated the city, the more location counts for the buyer's choice. However, one respondent emphasised that the area matters only for first-time buyers, and that, when moving up the property ladder, the quality of the house matters much more. Finally, in at least one interview it was maintained that usually both location and house are very deteriorated within this segment and neither of them really matters for the potential buyer or renter. This is not indifference on the part of homebuyers, rather, it is an expression of other kinds of factors determining their choice.

The elicited preferences for demand side segments are shown as bar diagrams in Figures. 6.1-6.5 below. As with the previous exercises undertaken in Metropolitan Helsinki and the Dutch Randstad, the idea was to create one aggregate profile and a few more disaggregated profiles based on the elicitation intensities and their variation. The aggregate pattern is shown in Figure 6.1. Overall, the social factors are the most important, and services the least important attribute.

The responses may also be divided into four differentiated patterns based on simple grouping of the profiles (see Figures 6.2-6.5). In order to make connections with known cases, a number of simplifying and somewhat stereotypical labels were given. The profiles were given labels in order to easily generalise the type of dominating features we are dealing with, according to the principles of naturalistic generalisation (Johansson, 2005). The aim of naturalistic generalisation is to label the studied cases based on conceptions of earlier research with comparable findings, but possibly from other geographical contexts, so as to fit into an operational typology that covers the phenomenon, in this case location-specific housing choice (or to be exact, housing consumption), as broadly as possible. In social and behavioural research this methodology is helpful when the goal is to show the variations of the empirical material as analytically as possible, without resorting to either extreme treatment: complete disaggregation or over-generalisation. The methodology of naturalistic generalisations implies that the case repertoire grows – hence the selection of the segments did not involve any strategic choices. In this analysis four specific profiles were identifiable (see Table 6.1).

A 'more traditional European' urban sentiment (urbanity) emphasises the physical environment (profiles 5 and 9 above). In profile 8 – a typically Budapest-specific profile – the social dimensions are important, whereas accessibility is not. A 'more American' segregation sentiment emphasises the social factors (profiles 2, 3, 4 and 6) or the municipality in the sense of a Tiebout ef-

Figure 6.1 Aggregate model

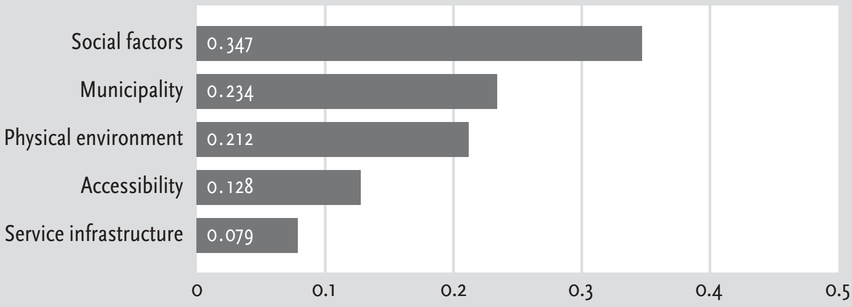


Table 6.2 Naturalistic generalisations of housing consumption profiles based on the most and least important attributes

Respondent	Most important attribute	Least important attribute	Dubbed model/profile
1.	accessibility (social)	municipality	- Helsinki-type
2.	social	services	- US segregation type
3.	social	municipality	- US segregation type
4.	social	services	- US segregation type
5.	physical	services	- European traditional type
6.	social	accessibility	- US segregation type
7.	municipality	services	- US Tiebout type
8.	physical, social	accessibility	- European traditional type*
9.	physical	municipality	- European traditional type

*) This could be separated as a more specific 'Budapest-type'.

fect (profile 7). Finally, when accessibility (and also social) factors are important, the profile is akin to the one found in the Helsinki analysis (profile 1).

These four general profiles can be elaborated further using the supporting 'in-depth' comments of the nine respondents (almost verbatim from the open interviews when asked about the logic of a certain ranking):

'European traditional urban' (three respondents)

- All districts include good and bad areas. Closeness to Danube matters. (Tangible factor.)
- To some extent the inner part of district VII is still quite popular as it is a 'historical' area. (Intangible factor.)
- Whether it is about 'urban renewal' is important. Even if the neighbourhood is not renewed, but it is close to the rehabilitated properties, it is attractive. Thus, the anticipation of a change towards better times. (Intangible factor.)
- In a typically 'Budapest model', a nice physical environment and not having social problems go together.

Figure 6.2 Disaggregate model: 'European traditional urban'

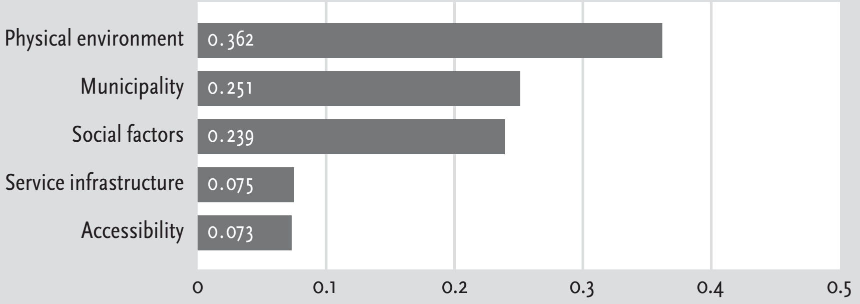
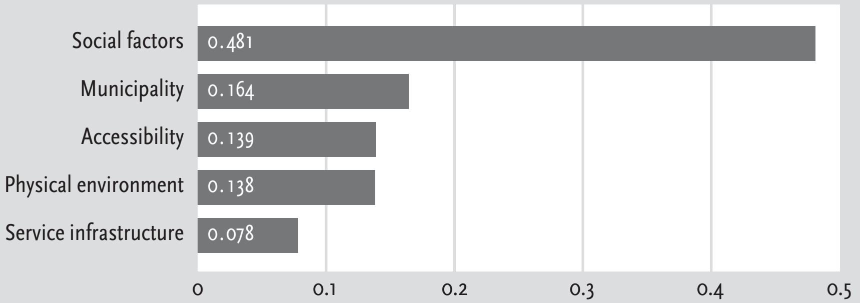


Figure 6.3 Disaggregate model: 'US segregation'



'US segregation' (four respondents)

- While the social factors are improving with time, when different consumer groups compete for an accessible location, if there are 50% Romas in a building people do not move there.
- Social factors are important for the upper classes. However, unlike in the US, this is never about negative social externalities such as school district or crime rate – such variables are irrelevant here. (Thus it is only about status and possibly a 'sense of community'.)

'US Tiebout' (one respondent)

- In general, young families look for cheap alternatives in the inner city, and consider districts IX, VII and XIII.
- The social aid is the best in district VIII.
- According to surveys the district (kerület) matters to some extent (when moving in, and also when moving out); its image more than its policies.
- Buyers from Budapest and elsewhere are two separate groups: the former group knows better about the district image.

'Helsinki' (one respondent)

- Accessibility is important: good accessibility to downtown and other areas with good services.
- Proximity to educational services is important for housing choice in this

Figure 6.4 Disaggregate model: 'US Tiebout'

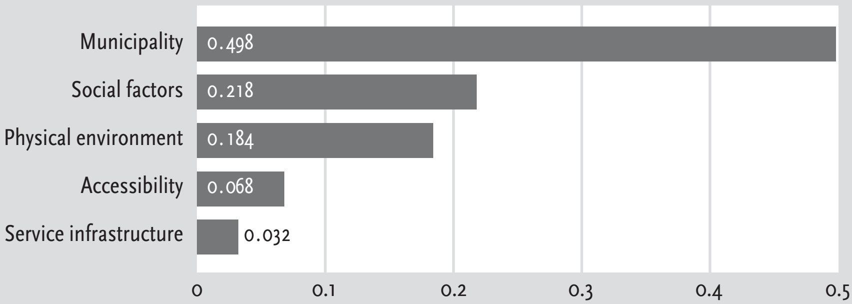
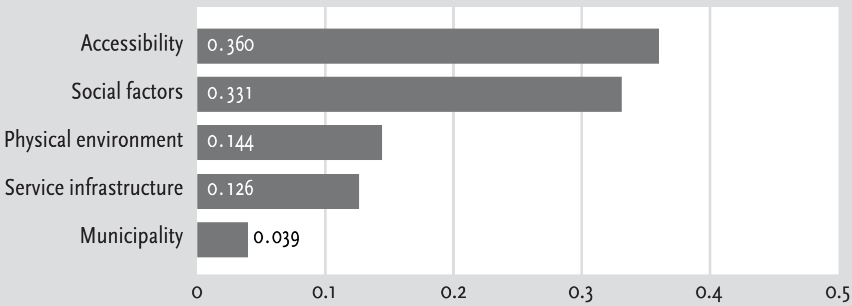


Figure 6.5 Disaggregate model: 'Helsinki'



context; young residents tend to choose a temporary dwelling.

- Increasingly important; not everyone wants a car and then public transport is important.
- Parking problems.
- People do not care about the image of the municipality if the neighbourhood is acceptable – provided they have all the relevant information.
- Most people can discover good areas in all districts.

6.4 Geographical differences between micro-locations and densities

The following points were raised in the in-depth analysis supporting the AHP:

- Even districts with a bad reputation (VI, VII, VIII) include parts that are attractive.
- District VIII comprises totally different areas: the inner part (Palace quarters), which is also the densest area, is without doubt the most attractive neighbourhood; the Grand Boulevard is the cut-off between the inner and middle parts; the outer parts (beyond Kerepesi) are far away and represent different area types altogether.
- Within middle Józsefváros there is a diversity of areas in relation to two factors: (1) social status; (2) housing and location quality. The worst areas are

close to Józsefváros railway station, Fiumei út and the Chinese Market.

- The strategic development plan of Józsefváros partitions the whole district into 11 quarters (Rév8, 2004). New housing development has begun in only two of them (the Csarnok quarter and the Corvin area). In district VIII no 'real market' has emerged yet, as people are waiting to see how the area will develop. Some already refurbished buildings remain in municipal ownership because of rules that prohibit their sale; otherwise the municipality would not have been able to obtain a subsidy for renewal.
- In district IX the reason for high prices lies not in social factors, but in the actions of first-time buyers and foreign investor-buyers:
  - The upper classes favour a different market: the fifth district and the Buda Hills depend on the Hungarian economy. The remaining consumer groups (such as first-time buyers moving to district IX) depend on the subsidies, and how they develop. In 2001 a system of subsidies for new dwellings was introduced, and in the following year this was extended to used dwellings. As a consequence the amount of loans went up 30%-40% from a hitherto low figure. However, the new government (after the parliamentary elections of 2002) stopped this immediately. As a consequence, market activity slowed down on the Pest side.
  - The changes in international economic trends have an impact too: e.g. the collapse of the Russian stock market in the early 1990s directed huge investment flows to Hungarian markets, and area-location is not important for this category of investor.
- In district VIII the housing prices increased just because of news, but the prices were not realised on the market. When the prices and the demand increased, developers bought plots. For example, on Futó Street the first developments in 2003 had a price tag of 300,000 HUF/m². (This is comparable with district IX.)
- In 2003 Irish investors invented the market in districts V, VI, and VII.[34] However, they did not cross the Múzeum körút (Lesser Boulevard) to the neighbourhood known as Palace Quarters, which in fact is fairly popular among local residents, as this area administratively is already part of the infamous district VIII.
- Buda is improving – Pest is degrading. In Pest big pockets are degrading faster

34 The case of Gozsdu Yard demonstrates the situation in district VII: Autoker Holding, an investor active in new construction in district XIII moved to inner Erzsébetváros. They had first been successful in developing new blocks in Újlipótváros; later (in 2002) they realised that similar projects were feasible in worse environments. In Király Street ca. 100 units, and in Gozsdu Yard a listed block with courtyards that enable passing through will be developed into luxury apartments. Facades and the structure of the building are kept intact. This project is advertised in the UK and Ireland, because people there have already invested in apartments in this district. The price will be ca. 600,000 HUF/m² (2,450 EUR/m²).

than other areas, and the trained middle class is unable to move out of them.

- The middle-/upper-middle income groups have more heterogeneous preferences than lower income groups. Very few locations on the Pest side are suitable for them: Újlipótváros, Zugló, some areas in districts VI and VIII. The success of district IX is surprising from a market perspective, as this area is 'running out of steam'. In the early 1990s, developer-built housing took place only in Buda and in district IX. At present more than 60% of the housing stock is developer-built.
- Homebuyers aged 25-35 buy in the inner city. They see illustrations of refurbished flats in magazines. The projects are reasonably successful.

6.5 Conclusions from the expert interviews

Due to the narrow market segment under study only about five percent of the total citywide population qualifies as the target population of Budapest housing consumers.

It can be concluded that location is marginally more important than the house in this supply segment. For location, two factors matter in preference formation. First, to avoid Roma concentrations – this is the same for all movers. This finding is not unlike models of social segregation from the US. The second, in turn, reflects traditional European urban sentiments: that is to say, proximity to the city and living in the densest possible (but nevertheless pleasant) urban environment is appreciated. This finding is much similar to the findings from other European housing market contexts. However, in the Budapest segment in question this is not an issue of public transport, which is good everywhere, but rather about 'nice architecture', proper urban density and the cityscape – this is an important factor for a proportion of movers. This is by no means a new phenomenon – compare for example Ley's (1986) findings about a 'pro-urban ethos' in Canadian cities. This possibility to compare findings from this housing market with other, better known urban housing market cases, is a particularly important issue, which I will return to in Chapter 8.

Apparently the condition of the dwelling is not as important as the micro-location, i.e. the condition of the block or the building as a whole. On the other hand, the administrative district (kerület) does not matter that much either, which confirms the prior market-based modelling results where the immediate surroundings of the dwelling is considered the key to location choices.[35]

35 All this has potential implications for the building industry in deciding upon the most feasible strategy of production – in this Budapest segment and elsewhere, in comparable housing market circumstances. The advice would be to focus on the block and vicinity rather than on the too detailed dwelling level or the too general district level in this case.

7 Case study evidence of urban regeneration and house prices

7.1 The purpose of the case study

To balance the demand side aspect covered in Chapter 6, next the study turns its attention to the supply side processes and external circumstances affecting the development of house prices. After modelling the urban housing market on the overall city level, and then the housing consumption in the inner city, the last empirical task was to look for planning-related price effects in the two targeted areas within the total structure. This kind of institutional analysis used the same samples of house price data assembled for the quantitative part.

In an urban renewal and housing development context, the local housing market development may be seen as a by-product of decision-making processes related to the provision of the built environment. The house price level makes for a valid and convenient indicator of relative attractiveness of an area (quality view) but is also connected to the collective decisions made about the development of the planning and building project in that area (policy view).

These kinds of planning and policy effects cannot be modelled without a temporal (and arguably also a more qualitative) perspective focused on processes. Therefore, a case study was carried out on two adjacent neighbourhoods in inner-city Budapest, which involve urban regeneration.

According to Locsmándi (2004), the problem is the narrow definition of planning in contemporary Hungary: the only relevant determinant for land development and thereby also for the planning component within the local housing market processes is subsidising of urban regeneration that is usually rather piecemeal. According to Locsmándi, the lobby groups involved in housing development compete for available finances, with a bias for funding the less affluent districts. However, in the analysis reported in Chapter 6 this was not a relevant aspect as all districts were offered the same possibilities in this respect (see also Appendix 3).

Recent American studies on the effects of new urbanism by Song and Knaap (2003) and Kushner (2002) provide a background for this module of the project. According to these authors, it need not necessarily be the case that increased density generates negative externalities that capitalise into lower property values in a given neighbourhood, in fact, these authors find evidence that increasing densities and building on smaller plots, as is the traditional style in Europe, can lead to value premiums that more than offset the negative effects of congestion. This however requires an appropriate design that allows for improved heterogeneity and internal connectivity of the plots. The aim here is to see to what extent the empirical material collected from the middle parts of the Budapest districts IX and VIII provides 'the proof of the pudding': densification improves the quality of housing environments contrary to neoclassical formulations, but in line with the more context-sensitive and non-linear framework presented in Chapter 2.

As a general wisdom, spatial planning is today considered an ineffective practice, due to the difficulty of controlling processes in an environment where the market is often in the driving seat (see e.g. Levy, 1992). This is particularly true for the post-socialist context, where the public sector is struggling to maintain any role in urban management and development issues. On the other hand planning may have a substantial if unintended price effect on the local housing market. For this topic two background literatures are relevant: first, the effect of regulation on the housing market – this is typically about larger areas and constraints in an ex-post framework; second, planning evaluation – this, in turn, is typically about processes and non-economic outcome criteria. The study reported in this chapter merges the two and in this way adds to the literature. Such an aim concerns an evaluation of urban rehabilitation, based on case study methodology involving three different types of data: (1) house prices, (2) housing and neighbourhood quality, and (3) development and planning documents together with interviews with stakeholder experts.

Applying case study methodology on two neighbourhoods of Budapest, Hungary that are undergoing substantial rehabilitation – the middle parts of districts VIII and IX – this chapter argues that an indicator-based evaluation of the success of a change in the urban environment in relation to measures ex ante and ex post is the way forward. In doing so, it highlights the relationships between planning and urban consolidation, the local housing market, and the residential quality at a micro-level by observing the cityscape in a dynamic metropolis. It has two specific aims. The first aim is to investigate the effectiveness of a certain planning measure from the point of view of market vitalisation (cf. Southworth, 1997; Grant, 2002; Deitrick and Ellis, 2004). Here it is assumed that either the dwelling or its vicinity is improved, or an increase in prices is to be expected, before the sale takes place, which would imply a premium related to the rehabilitation project in question. The second aim is to investigate the nature of the house price development (cf. Kauko, 2003).

The framework relates the nature of the price increases into two elements: (1) changes in actual quality; (2) changes in market value based on future expectations and without changes in actual quality (see also Levin and Wright, 1997). This framework is applied in a case study based on expert interviews, planning blueprints and project documents, descriptive statistics, and casual observation (cf. Deitrick and Ellis, 2004). Using the comparable sales valuation method with a spatially identifiable price dataset, any extra price development is isolated by comparing the price development with a similar dwelling sufficiently (but not too) far away. An earlier study by Sluis and Kauko (2003) on renewal of a post-war neighbourhood in the western part of Amsterdam reached modest conclusions about these effects.[36]

7.2 Prospects for urban regeneration in Budapest

As was explained in Chapter 3, the 19th century tenement blocks include some dense areas of good quality, as well as others of poor quality. The poorest of these blocks are situated on the outskirts of the inner city, and these areas represent all kinds of densities; the best areas also have all kinds of densities.

To the south-east, just outside the Grand Boulevard (Nagykörút), there are two significant urban renewal areas of relatively low density. In these locations the ownership is semi-private, because these apartments were not sold to sitting tenants. The first development plan for district IX was – and still is – a success: a unique milieu in Budapest was provided with an eclectic, yet cosy, streetscape. The project in neighbouring district VIII is still in its early stages, and there are plenty of bottlenecks and problems involved.

In 1994 a new policy For the Renaissance of Budapest and the Urban Renewal Programme of 1997 identified so-called urban renewal action areas. By that time one quarter of all homes in Budapest were located in the inner city parts. These buildings were extremely deteriorated and the housing stock did not meet the minimum requirements in many places. As the slumming of the inner parts of the city is causing damage also in terms of the viability of the whole city, urban renewal was considered a possible alternative to greenfield development and abundant suburban development. This programme identified the south-eastern sector of the so-called transition zone as a target area for urban renewal in addition to the densely built inner city. The programme left the identification of action areas to the district municipalities. The Municipality of Budapest was to provide support to the renewal programmes of both district municipalities and the communities of condominium owners. The instrument for providing subsidies to both types of actors was the Urban Renewal Fund. The eleven action areas included the middle parts of districts VIII and IX, the two case study areas (see Section 3.4).

36 In this study the dataset allowed isolation of both premiums and quality improvements, as the quality variables included maintenance, dwelling quality and micro-locational quality. The time period of the data was 1992-2001; the project began in 1997, and was still ongoing at the time of writing. On average, estimates for the whole renewal area, the share of each effect of the total price increase during the time period (almost ten years) was as follows: ca. 10% due to provision of amenities and the improvement of housing and neighbourhood quality, 20% due to formal institutional effect (taxation, first price setting etc.), and 10% for informal institutions (speculation caused by image creation, and procedural bottlenecks); the remaining ca. 60% was contributable to the macro-market trend.

7.3 Regeneration (intentions) and house price development in the target areas

According to American studies by Song and Knaap (2003) and Kushner (2002), increased density does not necessarily generate negative externalities that capitalise into lower property values in a given neighbourhood. In fact, these authors find evidence that increasing densities and building on smaller plots as is the traditional style in Europe – a strategy known as New Urbanism or Neotraditionalism[37] – can lead to value premiums that more than offset the negative effects of congestion. To achieve a better quality environment – applying property values as attractiveness indicator – requires nevertheless an appropriate design on the block level that allows for improved heterogeneity and internal connectivity of the plots. Obviously, New Urbanism, being an American concept, does not enable a strict comparison with similar measures in a European urban area.[38] The other aim of the study was to relate any element of price increase with the urban rehabilitation strategy applied in these parts of Budapest. While this is not an often applied framework for either economic or institutional analyses of the housing market, Huston et al. (2005) argue that property price and neighbourhood quality changes in time may be a useful proxy for risk assessment. If that is the case, both of the Budapest case study areas should provide opportunities to determine the success and risk of planning processes.

The processes are evaluated partly based on house price trends at a street level, and partly based on narratives and documents such as interviews with stakeholders and experts, and official accounts on project implementation and the development plan. In the Budapest case useful records on quality are lacking altogether, and even house price data is available in large quantities only on an aggregate level (district and street). This is not an ideal situation, as more indicators, notably proxies for tenure changes, would undoubtedly enhance the quality of the analysis. However, the context itself is remarkably well suited for such an analysis, as noted in Section 3.5.[39]

Table 7.1 makes a distinction between four different cases on the basis of the balance between house prices and quality of the dwellings and the vicin-

37 Southworth (1997) criticises the piecemeal efforts of Neotraditional design, and relegates it to suburbia; Deitrick and Ellis (2004) however consider New Urbanism successful for inner city revitalising efforts using financial, functional and aesthetic criteria.

38 In Canada, New Urbanism and infilling of core areas with mixed uses is apparently better integrated in the planning practice than in the USA (see Grant, 2002).

39 Sluis and Kauko (2003) had, on top of other relevant variables, indicators of the quality of the dwelling and its vicinity, but as this particular urban renewal area in Amsterdam was not a favourable case in terms of the strength of market processes, the analysis ended in a somewhat frustrating stalemate.

Table 7.1 Effects of planning measures on house prices and residential quality

Effects of a planning measure on quality and prices	The quality does not increase	The quality increases
The price level increases (effective project)	P+, Q– : market hotspots and price bubbles without a link to quality improvements; an unfavourable outcome (middle Józsefváros)	P+, Q+: economic efficiency and equality/ sustainability is achieved; favourable outcome (middle Ferencváros)
The price level does not increase	P–; Q–: no real effect of plan, economically efficient but poor neighbourhood/dwelling quality; debatable outcome	P–; Q+: bargains, economically inefficient but environmentally and socially sustainable planning; debatable outcome

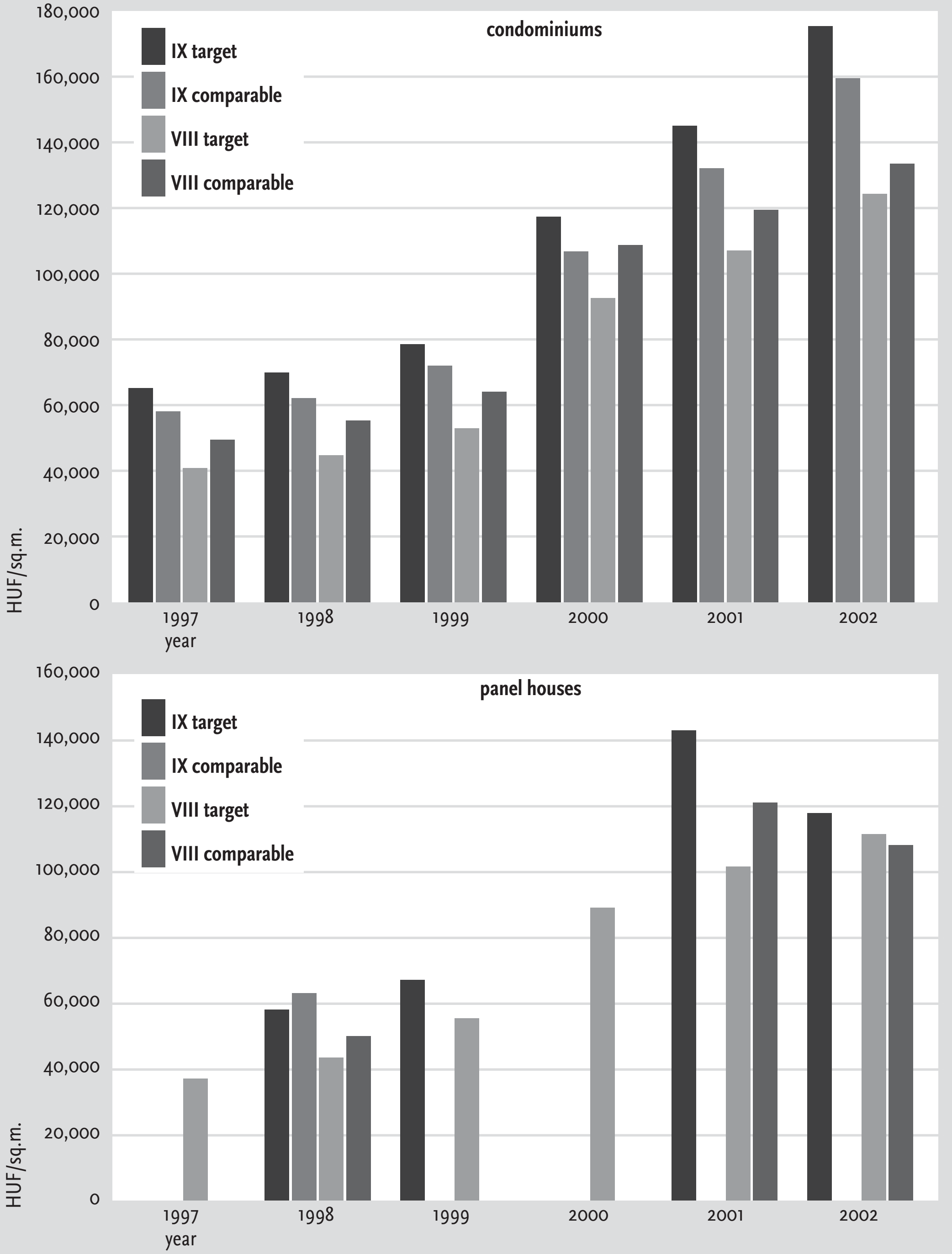
ity. From a planning perspective one would expect a situation with good quality (Q+) to be favourable regardless of whether the price level is considered high (P+) or low (P–). Likewise, from an economic efficiency point of view one would expect a situation where good quality associated with high price, and poor quality (Q–) associated with low price are acceptable situations: the market needs affordable packages too (cf. Quigley and Raphael, 2004, on affordability). Thus the cases that are favourable with respect to social equity and environmental sustainability criteria are indicated in the right-hand side of the scheme, whereas those that are favourable with respect to economic efficiency criteria are indicated in the diagonal quadrants. A different situation in turn occurs in times of shortages, when even low quality dwellings generate a price premium (i.e. the case in the upper left quadrant).[40] This is arguably an unfavourable situation from both economic efficiency and social equity (or sustainability) points of view.

Studies were carried out of the same area using both available datasets (see Chapters 4 and 5). The first task was to carry out a case study in the middle parts of districts IX and VIII using the subset of the 215 observations of individual mortgage appraisals acquired from ECORYS that fell within the boundaries of the urban renewal areas. After examining the data, eight useful observations were found: at four locations in two points in time for each. The value increases were then compared for certain streets inside (the target location) and outside (the three comparable locations) the case study area. The comparable locations would give an indication of the counter-factual case: changes that would have occurred otherwise had no urban renewal taken place. The location of the target observation for which the price increase was observed was along Üllői út – the main street which serves as a boundary between the two districts VIII and IX (see Figure 3.4 earlier).

When we observe the increase in property value along Üllői út, it was as

40 Smith et al. (2006) argue, using qualitative evidence from Edinburgh, Scotland, that such shortage can be created artificially in situations where the marketplace of house-buying becomes a 'casino', with the actors involved behaving emotionally: professional intermediaries (agents, in particular) becoming ignorant; buyers throwing money away; and sellers raising their expectations and successfully realising them.

Figure 7.1 Price development disaggregated by area (target or comparable) and by dwelling type (condominium or panel house)



high as 20%-25% in a less than three-month time period when controlled for the two structural variables age and size. This is substantially more than a

Table 7.2 Increase in prices (HUF/sq.m.) during the time period for each area and house type

	1997	1998	1999	2000	2001	2002	total change
Condominiums							
IX target	65,235	70,000	78,538	117,444	145,150	175,478	+169%
IX comparable	58,150	62,111	72,063	106,864	132,100	159,522	+174%
VIII target	40,824	44,704	52,971	92,574	107,048	124,380	+205%
VIII comparable	49,450	55,273	64,125	108,733	119,450	133,526	+170%
Panel							
IX target	-	58,000	67,000	-	143,000	117,750	+103%
IX comparable	-	63,000	-	-	-	-	-
VIII target	37,000	43,500	55,333	89,000	101,500	111,400	+201%
VIII comparable	-	50,000	-	-	121,000	108,000	+116%

comparable dwelling in district VI (Eötvös utca), where the corresponding value increase was 10% at the most. In two somewhat less comparable locations and house types the price increase was also not of the same magnitude as for the target case for the same time period: 10%-15% in district III, and only 2%-5% in district XI. Thus, when observing the increase in property value along Üllői Road, the price increase was 10%-15% higher than in a comparable location, which indicates an element of value premium related to the effect of urban infill.

However, given the modest set of evidence this conclusion remains speculative. As the sample of individual house price data was too small, the other database of stamp duty calculations based on Ingatlanadattar was used. The subset of observations from the particular area under study is isolated, and the analysis extended to a six-year period covering cross sections from 1997 to 2002. For each of the six cross sections, data is recorded for the mean prices and the turnover for given streets.

When relevant, the street was disaggregated by the two main house types: condominium or panel houses. One set of data, the target cases, were formed for the locations inside middle Józsefváros and middle Ferencváros respectively, and another set, the comparable cases, for the locations just outside the respective target areas but nevertheless within the boundaries of districts VIII and IX (inner/outer VIII/IX districts). In compiling this set, an ad hoc definition of 500 metres (ca. 1/3 mile)[41] from the boundaries of the area under study was used (see Sluis and Kauko, 2003). The results of these calculations are shown in Figure 7.1 and Table 7.2, and summarised below.

District IX

For the whole period, the price level for the target area is higher than the price level for the comparable area (at least for condos, but whether this is the case for panels too is not clear because of insufficient data). On the other hand, the fact that the price changes are steeper for the comparable area

41 To compare with Southworth (1997), the distance Americans will walk for ‘typical daily trips’ is ¼ mile at the most.

than for the target area indicates that the target area has not experienced an unnatural increase during the period (cf. the sharp increase in new dwellings from 1993 onwards already described). Hence it cannot be claimed that any kind of artificial 'value creation' took place within the urban renewal project. Furthermore, the area cannot be said to have undergone unfavourable price development (i.e. speculation without the link to quality improvement) recently. Hence the situation fits into the upper right quadrant of Table 7.1.

District VIII

For the whole period, the price level for the target area, which is indeed a stigmatised area, is lower than the price level for the comparable area for condos, and, except for the last year recorded (2002), also for panel housing. The price increases are however steeper for the target area than for the comparable area. Hence a clear 'value creation' effect is seen during the period, and as no actual quality improvement took place in the area, this is due to expectations about future price increases – a highly unfavourable trend. This situation fits into the upper left quadrant of Table 7.1.

Comparison of the areas

On the basis of this evidence, plenty of differences between the two areas prevail. Thus, the nature and pace of the changes are different in the two affected target areas, when related to unaffected comparable areas just outside: in district IX the price level of the target area is higher and the increase less steep than in the comparable area, whereas in district VIII the price level of the target area is lower and the increase steeper than in the comparable area. It may well be that the futures of both areas will be in the quadrant with a market hotspot character, if the demand of this segment – assuming they then are part of the same urban, younger middle-class segment – develops quicker than the physical development process can provide new housing; however, an alternative scenario is that the areas remain fundamentally of different character.

7.4 Summary of the case study and discussion

The study reported in this chapter had two objectives. The first, descriptive goal of the study was to ascertain the change in price in relation to the building up of the areas under study. A certain increase in price over the period under study may be due to a process of value creation through the technical planning apparatus, power positions and institutions, and not just the market mechanism of supply and demand, and the macro-price trend – or even a clear urban quality improvement. The second, and more prescriptive goal was to be able to evaluate a government-initiated change in the quality of the built environment from a micro-level market point of view, based on the empirical material. This way, the potential situations are classified as favourable, unfavourable and debatable based on the change in price and quality levels.

Above, empirical material was provided in the form of case studies from two neighbourhoods that are undergoing substantial rehabilitation – the middle parts of Budapest districts VIII and IX. The development of the two case study areas differed in timing and type of processes, as well as starting points. In the case of district IX, quality improved throughout the 1990s, with an immediate and steep increase in price levels as the result – arguably an efficient and sustainable outcome. The calculations based on house price statistics, in turn, showed how these areas have developed at a different pace using aggregated observations from a six-year period 1997-2002: during this period the case study area in district IX did not experience as steep a price increase as the adjacent case study area in district VIII, as the price level at the beginning of the period was substantially higher in the case study area of district IX than in the case study area of district VIII. Thus it can be concluded that during this period intangible 'value creation' (as defined for the purposes of this study) through the regeneration project took place in the case study area of district VIII only, as an intended future upgrading was effectively capitalised into prices. As the actual quality did not change, this is an effect based on expectations – arguably an inefficient and unsustainable outcome.

In other words, during the period 1997-2002 an intended future upgrading (i.e. a speculative effect) was effectively capitalised into prices in the area of district VIII only. In district IX the price impact was real, due to physical and social upgrading as a result of an increased housing market turnover.

8 Concluding discussion

8.1 Summary

The observation about how today's global territorial competition processes and the strategies of cities in responding to them elevate the importance of investigating urban real estate and housing markets prompted a research project aimed at comparing the spatial housing market structure and dynamics of European metropolitan areas with respect to available indicators, most notably house prices. After successful research on two 'Western' and 'Old European' urban housing market areas, Helsinki, Finland (see Kauko et al., 2002; Kauko, 2002, 2004) and Amsterdam, The Netherlands (see Kauko, 2004), the next idea was to broaden the variation to a more 'Eastern' and 'New European' context. This contribution has reported the housing market analysis of Budapest, Hungary using neural network classification, expert interviews and case study methodology.

The study began with a presentation of the methodology, and after that the context of study was defined. In order to understand the way the method is used, it was necessary to examine the more established tools for spatial housing market analysis. It was concluded that an alternative modelling approach may well be a welcome addition, and that there clearly is a deficit of comparative analysis of urban areas. The objectives are urban housing market structure and locational preferences/behaviour; and house and land prices. Empirical modelling based on housing market data and expert interviews was the starting point of the analysis. Two neural network techniques, the SOM and the LVQ, were used for analysing statistical datasets of house prices and related indicators. With these methods it is possible to obtain information primarily about dwelling prices, locational values and submarkets, and additionally about certain underlying more institutional and behavioural features as patterns that form on the map surface generated by the SOM. The interviews in turn were both quantitative comparisons of preferences, which subsequently are elicited with the AHP model, and supporting in-depth interviews with the same experts.

The qualitative aspect of price analysis, segmentation, was strongly emphasised in the study. The housing market segmentation theory is split between the purely economic and the multidimensional criteria, and it is safe to assume that neither of the two models is always the better one, and that the success of a model depends on how and where it is used. In other words, scrutinising the background of the study area becomes crucial for carrying out a successful analysis using this approach.

The literature on local housing market processes and residential patterns in Budapest is ample. The first thing to note is that, while being a case of its own between Eastern and Western settings, the Budapest housing market is, like other post-socialist urban housing market contexts, about change. In the case of Budapest this can be characterised through three waves (see Kauko, 2005b, for a historical overview):

1. The increasing market orientation beginning in the late 1970s.
2. The fundamental changes of the 1980s, such as the mass privatisation, the construction of high-quality single-family homes for the affluent new suburbanites, and the plans for urban renewal of the inner city.
3. The anticipated trends of a future system, where the privatisation is completed, and optimistic views are presented following Hungary's accession to the EU in the spring of 2004. Such 'new winds' include piecemeal redevelopment of inner city sites and construction of high-quality houses and apartments – not only for the most affluent buyers, but for the growing middle class too.

When looking for features that are combinations of several characteristics, two main dimensions (principal components) can be isolated: one is related to the attractiveness of the cityscape; the other to social disamenity effects.

In the neural network classification of the city-wide housing market the following conclusions could be made:

- House price is partly determined by a tangible housing quality, which may point to a certain building design, size and building age. It may however also mean image-based appreciation without any link to fundamental price determinants. In general, non-linearity prevails: for example, a small and popular inner city segment comprising refurbished dwellings exists amidst a largely unattractive residential environment.
- The phenomenon under study is characterised by plenty of idiosyncrasies, constant disequilibrium and uncertainty, and involves certain fuzzy relationships. Notably, a housing market existed in Budapest already in the early 1970s, but it was not a 'Western' market, and it still is not, as the chaotic housing market is a result of over-liberalisation in an immature context. Hotspots and run-down dwellings exist side by side even in the same block. Apart from the small enclaves of prosperity, and the rapidly growing but still small middle class, there is a lack of purchasing power – about 95% of the population is not in the market.
- Therefore an explorative research strategy is worth selecting rather than working with equilibrium assumptions. The idea is to become acquainted with the context, and then generalise vis-à-vis different institutional and geographical contexts.

The results based on a small set of individual mortgage valuations suggested the Budapest housing market to be spatially and functionally extremely fragmented, as a mosaic of various house types, age categories and price levels, as well as micro-locations, could be identified. A follow-up analysis of street- and district-wise aggregated data with the SOM and the LVQ shows further evidence about the balance between physical and socio-demographic characteristics and house price levels. The new results are synchronised with the earlier findings: also here the administrative district is found to be a less important determinant of the market position of a dwelling than its price, type and street address.

The conclusion based on the first SOM analysis was that this housing market is not compact at all with respect to the spatial features; even in the same residential location substantial differences are found in house type, age of construction and price level, as well as in the quality of the immediate vicinity of the dwelling (micro-location). Even stigmatised districts contain a share of dwelling stock with good market position; likewise, even the top districts include a cheaper and/or more dilapidated stock of dwellings. Thus, location did not show as an important feature of the housing market on this coarse level.

The second modelling of the whole Budapest housing market also showed that the dimensions of housing market segmentation are very nuanced and do not correspond to districts. An analysis of street- and district-wise aggregated data with the same neural network modelling techniques, namely the SOM and the LVQ, showed further evidence about the balance between physical and socio-demographic characteristics, price and regulation that affect the local housing market. The new results are at least partly synchronised with the earlier findings: the overall market analysis using SOM and the LVQ on a cross section of housing sales from the year 2002 showed that including district variables leads to less valid results than using only streetwise aggregated market and house type indicators (sales price, market tightness and share of condominium dwelling sales in the total number of sales). The rough classification of housing and location bundles together with price estimation on the overall city level was based on the visual interpretation of the SOM output, and further classification was conducted with the LVQ. This was the first important goal of the modelling.

The second objective of the study was to model the temporal housing market dynamics on a smaller geographical level within the overall urban area. The market situation of districts VIII and IX were modelled by running a subset of the larger dataset that falls within the boundaries of the targeted areas (i.e. middle parts of districts VIII and IX) with the SOM and the method of ‘fixed time windows’ by Carlson (1998). This area comprises two neighbourhoods that have undergone rapid social and structural changes during the last decade. The data was observed from six yearly cross sections from 1997 to 2002. When zooming in to two particular adjacent target areas it was noted that, while both areas had experienced a price increase during the six years under study, one of the areas (middle Ferencváros) showed a link to fundamental changes in price determinants, whereas the other (middle Józsefváros) showed more of a speculative outcome. Using the SOM output as ‘fixed time windows’ it was found that the housing market dynamics in the selected ‘slice’ of the urban area is differentiating micro-locations in terms of house price escalations on one hand and changes in the urban housing structure on the other, during the observed six year period. However, as fundamental changes are underway in middle Józsefváros too, and as convergence between the two areas is likely, it is not to say that these two aspects of price increase are to be understood as separate phenomena.

The third exercise was aimed at eliciting weights for locational feasibility assessment and investment appraisal purposes. The idea was to give relative weights for various attributes related to the quality of the location in a housing investment setting. This enables quantification of fuzzy, nearly unmeasurable elements of quality to arrive at a ranking of attributes regarding their relative importance and, subsequently, to arrive at ranking of alternative locations. The elicitation is used with the AHP technique, which allows detachment from a market equilibrium perspective. The exercise is comparable with similar exercises from the urban residential areas in Amsterdam and Randstad Holland in 2003, and metropolitan Helsinki, Finland in 1998.

Here, various housing consumer groups were targeted, from the point of view of residential choice criteria composed of a set of attributes that describe the location in question. As a result, it may be seen how various preference profiles differ from each other, for example inner city vs. suburban types of preference formation. Such information can be of valuable help when a model built on more large-scale data fails to deliver, or if the analysis contains fuzzy and qualitative characteristics that are mixed with more crisp and quantitative ones.

After that, a case study based on identification of relationships between key variables, supported by some simple calculations of changes in indicator values, was undertaken regarding the contribution of each factor to the price formation of housing in an urban renewal context. This requires a triangulation approach: to combine statistics on various market indicators such as transaction prices, and various qualitative and quantitative information recorded about the sites in question, planning documents and stakeholder interviews. Indeed, an artificial 'extra' price element was found here too, in addition to the more standard price effects found in the SOM analysis. In principle, this kind of analysis is a promising means of evaluating a government-initiated change in the quality of the built environment from a micro-level market point of view.

Following this logic, the first target of this analysis was to relate the development of house prices to localised development, land ownership and land use circumstances in search of an 'artificial' price element. The second target is to classify areas into 'favourable' and 'unfavourable' based on two simple indicators: the development of price and quality. Here the notions were about price escalation occurring due to either factual quality improvement, or only anticipations about such improvement, when the market is noisy, volatile and thus inefficient. While there was no direct anchorage for the theoretical framework of the study, some of the ideas have been discussed in the urban-based literatures of housing economics and land use planning. In these mostly quantitative assessments of a resulting or hypothetical land use change, the objective has been whether planning or zoning regulations are economically efficient, and whether a certain design involving infill and consolidation is on a par with housing consumer preferences (see e.g. Song and Knaap, 2003, 2004, and Morrow-Jones et al., 2004). Most of this evidence is from the USA. Given the ongoing integration process of the EU, there is an apparent need for cross-country comparisons of economic evaluations of planning and policy measures within an explicitly European context. In doing so it is vital to incorporate exemplars of the emerging economies and rapidly developing post-communist urban societies. While high-quality data and plenty of previous research published in English exists in the Western countries, the situation is different in the Eastern and Central countries of Europe. To balance this handicap, in these countries the urban development processes to investigate are extremely interesting as they happen very rapidly and may take surprising proportions when regimes change. A sudden wholesale turn from an extremely planned context to an equally extreme free market context some 10-15 years ago surely makes such work interesting.

8.2 Comparison with prior cases: Helsinki and Amsterdam

Within housing economics, relevant spatial and clustering analyses have been carried out by a number of authors, some of which were mentioned in Section 2.1. It can be noted, however, that not much work has been conducted as comparisons between two or more urban areas.

Budapest turned out to be an especially interesting case on which to undertake research on this rather interdisciplinary, multifaceted and complex topic. A variety of spatial zones, temporal phases and exceptional institutional conditions characterise the idiosyncratic Budapest housing market. The fact that this context is 'a case of its own' does not deny many of the same basic relationships that are found elsewhere: premiums for low area density, good traffic connections and certain neighbourhoods that are, for various historical reasons, very specific and considered more attractive than others, even in close geographical proximity.

Based on this analysis, the following conclusions about the Budapest spatial housing market structure could be made:

- higher building age decreases the property value relatively unambiguously (compared to the earlier cases Helsinki and Amsterdam, where the association between age and price was highly differentiated, and in many locations completely the opposite)

- the most important criteria of segmentation pertains to the house itself, that is, the type and the size in conjunction (plus the age and the price) with the immediate surroundings of the house, rather than to area-location
- the symbolic level (for example, ‘garden city’) and the local history are further determinants of intra-urban spatial price differentials

  the district location cannot really be considered an important determinant of price; even in the same block the dispersal of prices is very wide
- on the whole, the situation in terms of housing market structure is more idiosyncratic – one could even say more chaotic – than in the other two European cities under study.

The classification of spatial housing market structure with the SOM and the LVQ involved the assumption that Budapest is different to the earlier cases Helsinki and Amsterdam. This entailed expertise of the Budapest market gained from previous surveys and literature, together with the author’s own explorations with regard to evaluation and comparison of the urban residential areas. Furthermore, a case study regarding how planning, in its administrative and quality dimensions, and economic factors relate to house prices at the neighbourhood level was carried out.

The AHP exercise on housing consumer preferences in turn followed loosely the idea of naturalistic generalisation, where an actual problem situation is compared with known cases (see Johansson, 2005). Subsequently, various naturalistic generalisations about locational profiles are obtained. The cross-country evidence indicates fundamental differences in housing consumer tastes and intentions between housing markets, as prior cross-country evidence on housing consumer preferences based on expert elicited residential location quality profiles demonstrated fundamental differences in housing consumer tastes and intentions between the two housing market contexts metropolitan Helsinki (1998) and Randstad Holland (2003). In Helsinki location was important, and two aspects of location in particular: accessibility and ‘pleasantness’. In Randstad Holland the situation was somewhat different, especially with regard to the suburban areas: for the majority of housing consumers the functionality and spaciousness of the house itself mattered more than location, and the tangible factors weighed more than the intangible ones when it came to evaluating the physical surroundings (see Kauko, 2004, 2006). In Budapest it was a combination of social aspects and the traditional pro-urban sentiments that stem from proximity to the city core and a densely built environment involving certain design elements.

The overarching aim of the whole project was to analyse the housing markets, residential value formation and housing preferences with respect to the locational factors in various European urban areas. Empirical modelling based on neural network and expert interview techniques was undertaken in this study, which enables comparison of the results with those from the prior study on metropolitan Helsinki and Randstad Holland. Moving onto a higher level of abstraction, the idea was to repeat the analysis with different datasets of different time and place, in search of new generalisations. Here we can pick up ideas of two heavily cited contributions in recent housing analysis. In housing research, Kemeny and Lowe (1998) refer to this as middle-range theory. Such a theory is positioned in between the idiosyncratic and particular level of case studies, and the nomothetic, general level of neoclassical models. Pickvance (2001) discusses the methodological aspects in comparative analysis involving causality. He designs a typology of four cases (A-D), based on similarity and plural causation. The question is whether we find similarity in results, similarity in expectations, neither or both?

When conducting cross-country comparisons in social and economic research, the guidance of Pickvance (2001) is useful. According to Pickvance, comparative research projects may be classified based on two dimensions: whether they aim to explain differences or similarities, and whether the assumptions about the underlying causal patterns are identifying differences or similarities. By cross-tabulating four cases A-D thus result, three of which are recommended by Pickvance. A (expected and observed differences), C (expected differences but observed similarities) and D (expected and observed similarities), but not B (expected similarities but observed differences), which is somewhat illogical.

For this project this idea is translated as follows: to what extent are we able to generalise, when the analysis is repeated in various contexts? Incorporating a substantially different city, Budapest, will give us some perspective to decide on the issue of similarity between the segmentation in Helsinki and Amsterdam. Based on this project the assumption of differences (A or C) holds. We expected differences and observed differences, but we also observed similarities. However, to Pickvance's framework I will add that the boundaries between these cases are fuzzy and relative. If the findings support similarity, then of course the question is whether the assumptions should be revised as well towards case D, the 'full similarity' model. Perhaps Helsinki and Amsterdam after all share the assumptions regarding the value formation mechanisms and market structure? To confirm this, we need a completely different context; that is why a city such as Budapest needs to be selected. If the causal mechanisms are once again assumed different between Budapest and the two earlier cases, we get a full model of the three cases regarding similarity and difference and speculation about causality: Helsinki and Amsterdam are indeed different (and Amsterdam more similar to Rotterdam and The Hague, as concluded in Kauko, 2005b), but when compared to Budapest, they have to be considered similar in relative terms.

As expected, the findings from the SOM analysis of Budapest differed from those of Helsinki and the three Dutch cities reported in Kauko (2005b). According to the Budapest results the district location is a less important factor than the price, type and immediate vicinity of the dwelling for the market position of the dwelling. Because of an increased exposure to a competitive market in an initially constrained housing market context it is more valid to refer to certain market 'hotspots' that have developed instantly, whereas the majority of the locations and house types are lagging behind in quality levels. The study did not aim to make value judgements of policy changes and their effects[42], but indeed, for the Budapest context various objectively positive and negative aspects can be singled out: one could say that since the early nineties the administrative constraints of the old days have turned into financial constraints, and that there is still huge inefficiency in the market. In other words, the traditional agency relations between actors that underpinned the old housing market situation have partly become converted to transaction costs in a more Western type of competitive urban housing market.

In the case study analysis reported in Chapter 7, two micro-aspects of price development were of interest (as suggested by Locsmándi, 2004): the physical development and the management of the urban renewal project. The Amsterdam analysis of Buurt Negen (see Sluis and Kauko, 2003) serves as a model here.[43]

The two Budapest cases illustrate the regeneration of an old but dynamic urban area with partly inner-city, partly transitional zone character. The story here was piecemeal rather than total renewal of neighbourhoods. The specific aim was to see the fit between housing market process and the physical and social upgrading of the area, and to make generalisations, following Sluis and Kauko (2003).

Two familiar contexts are required to reach any generalisations, and a third more unfamiliar context to test them on. In this case I have chosen two countries where market-based quantitative housing market analysis is frequent (Finland and The Netherlands) and a third where this kind of tradition for historical reasons is only just emerging (Hungary). These three countries demonstrate the variation in housing market structure on a macro-locational and nationwide level across European countries.

Before looking at the structural differences between the three cases, we can first note a rather obvious observation: their mean house price (per m^2) levels in the datasets applied were of very different magnitude in absolute terms (see Table 8.1).

Although it is true that exactly the same variables were not used in all cas-

42 Meen and Andrew (2004) judge spatial segmentation to be an unfavourable outcome, and suggest that it may be possible to abate with the help of tax policy (but probably not with the help of planning policy or area-based initiatives).

43 This was however a much smaller area, and one with a different urban renewal strategy. No similar study was conducted from the Helsinki context.

Table 8.1 Mean price levels in the three urban housing markets

Helsinki (metropolitan area)	€ 1,056 (1993)	€ 1,885 (2001)
Amsterdam	€ 494 (1993)	€ 1,332 (2001)
Budapest		€ 275 (2001/5-2002/1)*; € 699 (2002)

*) mortgage valuations

es, the results indicated the following types of differences among the three cases Budapest, Helsinki and Amsterdam:

- difference in the magnitude of the same price determinants (cf. hedonic approach);
- totally different price determinants due to context specificity, thus requiring different intermediate theory frameworks;
- differences in the supply of housing, due to restrictions in house building and second-hand housing markets.

In some cases similarities were found in terms of submarket structure in relation to preferences and price determinants. Below I list some results regarding the comparison between Amsterdam and Helsinki, and how Budapest compares with these cases on each count.

Similarities:

- In both Helsinki and Amsterdam physical features were more important segmentation criteria than socio-demographic and price criteria; in Budapest this applies to some extent, but both social standing and the price level are important criteria in a detailed sense.
- Presence of water brought a price premium in both Helsinki and Amsterdam (on a general level); the case is probably the same with views over the Danube in Budapest, although this effect was not investigated explicitly here.
- In both Helsinki and Amsterdam area density had a differentiated influence on price: (1) scarcity value of large plots and low density development, although in both contexts there was (2) a market for high area density as well; in Budapest (1) applies for the attractiveness of the outer parts of the inner city over the 1970s suburbs, whereas (2) applies for the attractiveness of the city centre.
- In both Helsinki and Amsterdam socio-demographic features such as the population density and the proportion of single-person households (ca. half of the households in each city) were important for the organisation of the feature map and thus contributed to the segmentation further; such findings could not be identified from Budapest.

Differences:

- Amsterdam turned out to be in general much more heterogeneous than Helsinki in terms of internal submarket structure. In particular, when using concentric rings as segments, the variation in price and other attribute levels within one segment was much larger in Amsterdam than in Helsinki.

Table 8.2 Summary of the findings concerning the formation of submarkets and prices; comparison between the three urban housing markets

Market segmentation may be detected, and attributed to various determinants: (1a) physical factors, investment history layers, and inertia → supply (1b) socio-demographics and preferences → demand (2) submarket boundaries are heterogeneous mosaics or more homogeneous blocks, and change in time	Particular circumstances in Budapest, Amsterdam and Helsinki: - in all three supply considerations carry more weight than demand considerations of the housing market - demand factors have grown in importance - Budapest is most fragmented (symbolic level: e.g. garden city image; local history: e.g. radiuses from the V district), Helsinki has a clear structure, The Hague and Rotterdam are polarised
House price determinants vary between contexts as well	
(1) age of the building	- has a nonlinear association with price in Helsinki and Amsterdam; in Budapest higher age indicates lower price, although also a small segment with old expensive dwellings exists
(2) house vs. location	- in Budapest the house itself (type and size in conjunction) and its immediate surroundings including the building affects price; in Helsinki and Amsterdam location was more important
(3) density	- has a nonlinear association in relation to price in Budapest (like in Amsterdam and Helsinki)

The middle part of the price continuum was especially difficult to identify as one or more separate segments in Amsterdam. Budapest is even more heterogeneous than Amsterdam in terms of various supply and demand dimensions.

- Because of scarcity of green areas and space (in a general sense), in Amsterdam plot size and low density had a much stronger association with high prices than in Helsinki. In Budapest the intensity of this association is lesser than in Amsterdam, but stronger than in Helsinki (see similarity above); in Budapest the design of an area matters even more than the spaciousness of the environment.
- Water proximity is always attractive in Helsinki; in Amsterdam there might be unattractive canal locations in the inner city. In Budapest we cannot validate anything based on these analyses, but the situation is probably closer to that of Helsinki in this respect.

These conclusions are presented in Table 8.2.

To sum up, the factors that matter for the urban housing market structure and dynamics are somewhat different in Budapest than in the previously investigated cases. The differences relate to three dimensions: primarily, to the paths how urban regeneration and public infrastructure investment shape the residential environment, the housing market and the boundaries between market segments; in a secondary sense, to the social standing; tertiary factors are the way preferences of consumers are differentiated in relation to lifestyles and image, and the intangible/soft factors.

How similar and different then are the three urban housing market cases in terms of the dimensions under study? Two conclusions may be drawn based on the evidence obtained from the study when compared with that reported in Kauko (2005b). First, both Amsterdam and Helsinki are substantially different from Budapest. Second, Amsterdam is more similar to the other two Dutch cities, Rotterdam and The Hague, than to Helsinki and Budapest.

8.3 Some implications for urban theorising

No theory was formulated in the beginning. However, a later discussion on theory was anticipated in order to put the results into a broader perspective. After documenting the empirical material, theory was sought as a tool for organising the findings. This inductive research strategy necessitates keeping the theory as open as possible. Next, two broad 'heterodox' perspectives are presented, as it is argued that they fit the purpose of this paper well. The inconvenience however is that these arguments are often only treated implicitly by current theory (see e.g. Maclennan and Tu, 1996).

If we relate the processes and the structure of the Budapest housing market discussed above to any specific urban economic location theory the fit is poor. First, the submarket structure is to a large extent about sectoral segmentation, as both types of housing (single-family and multi-storey) are often found within the same urban or suburban neighbourhood. Thus both types of housing market structure prevail: the city vs. the suburb; and the sectoral segments. Following the simple equilibrium model of neoclassical urban economics, some households choose to locate close to the CBD, while others gravitate towards the suburban land and housing market (Baross et al., 1997). However, when such hypotheses are presented it has to be remembered that this only applies for the newly built medium and upper owner-occupied market segments, and that the mistakes made by the old housing and planning regime for a long time continue to constrain the lower market segments, not to mention the very marginalised rental housing market in Budapest.

According to Locsmándi's study (1989) the problem was that in the new housing estates the system of distribution mattered more than real attractiveness potential proxied by income, prices and so forth. Locsmándi (2004) points out that inertia (subsidies, taxation, political will, image aspects, etc.) was an important determinant of the character and density of the sectoral development when the city grew from the city centre outwards. For example, in the 19th century a lot of building took place from the valuable inner city (which was also exempt from taxes) outwards, but not in all directions. A certain area may have experienced an upward (for example, Andrássy út in district VI), or downward development in value (for example, the 'Chicago' of district VII). The investment, or lack of it, either enhanced the potential of that location, thereby attracting further investment, which increased the value further, or led to dilapidation, a loss in potential, absence of investment and a further decrease in value. However, in either case, the trend may plausibly have been reversed: inappropriate structures have generated a downward trend in value formation and development activity, and gentrification of a neighbourhood would have led to an upward trend.[44]

Maclennan and Tu (1996) point out that spatial arbitrage may or may not hold in a given urban housing market context. If the submarket concept is apt in this context, then it may be assumed that two (or more) potential submarkets with a price difference contributed to different supply constraints, difference in quality, or something else (asymmetric information, topography or public sector interventions) exists. This would mean that two adjacent areas, for example, the recently rehabilitated and upgraded district IX and the rest of the inner city of Pest are not substitutes for the housing consumer. In a theoretical sense, the submarket concept implies that, if the supply now is increased in the submarket with the higher price level, the price differences may remain. However, if this price difference is levelled due to spatial arbitrage, then we cannot talk about separate price submarkets.

At present, the local housing market is partly characterised by a competitive market-led price formation and related to quality levels, especially for the prestigious areas. However, it is also burdened with huge transaction costs. Furthermore, due to the room for uncertainty, here negotiation is far more important than government regulation for the market outcome. For example, in district XI, the gap between market value and collateral value (i.e. risk-adjusted value) is huge, because there is plenty of uncertainty about the real potential of locations. This is ostensibly the situation in many other districts too. To this can be added that, even though decentralisation was carried out heavy-handedly, there are still no preconditions for a Tiebout-effect type of differentiation between the twenty-three Budapest districts, because, contrary to what fitting with this line of neoclassical urban economic textbook theory necessitates, here income taxes are levied by the state government, and the local business tax is relatively minor for any firm.

The material presented in Chapter 3 showed that the Budapest housing market is a very rare case, where the role of change is substantial. In the past, the local housing market was characterised by a cost-based and decree-led price formation, together with an informal sector; agency was everything in a meritocratic system. In such conditions, the system of (re)distribution and specific inertia had a far stronger impact than the real attractiveness po-

44 The character of an area depends on the time period during which it received investment and if it was developed in many waves that may give a particular character. Recent developments have a positive effect; however one should take a closer look at this. Perhaps, since location is a rather important factor, those areas that received more attention from developers are good locations, but it is a 'chicken and egg' type of situation: which came first, the locational quality or the development activity? (I am indebted to Gábor Soóki-Tóth for this point.)

tential of places. It is exactly because of such strong elements of change involving friction and discontinuity that the institutional and evolutionary approaches can be argued to fit the Budapest housing market well. Thus, even though this study focused on the spatial dimension, as with Helsinki and Amsterdam, the role of forward and backward looking cannot be ignored in this context. The changes from past to present housing market have been extraordinarily immense and impulsive, and make for a good example of path dependency in socio-spatial analysis.

Institutions are understood as the rules of the game, and they involve feedback with human interaction. They are dynamic; they may be constitutive, constraining or liberating the aggregate structures and individual decisions; and they are either formal or informal. Often a more institutional view is considered more appropriate, or at least to be dealt with alongside the rather mechanistic 'market' and 'amenity' views of neoclassical land use and housing economics. Land use planning can be seen as a specific type of institution. Within the institutional approach, the Austrian school allows for the 'feedback framework' between market outcome and policy formulation (see e.g. Monk et al., 1999). This has important ramifications for this analysis. Furthermore, these processes are path dependent. These concepts support the empirical analyses of the Budapest housing market, in the multiple ways presented in this study.

However, for the modelling results presented in Chapter 4, no such links to dynamic theory can be made. This approach namely treats the SOM as a static model. Thus, one cannot draw any parallels between actual processes and the process of computation in my approach, as suggested by Daffertshofer et al. (2001), who suggest that the decision-making process of persons searching for a flat can be simulated as a self-organisation process, and that calculating the interactions and competitions across the whole structure generates a process. The temporal dynamics can only be added by making new runs with either new cross sections, as was done in Chapter 5, or simply by using the existing map for classification of new observations (in principle drawn from the same population as the training dataset) and seeing which part of the data structure they will correspond to.

If we want to look at the picture at the aggregate level, the logic of the market dynamics is largely different from Western metropolitan areas, although some similarity to Helsinki and Amsterdam was identifiable from the empirical evidence obtained. The SOM-LVQ analysis performed in Chapters 4 and 5 generated a mixed, mosaic-like housing pattern, which corresponds poorly with a specific location modelling paradigm. On the basis of this evidence, no urban economic model works – not the single equilibrium, nor the multiple equilibria. In the absence of a significant housing middle class, probably not behavioural-cultural models (i.e. models where the tastes of consumers matter within their socio-demographic background characteristics) either, although interview-based research on housing consumer tastes reported in Chapter 6 indicated diversity in preference profiles. The only generalisation to be made is that the trend in housing market patterns is extremely fragmented; in fact, residential locations are expected to be even more individualistic in the future due to new designs, especially on the Buda side.

The last empirical module of the study, the institutional case study, argued that planning and policy cannot be modelled without an essentially qualitative approach, and from a temporal perspective focused on processes. Such a method allows improving of the planning practice by paying more attention to the influences on house price – firstly, how likely premiums are to be achieved in the light of resources at one's disposal and the territorial complexities of the areas subject to such a measure, and secondly, whether such an outcome is healthy and desirable in terms of economic, environmental and social criteria.

The observed market development indeed becomes interesting when it is related to the physical and social upgrading processes taking place, because the two selected target areas in Budapest are subject to urban upgrading and consolidation policy. Recently, Meen and Andrew (2004) have considered area-based initiatives, although well meaning, inefficient policy for abating segmentation in European cities, when segmentation is argued to be an unfavourable outcome from both social and physical points of view. In European cities the main instruments for influencing the structure of housing are planning policy and area-based regeneration initiatives such as physical neighbourhood improvement, counteracting bad reputation, change in tenure, support for private service facilities and attempts to attract new firms. The experiences of these two strategies are however not yet promising, as such policies have not delivered convincing results in terms of long-lasting amenity improvements anywhere in Europe, except on small scales. The evidence that conditions have improved in the supported areas is only limited. For example, in Britain the deprivation rankings of urban areas have changed only little despite ten years of implemented regeneration policies. Potential reasons for this are that the European initiatives are rarely implemented with any overall strategy, and that one cannot control for random events that cause fundamental changes through cumulative processes of upgrading and decline in the environment regardless of the intentions of planners, Meen and Andrew (2004) argue.

The American research tradition in turn shows mixed results when it comes to evaluating the success of neo-traditional or New Urbanist policy: in the American studies it is often found that the increased density does not generate a value premium (but see Song and Knaap, 2003, and Frew and Jud, 2003), but if parks and other amenities are present in the development scheme the project is a promising option (see Morrow-Jones et al., 2004; Song and Knaap, 2003). While this evidence pertains to a larger geographical scale than a neighbourhood level, most of it nevertheless shows that parks and other amenities fulfil a demand for certain housing bundles and locations in a niche market for young, educated households, even if the rest of the urban rehabilitation measures are deemed unattractive. In any case, the SOM analysis is not meant to impose any value judgement about whether the changes taking place are good or bad, just merely to see to what extent they are identifiable from market data and possibly explainable by all available evidence. Here a positive change in price levels was identified regardless of whether the change was tangible (district IX) or intangible (district VIII). Furthermore, Ladányi's (1998) prediction about a growing ghettoisation cannot be considered valid in the light of these results; if anything, the analysis in Chapter 5 pointed to the opposite direction: strongly rising prices and an increasingly homogenous housing market in the socially and physically least attractive part of the city.

Here, a few thoughts on the applicability of the findings from an under-researched European and post-socialist urban housing market to the American (and perhaps also British) circumstances and housing economics paradigm are in order. Here at least three types of transferability issues can be noted when looking at the contextual differences. First, the transparency of the market in terms of prices in relation to quality, which is poor for the (Central and) Eastern European cities. Second, the role of neighbourhood amenities as determinants of dwelling prices. To some extent this concern is universal – for example, in district IX a whole block has been demolished and a park constructed instead. However, the need to improve safety and the school levels in one's residential environment is arguably a secondary factor in Budapest, even for the wealthy and well-educated population. Third, whether an inverse relation between area efficiency (i.e. density) and price level can be isolated in this context. Not unlike many other European urban areas, in the densest inner-city locations of Budapest the historical architecture and design of the blocks – the cityscape – is considered a factor that residents have a strong preference for. This attractiveness increases the marketability of such 'properly' urban locations compared to less urban locations of the inner city. Thus the assumption of low density bringing high prices does not hold for inner-city Budapest.

This issue about the inverse link between density and price is reformulated if we consider the price differentials between the inner city and the suburbs along rays drawn outwards in certain directions from the city core. Namely, traditionally in district IX the density increases when moving outwards from the outer part of the inner city towards the suburbs, which is contrary to classic urban monocentric land use models. Plot efficiencies in some of the older multi-storey blocks may in fact be lower than those of the areas developed later, in which case preferences for a lesser density also means preferences for the outer inner city over the suburbs. In this sense the assumed price premium generated by low density holds. Because of this spatial non-linearity caused by locally-specific circumstances there is no reason to assume a repulsion effect of the inner city so commonly found when reading studies on American (and even British) cities.

While the main motivations and broad strategies for planning innovation are transportable across countries and cities, the specific local context is always a crucial factor to account for. In the Budapest context, the role of planning is more limited than in Western Europe, and the area regeneration initiatives also differ remarkably for a number of reasons: notably, the social level is largely absent, the actors are expected to actively acquire government subsidies, and the development schemes are usually only piecemeal (see Appendix 3). This strategy of block-wise and developer-led market rehabilitation of the housing stock using a system of subsidies available for both local government and household group initiatives may be seen as a partly indigenous and partly imitated strategy. Any travelling planning/development institution always needs to lay roots in the new context, because the processes and goals of the urban rehabilitation are tied to the local conditions. For example, how easy is it really for (Continental) Europeans to understand the North American discourse of New Urbanism (see Grant, 2002; Song and Knaap, 2003; Deitrick and Ellis, 2004), or even the British discourse of Urban Renaissance, as the difference in urban context is substantial (see Meen and Andrew, 2004)? As noted above, in Budapest the issue about attracting subsidies is a crucial one; another is the absence of social rehabilitation. This applies for the target areas of districts VIII and IX as well.[45] On the other hand, also in the Budapest context, policy practices transplanted from the West undoubtedly have affected the inherent decision-making and management procedures that direct the rehabilitation.

The success of any imitation is arguably only relative at best. What is considered innovative in one context may not work or is harmful elsewhere. From a theoretical point of view, two questions arise. First, does an urban planning instrument such as urban rehabilitation contribute to locally rising prices, which can be observed when comparing price differentials to other dwellings situated nearby but outside the affected area? Second, if 'yes', then how big a proportion of the price increase is caused by quality improvement in the neighbourhood amenities and the housing stock, and how big a proportion is an artificial price element, caused by rigidities within the project such as unexpected bottlenecks and (more than reasonable) speculation?

In this framework, the first aim is to isolate the extra price premium that is suspected to have occurred through actual events, or speculations about these events, that are parts of the development project. This is conducted without a

45 Although claims about the existence of a social dimension are articulated in the documentation of these two neighbourhood rehabilitation projects in the EU 5th Framework Programme (see Egedy, 2004).

normative stance. Most of the US-based literature on the topic typically considers planning or zoning as a negative transaction cost, as it causes prices to increase through scarcity and not through quality improvements. However, in this context it can be argued that the scale of the analysis is usually broader, metropolitan at least, and the methodology of isolating spatial price differentials and their determinants insensitive to nuances. For example, Jud and Winkler (2002) investigate the dynamics of metropolitan housing prices and isolate a fixed effect, that is, residual price change attributed to location. Consequently, these authors argue that the magnitudes of the fixed effects depend on the restrictive planning policies and limitations. Nothing is said about a potential increase in the quality of the environment. This perspective has further significance in Europe where planning is not seen as 'bad' by default (see Kauko, 2003; see also Leung and Hui, 2005).

The second target of this kind of analysis is to assess the area attractiveness based on prices in relation to the quality of the dwellings in a given neighbourhood where physical, socio-economic and functional changes have occurred. This results in a classification into four cases based on the price-quality association of the areas under study. The favourable case is when both price and quality are high compared to the starting level, whereas the unfavourable case is when only the price is high but quality low. The remaining two cases where the price is low (and the quality either high or low) then are debatable and can be considered either successes or failures depending on the position of the evaluator. Here the criteria of success are partly related to economic efficiency and partly to other more socially and environmentally conscious goals.

The study has applied a divergence perspective on urban housing market analysis, and in this sense the findings fitted well. What are the implications of such a stance? Although no direct policy relevance was discussed, the notion of territorial competition was brought up at the outset. It is of relevance in this study to reflect on whether there are similarities to a Western city in this sense. That is to say, a city or city-region selects a specific strategy to attract professionals and firms. Such a strategy might focus on promoting housing or real estate market efficiency, or affordability and quality of life. Thus, what is more achievable – economic or multidimensional (social, environmental, aesthetic, etc.) goals. In this sense Budapest cannot be treated as one element, because it comprises several intricately defined segments, the pace of change of which is very different even in qualitative terms. When evaluating relative market successes and failures, social equality and beyond, the outcome may not be as optimistic as presented in this study. The political climate will without any doubt have a huge role to play in conditioning and directing these processes, and perhaps in a few years' time some indications of harder evidence than this might be expected.

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Appendix 1 The approach based on the Kohonen Map

The SOM is a type of flexible regression method and also a machine learning technique. The SOM is a competitive network invented by Kohonen in 1982. The SOM is best defined as a mapping from a high-dimensional data space onto a (usually) two-dimensional lattice of points (Kohonen et al., 1996a). This way, disordered information is profiled into visual patterns, forming a landscape of the phenomenon described by the dataset (see Kohonen, 1995).

The starting point for using the SOM is to initialise the map by generating random values for each node. Then, the training procedure of the algorithm proceeds in three stages: first, select (randomly) a training vector x; then find the best matching neuron, node c, that is closest to x; finally, adjust the node c and its neighbours towards the observation x (e.g. Koikkalainen, 1994). Usually the matching is determined by the smallest Euclidean distance (i.e. the distance metrics showing the closeness in an n-dimensional observation space) between node c and vector x, when m_i defines a parametric reference vector (codebook vector) of every node on map i. This can be expressed (cf. Kohonen et al., 1996a) as follows:

$$\| x - m_c \| = \min_i \| x - m_i \| \qquad (1)$$

The technique is based on the principle of unsupervised competitive learning, which could be described as "the winner takes all". Thus, the winner is the node with the shortest distance to the observation vector, and its weights are adapted towards the observation. This goes on until all observations are used for training – usually more than once. Neighbouring nodes on the map are being similarly adapted towards the observation, but the extent of this depends on the selected parameters. Here are two important notions: the similarity between units within the structure, and the 'typical' properties of a given unit with respect to the input dimensions.

An extension of the SOM, the LVQ, is based on the principle of supervised competitive learning. The idea of this algorithm is that the observations are now approximated into various classes of the input vector x, and x is then decided to belong to the same class to which the nearest codebook vector m_i belongs. The classes are determined a priori by giving each observation a label. Then the feature map is calibrated in such a way that the codebook vectors get a corresponding label based on the resemblance (i.e. the closest Euclidean distance) to a certain class of observations. Finally, the accuracy of the classification is determined, preferably with a set-aside sample. The classification performance is evaluated by the recognition accuracy, the ratio of successful 'hits' on average over all classes. The following equations define the process:

$$m_c(t+1) = m_c(t) + \alpha(t)\,[x(t) - m_c(t)]$$
if x and m_c belong to the same class,
$$m_c(t+1) = m_c(t) - \alpha(t)\,[x(t) - m_c(t)] \qquad (2)$$

if x and m_c belong to different classes,
$m_i(t + 1) = m_i(t)$ for $i \neq c$,

where α (t) (0 < (t) < 1) may be constant or decrease monotonically with time t, measured in steps of running (Kohonen et al., 1996b).

Here the most challenging task of the analysis is to interpret the feature maps visually, layer by layer (see Appendices 1A-C). The neuron is labelled after a certain predefined data category that corresponds with a certain combination of attribute levels. This is a sophisticated average of the combination of attribute levels of the observations associated with this neuron, and, to a lesser degree, of those observations associated with nodes situated further away from it. The key property here is that, in the same map, the position of the neurons is fixed across all layers.

The quality of the 'organisation' of the feature maps may be determined both with the SOM and with the LVQ. The statistic 'Q' denotes the average of the quantisation errors (i.e. the difference between observation vector and codebook vector) over the sample. An alternative measure would be the LVQ classification accuracy (calculated with a set-aside sample), given a certain predetermined labelling. Then the LVQ would not be used as a supervised but as an unsupervised network. This method is used for determining and comparing the relevance of certain discriminating features that are picked from the SOM analysis.

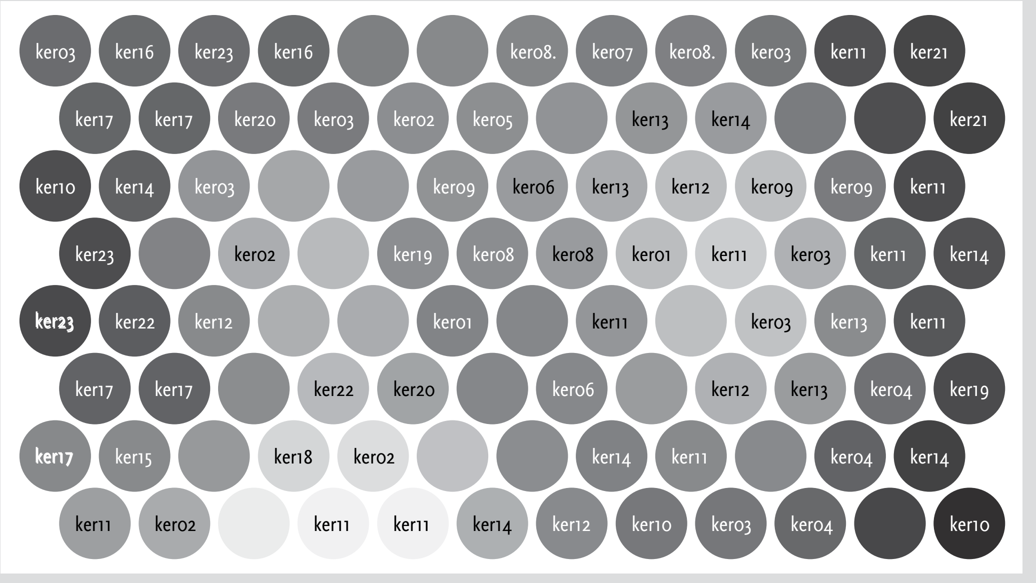
The power of the SOM approach can be enhanced by using more subjective and intangible determinants. In the case of the SOM analysis of Amsterdam, The Hague and Rotterdam reported in Kauko (2005b), the input variables included more subjective evaluation, as collected data on housing satisfaction and other similar variables was readily available from the Housing Demand Survey of the Netherlands (WBO). Such data has direct relevance for a demand-driven approach, where the quality is assumed diversified within a multiple equilibria setting. Moreover, by utilising such data sources, individual neighbourhood dissatisfaction can be related to an objective neighbourhood deprivation index (cf. Parkes et al., 2002).

Carlson outlines the following properties of the method when used as a tool for property market analysis (1998, pp.117-127):

- self-organising can be used to create an understanding of typical or less typical objects;
- there is no objective way of specifying the components of property value;
- the SOM enables visualisation and understanding of the market situation;
- the effect of principal components cannot be destroyed by using the SOM.

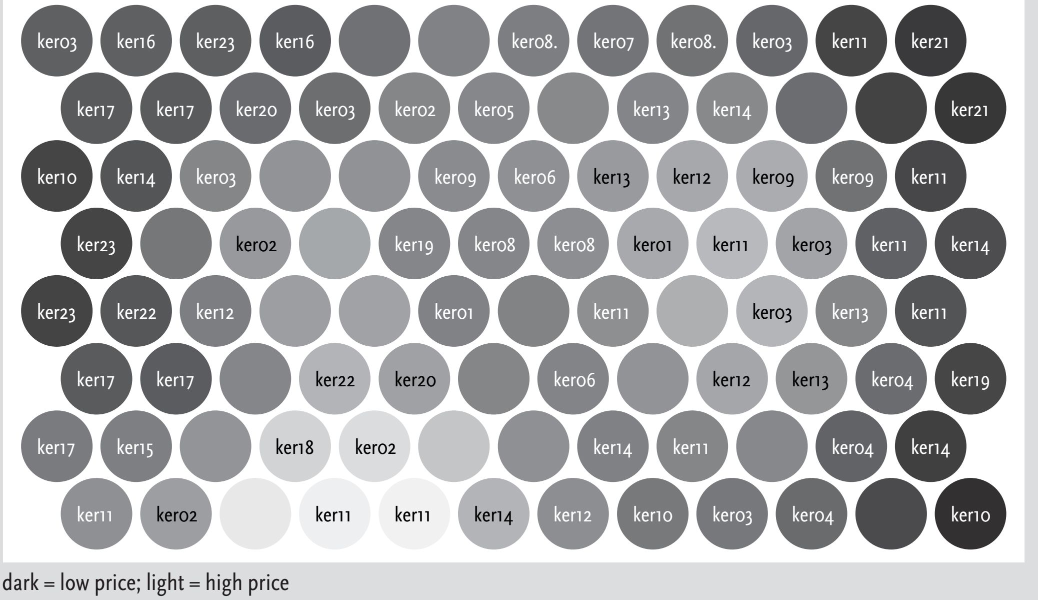
1A Feature maps – district label data

Figure A01 Feature map layer 1. Market value per sq.m.



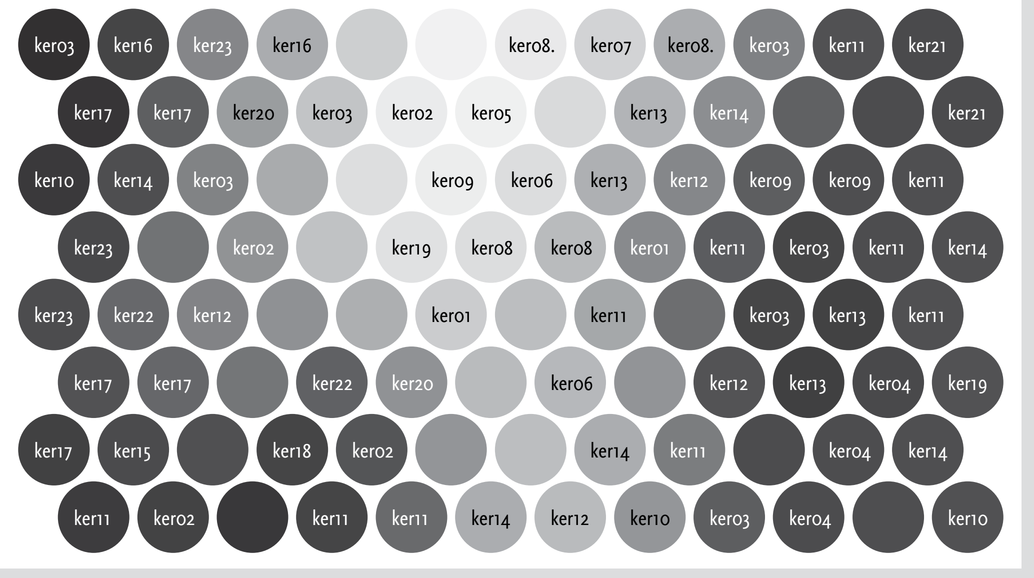
dark = low price; light = high price

Figure A02 Feature map layer 1. Collateral value per sq.m.



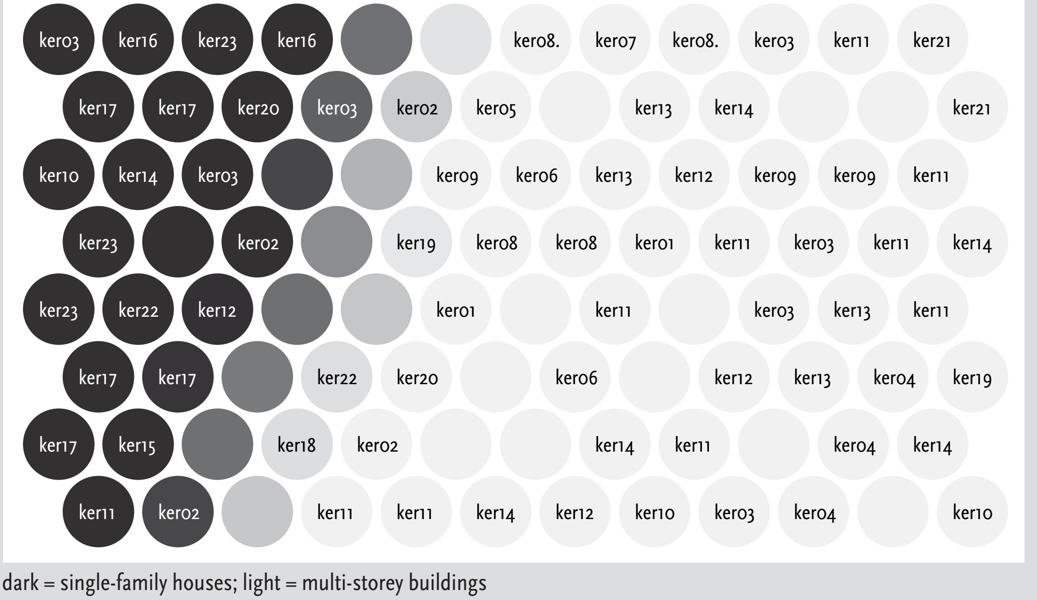
dark = low price; light = high price

Figure A03 Feature map layer 1. Age of the building.



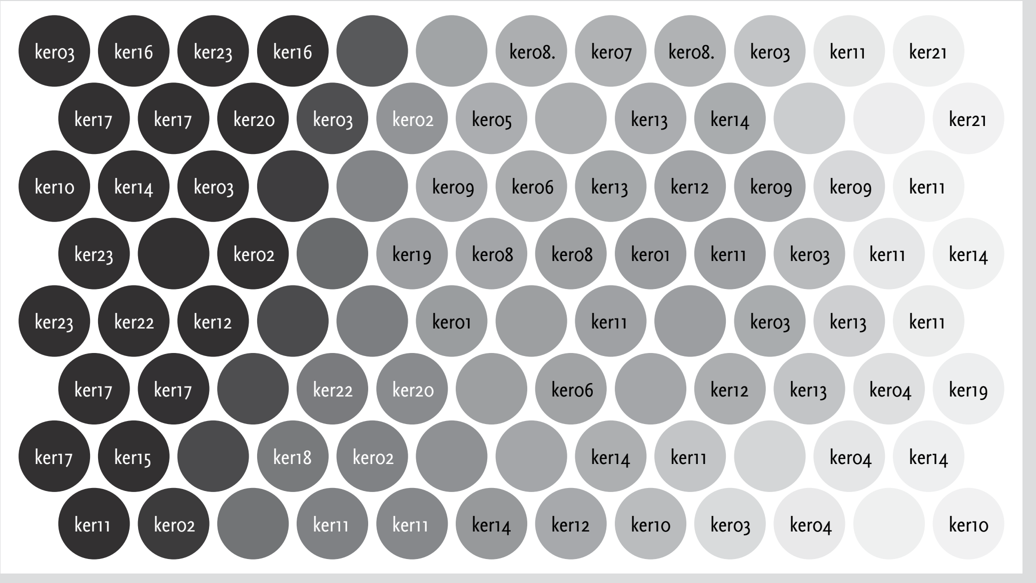
dark = low age; light = high age

Figure A04 Feature map layer 1. Dwelling format/density.



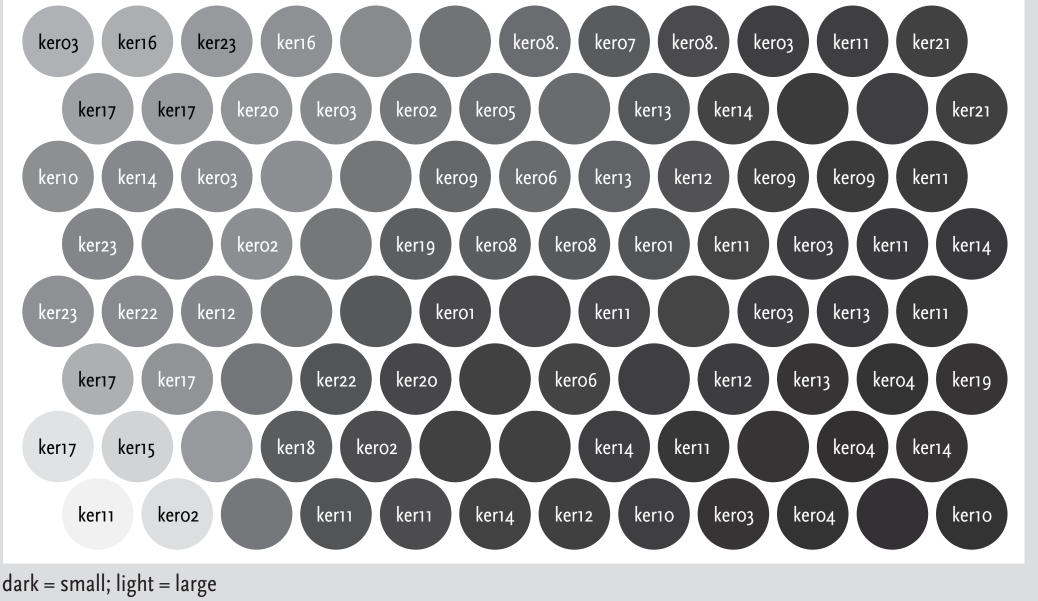
dark = single-family houses; light = multi-storey buildings

Figure A05 Feature map layer 1. Dwelling format/prestige.



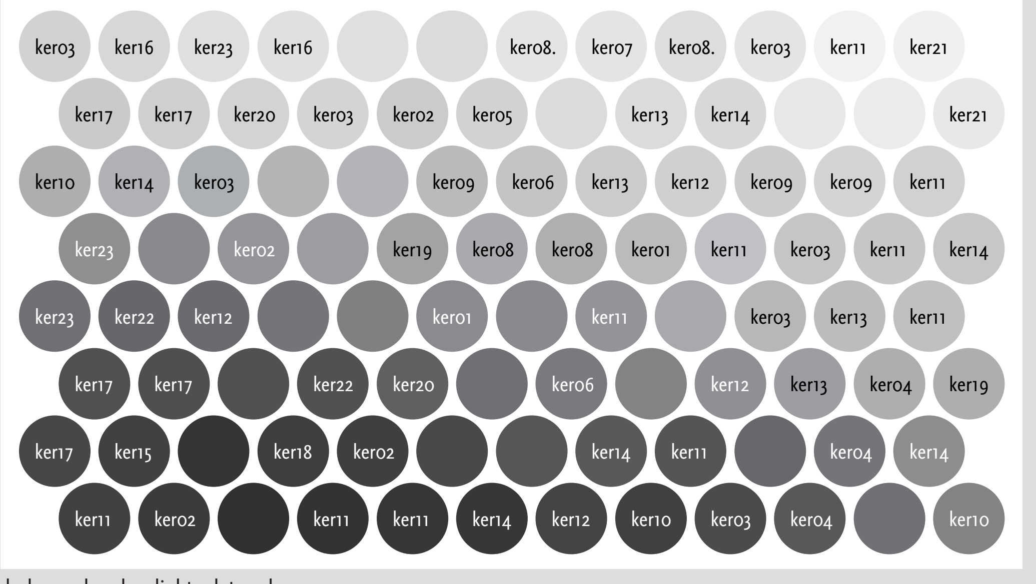
dark = low density; light = high density

Figure A06 Feature map layer 1. Size in sq.m.



dark = small; light = large

Figure A07 Feature map layer 1. Time of sale.



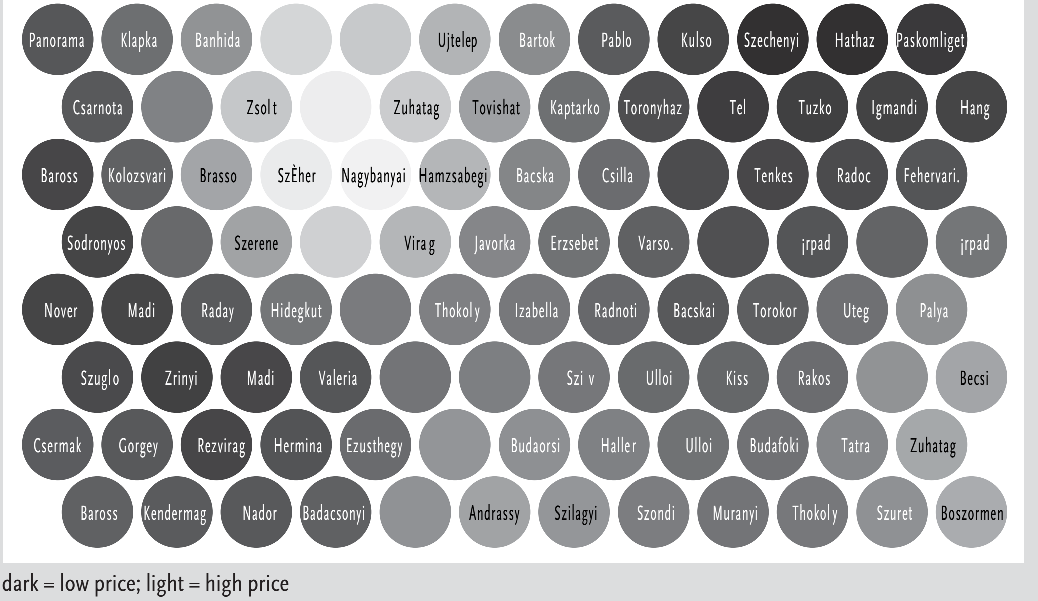
dark = early sales; light = late sales

1B Feature maps – street label data

Figure B01 Feature map layer 2. Market value per sq.m.

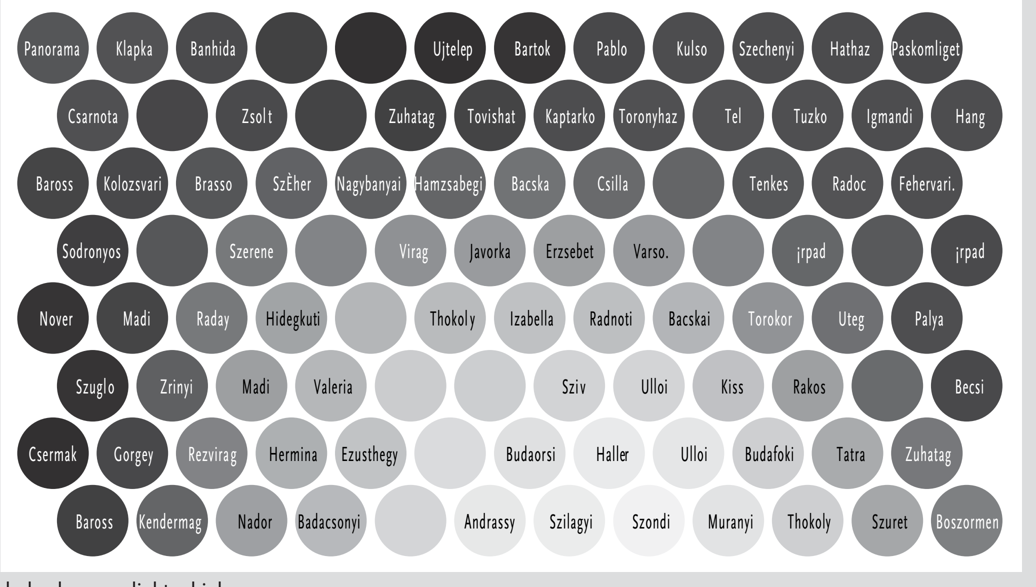
dark = low price; light = high price

Figure B02 Feature map layer 2. Collateral value per sq.m.



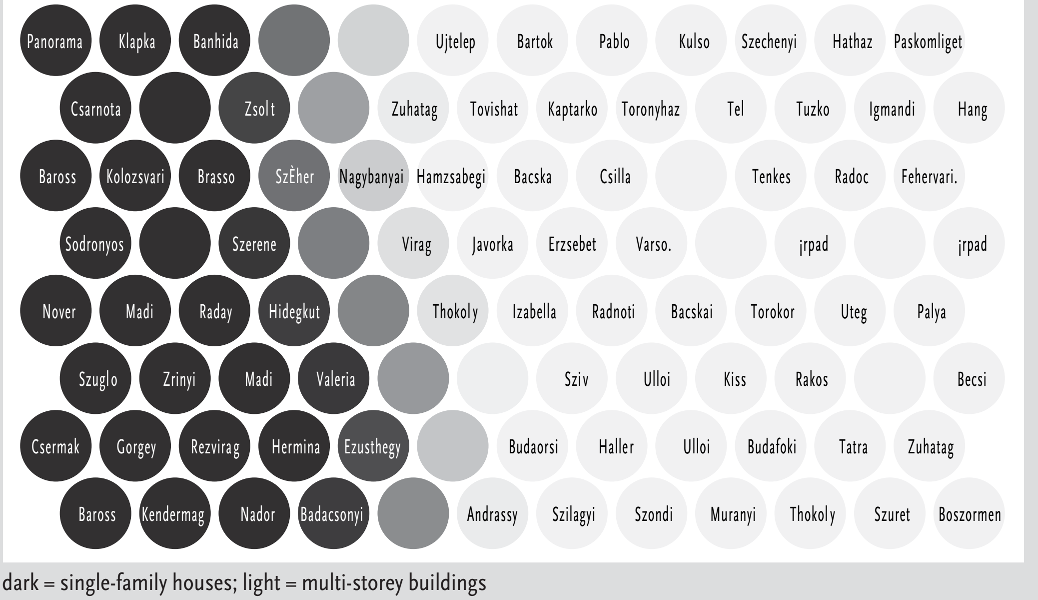
dark = low price; light = high price

Figure B03 Feature map layer 2. Age of the building.



dark = low age; light = high age

Figure B04 Feature map layer 2. Dwelling format/density.

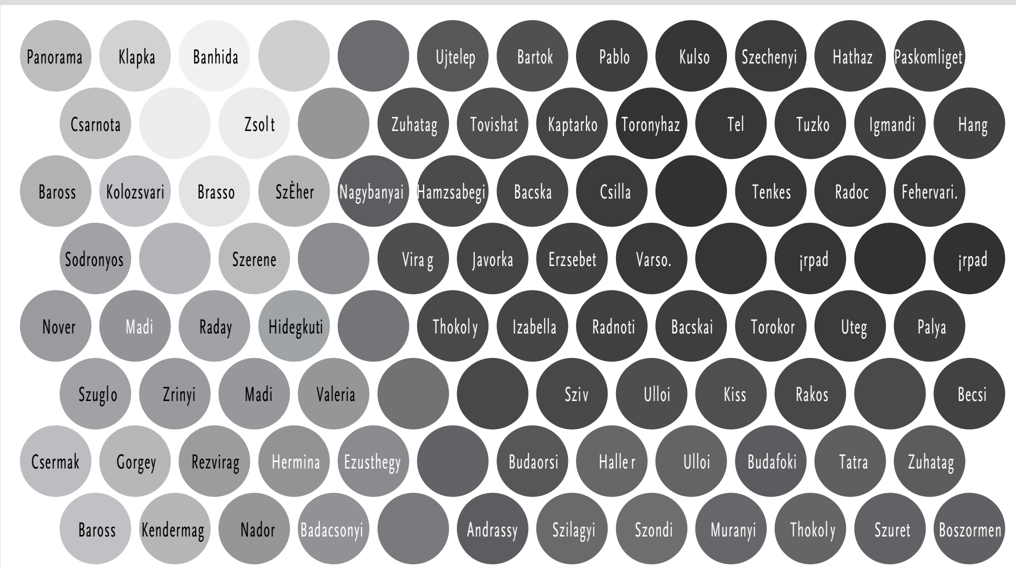


dark = single-family houses; light = multi-storey buildings

Figure B05 Feature map layer 2. Dwelling format/prestige.

dark = low density; light = high density

Figure B06 Feature map layer 2. Size in sq.m.



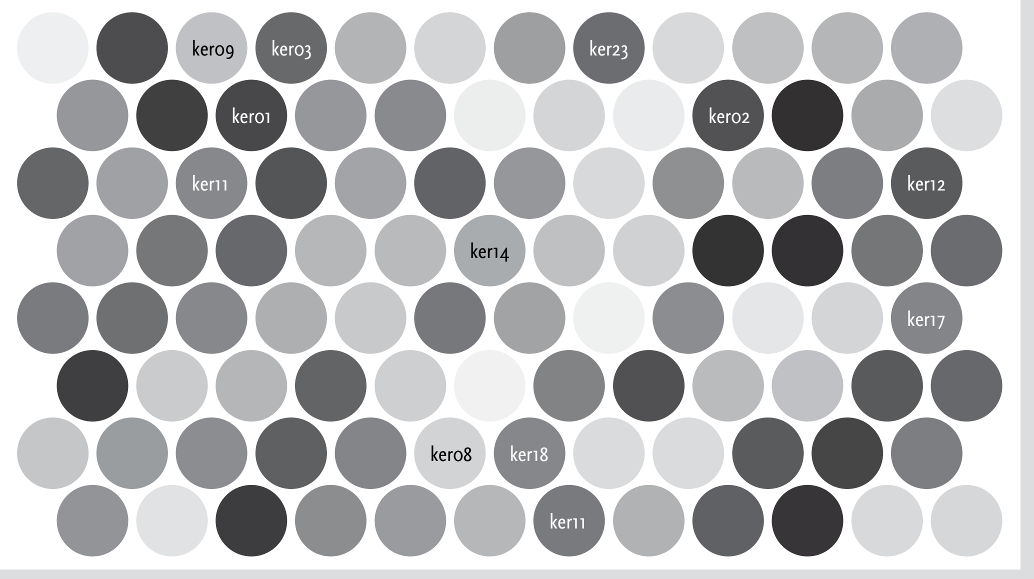
dark = small; light = large

Figure B07 Feature map layer 2. Time of sale.

dark = early sales; light = late sales

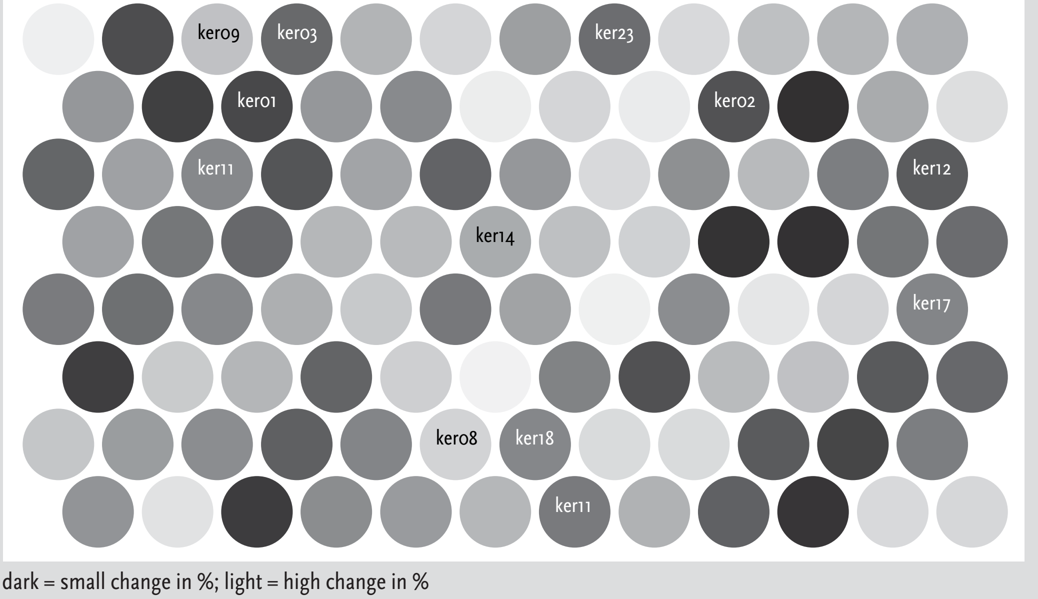
1C Feature maps – including district variables

Figure C01 Feature map layer 3. Market value per sq.m.



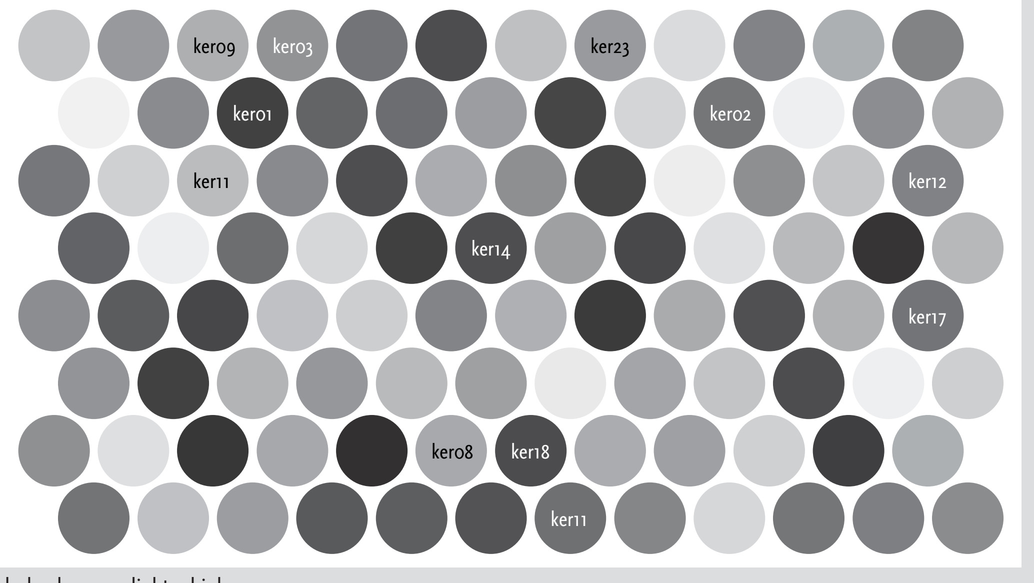
dark = low price; light = high price

Figure C02 Feature map layer 3. The change in dwelling stock.



dark = small change in %; light = high change in %

Figure C03 Feature map layer 3. Age of the building.



dark = low age; light = high age

Appendix 2 Modelling of expert judgements using the AHP

The analytic hierarchy process (AHP) technique is based on the pair-wise preference comparison of elements (attributes or alternatives), and results in a comparison matrix in which the relative importance of each element is determined as a ratio between 0 and 1. In sharp contrast to the classical multi-attribute modelling approach, which is based on the assumption that utility functions can be explained, the AHP does not assume that the evaluator is able to express the overall elicitation of the problem as a single function. Instead, the AHP is based on the assumption that the relevant dominance of one attribute over another can be measured with a systematic, pair-wise comparison of preferences at each level of a hierarchy of factors (Ball and Srinivasan, 1994). The overall objective of the decision stands at the top of the hierarchy, with lower-level objectives or attributes at the lower levels (Zahedi, 1986).

According to the original AHP, as developed by Thomas Saaty, the elements are first elicited with an ordinal scale from 1 to 9, with the values corresponding to verbal expressions. A value of 1 means that 'both are of equal importance', and a value of 9 means that 'A has an extreme importance over B'. After that the pair-wise ranks are balanced into cardinal rankings. This manoeuvre involves the use of measurement theory, as pair-wise judgments cannot be assumed consistent across the entire set of comparisons (e.g. Ball and Srinivasan, 1994). Following Saaty (1990), the functioning of the AHP technique is explained in terms of a matrix equation. Consider the elements: A_1, A_2, ... A_n within one level of the tree hierarchy. In practice, the maximum number of elements to compare within a single comparison matrix is nine (the 'Expert Choice' software actually has a maximum of seven elements), although there is theoretically no upper limit to the number of elements to compare. The comparisons among all of the elements (A_1:A_2, ... , A_{n-1}:A_n) then generate the following matrix:

$$A = \begin{matrix} A_1 \\ A_2 \\ A_3 \\ . \\ . \\ . \\ A_n \end{matrix} \begin{bmatrix} w_1/w_1 & w_1/w_2 & w_1/w_3 & \cdots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & w_2/w_3 & \cdots & w_2/w_n \\ w_3/w_1 & w_3/w_2 & w_3/w_3 & \cdots & w_3/w_n \\ . & . & . & . & . \\ . & . & . & . & . \\ . & . & . & . & . \\ w_n/w_1 & w_n/w_2 & w_n/w_3 & \cdots & w_n/w_n \end{bmatrix} \begin{bmatrix} w_1 \\ w_2 \\ w_3 \\ . \\ . \\ . \\ w_n \end{bmatrix} = n \begin{bmatrix} w_1 \\ w_2 \\ w_3 \\ . \\ . \\ . \\ w_n \end{bmatrix} \qquad (1)$$

The total number of comparisons is (A_{n-1} x A_n)/2. For example, a matrix of four elements generates six comparisons. Each comparison generates a pair-wise ratio (e.g. w_1/w_2, w_2/w_1). The overall weight is indicated by the priority vector.

The most common way to estimate the relative weights from the matrix of pair-wise comparisons is the 'eigenvalue' method (see Zahedi, 1986, for a full discussion).

The matrix formula *Aw* = *nw* applies only for the theoretical ideal situation in which the comparison is fully consistent. This is usually not the case in observed pair-wise comparisons (unless the comparison is unambiguous and the matrix is very small), and the estimate λ_{max} is therefore used instead of the exact n. To enable approximation of a less than fully consistent comparison matrix, there must be more observations than weights. In fact, as Saaty (1990) demonstrated, λ_{max} is always greater than or equal to n and, as it approaches n, the values of A become more consistent. In the terminology of AHP, this property has led to construction of the consistency index (CI), as follows:

$$CI = (\lambda_{max} - n)/ (n - 1) \qquad (2)$$

The consistency of the comparisons is measured with the consistency ratio (CR), which is calculated according to the expected results of consistent pairwise comparisons across the matrix, as follows:

$$CR = (CI/ACI) \times 100 \qquad (3)$$

The ACI is the average index of randomly generated weights (cited in Zahedi, 1986). Using analogous terminology from statistics, substituting λ_{max} for n generates a number of equations that exceeds the number of unknown parameters to be estimated. The CR should be very small. There are several opinions about the relevance of the CR; for example, it may be used as a filter. This measure is disregarded in the reported application.

Using AHP, quality ranks are generated for various bundles of attributes, using interactive data. The different expert judgements may subsequently be aggregated in various ways, such as by using the median, or as here, by using the Perth formula: (a + 4b + c)/6, where a is the smallest value, b the median and c the largest value of the observations.

In this exercise, the respondents were required to meet two criteria: (1) a pursuit as stakeholder, based on professional responsibility in business or administration and (2) a deep local knowledge of the spatial housing market structure, gained through professional experience. The experts represented transaction-related services, land and property ownership and user-oriented interest. There is no fundamental reason either for or against adapting the method by including the owners and renters of housing as experts. In contrast to the better-informed professional expert groups, these informants are likely to have somewhat less variation in the attributes determining their location choices or property appraisal decisions, as households tend to have much less information at their disposal than professionals in the field.

As evaluated in Kauko (2002, 2006), the AHP has a lot of potential, but it is conditional upon exact application. The method could be used firstly as a support to other models by generating quality variables and when there is a lack of data and secondly in a more independent sense, to provide a knowledge base of context-specific information, namely, to show ranks for preferences and how these may be linked to institutional background or to known price levels. Such an approach not only enables one to deal with the diversity of preferences, but it may also capture non-monetary values and cultural, behavioural and informal institutional aspects, for example, we could use it to investigate a group of trendsetter house buyers about whom we have no prior information, such as the Nokia professionals in Finland, to find out what kind of hi-tech buildings and what kind of locational amenities these people require. The problem with this technique, however, is that the values are merely hypothetical; there is a long way to go before it will be convincing as a property valuation method.

Appendix 3 Historical overview of planning processes in Hungary and urban renewal in Budapest

When analysing the planning system and the housing system, Hungary is 'a case of its own', caught between the influence of various different systems. The main notion is that transaction costs are enormous by Western standards. According to Locsmándi (interview), the reason for all observed changes is that institutional networks (state development companies) have collapsed.

Using a historical perspective, Locsmándi (1996) has analysed the development of the urban structure in Budapest through a number of distinct stages, as follows.

The early days, when the transitional zone of publicly-owned land reserve was outlined between the former city border and suburb; this belt, which was closer to the city centre (and much larger) on the Pest side than on the Buda side, was intended for industrial sites and public buildings such as hospitals. Outside the boundary of this belt the land was privately owned, fragmented and ill-suited for construction.

The 1937 Urban Planning Act introduced a two-tier urban planning system: comprehensive plans and detailed (land use and building) plans. This included a land regrouping procedure, where the affected owners were obliged to compensate each other according to the original and final land values. The aim was an integration of the betterment-compensation problem with the planning process. This act was more pragmatic and practical than similar and simultaneous attempts made elsewhere in Europe and surprisingly most later alterations were done in favour of the private landowners, as the new regime wanted to break away from all previous rules.

After the Second World War a partial nationalisation of landed property occurred. This was in contrast to the typical Western pattern as the majority of public land was concentrated in central areas of the cities. Planning adapted gradually to the new situation.

The 1964 Act on Building was supplemented in 1968 by a decree on the implementation of the act. This is the primary legal document relating to urban development.

Locsmándi (1996) emphasised the need to establish a clear zoning system. The problem is that due to the serious financial constraints that the local public economies face, and because planning as an ideology is not popular, environmental policies are still undeveloped in Hungary. Instead, private property rights have become strong and individualistic since the early 1970s liberalisation of the housing market, and especially since the mid 1980s. Nevertheless, the Hungarian system follows the model of the German system: the general rule is that it has to be marked out where one is allowed to build. However, the system is not clear and there is plenty of ambiguity in terms of the specific instruments of land use regulation.

Fisher and Jaffe (2000) compared restitution laws and practices after the transition across the CEU countries. In their pre-study they related restitution to the general structure of each society in question. They emphasised not only the universal importance of property rights for efficiency, but also the differences in contextual factors between different societies for the definition of those rights. As for Hungary, the main laws were passed in 1991 and 1992 respectively. Because of the substantial private property ownership before the regime change in 1989 compensation was preferred instead of direct restitution. In fact, only apartments with more than six rooms had been confiscated by the state (but without payment). The Hungarian planning system currently faces two main questions: how much compensation should be paid to the owners encumbered by a plan, and how much intervention should be allowed on individual property rights? (This pertains to the debate between American and German perspectives on ownership and the role of public intervention.)

The state rental sector never dominated in Hungary: its share of the total stock was only 25% (in Budapest this figure was however more than 50%), and remained fairly constant during the socialist period. Tenants were entitled to exchange their rented dwelling for another rented one, or for an owner-occupied dwelling. Rents were low and set in relation to m², with some variation in relation to quality (and marginally in relation to the location). The giveaway privatisation was introduced in the mid 1980s. Housing privatisation policy became a local government task until 1993, when a recentralisation occurred: the Compulsory Right to Buy scheme that favoured certain strata of society (Hegedüs et al., 1996). Privatisation of housing follows The Transfers of State Property Act of 1991, which transferred the ownership from the state to the local authorities, and the Capital City Act of 1992, which gave some planning power to the municipal authority. In Budapest these were the individual districts, who could now elaborate their own housing policy: in most cases equalling privatisation (Egedy, 2001).

Many problems are linked to the privatisation (Kovács, 1994; see also Kovács and Székely, 2004). This rapid transformation of the economy reshaped the city structure. The fate of the historical quarters of Budapest was determined by the neglect and destruction of nationalised residential buildings after the Second World War, as development programmes and construction funds avoided the inner city for several decades (with the consequence of burst water mains, etc.). Instead, huge blocks of flats were built on the outskirts. On the other hand, the inner city is where the most valuable historic buildings are concentrated (Palatium Stúdió Kft. and Városkutatás KFt., 2002).

The following observations can be made (Földi, interview):

- The housing and planning system was over-liberated in the early 1990s, even when compared with other new EU member states (see also Kovács, 1997).
- Hotspots have developed instantly; there are no homogeneous areas in relation to the housing stock. The original urban renewal strategy of filling in the areas with cultural functions was less successful and a 'block-wise renewal' strategy was adapted afterwards.

- Almost no social rehabilitation strategy exists in this context; in practice, only market rehabilitation and value rehabilitation (downtown area and fashionable streets only).

The following account of the process of urban upgrading and consolidation is based on the documentation of Palatium Stúdió Kft. and Városkutatás Kft. (2002). The idea of a more sensitive urban renewal arose in the early 1980s, but it was the fundamental changes of the 1990s that changed the political, legal and economic environment of urban development and urban renewal: the emergence of a municipality system, the introduction of the two-tier municipality structure in Budapest, the transfer of state assets to municipalities and then to private ownership, the strengthening of civil and ownership rights, and the emergence of private companies. Residential blocks, which were in a bad condition, were privatised quickly into condominiums, which made it impossible to continue urban renewal according to the earlier ideas.

The redevelopment process was smoothest where the local government retained the housing stock in its possession. Rehabilitation has been underway in the inner city districts, most notably in districts IX and VIII; here local circumstances decide the path, and whether the upgrading proves successful or questionable (Kovács and Wiessner, 2004). The urban rehabilitation activity in districts VIII, IX, X and XI all involve substantial redevelopment schemes. Three Pest side districts where significant urban redevelopment projects have taken place or are being planned receive case study attention in Soóki-Tóth (2002): the 9th (Ferencváros), the 10th (Kőbánya), and the 8th district (Józsefváros).

Ferencváros is split into an inner part, which underwent significant development during the 1910s-1930s, and an outer part (the middle- and outer district IX) characterised by mixed industrial-residential usage. As explained above, in the 1980s middle Ferencváros was designated an urban renewal area, as the area had become one of the slum neighbourhoods of the city. According to Soóki-Tóth (p.8), “the concept was to remodel traditional urban patterns and to create a better harmony between old and new”. The aim of the plan (1983) was to allow for diversity in the building structure. Furthermore, the income obtained from transferring the municipally-owned land to a private-public development company was used to improve public spaces and infrastructure.

Kőbánya too is described as an old industrial zone and working-class district, with below-average income in relation to figures for the city as a whole. Józsefváros differs from the other two areas in two different ways: it has a significant proportion of valuable public buildings, and (as already noted) an organic centre of its own. This area is in fact segregated into two very different parts: the higher quality inner part, and the poorer quality outer part (the division is based on the Grand Boulevard). This district is among the poorest in the city, and its district government struggles to change its unfavourable patterns, according to Soóki-Tóth. At the time of writing, the situation is still promising, with the project as a whole gaining momentum, however, it has to be noted that the project has changed management twice since it started in 1995 (1998 and 2002), and has become more complex.

While pointing out some serious problems in the new market favourable development trends of the 1990s (shopping centres in particular), Collins and Morsányi (2001) pointed out that the Hungarian housing market was activated thanks to the favourable availability of mortgage finance and interest rates. At the time of writing the situation is less favourable, however, as the system was ceased by the new socialist government after the parliamentary elections in 2002.

Locsmándi et al. (2000) conclude that "urban planning, regulations and administrative powers might have an impact on local revenue raising". On the other hand they note that "urban development as a complex activity requires cooperation among various professions: property and real estate managers, urban planners and regulators, local government and company finance experts".

According to Locsmándi (discussions), the question is, what the relationship is between both the quality and the price indicators, and the institutional system. The interrelationship between rehabilitation subsidies and the position of the property owners is too weak at present, which causes a gap of information between different levels of action and planning. One may therefore ask: is it really about 'urban renewal' in Hungary? No, just small-scale refurbishing of buildings. These processes depend on lobby groups who compete for available money. The spatial redistribution system of money results in the richest inner city districts obtaining less money for rehabilitation than other districts.

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The development of the housing markets in different European metropolitan areas is of high interest for the urban development and the real estate markets, which are moving towards globalisation. The Budapest housing market is an ideal candidate for scrutiny from an institutional and evolutionary perspective due to its fragmented nature: different house types, age categories, price levels and micro-locations are found side by side. This is a case 'in between' Eastern and Western settings, with its own distinctive path dependence – its development pattern does not resemble any other system. The study comprises an innovative economic analysis of the Budapest housing market structure. Applying the self-organising map and the learning vector quantification sheds light on how physical and socio-demographic characteristics, price and regulation are related in this market. Further analysis is carried out using the analytical hierarchy process together with in-depth interviews of experts and a case study of urban renewal in two neighbourhoods using market data. The results are compared with those of a prior study from Helsinki and Amsterdam, as well as with more general theory literature. The results suggest a great difficulty in relating the empirical findings from Budapest to mainstream theory of housing markets.

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