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The Budapest housing market structure from a heterodox economics perspective and with a neural network classification

Abstract: 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 about to globalise. What sort of pricing mechanism is able to explain the house prices in different areas? The Budapest housing market is well-suited for scrutiny from an institutional and evolutionary perspective. The 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, and running the data with neural network modelling techniques, namely the self-organizing map (the SOM) and the learning vector quantification (the LVQ), together with conducting the conceptual level analysis using a heterodox economics framework and some qualitative material, sheds some light about the systematic to the degree the market is affected by physical and socio-demographic characteristics, price and regulation.

Keywords: Budapest, Housing, Pricing Mechanism, Neural Networks.

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1. Introduction

As global economic functions are increasingly articulated at a local level, today territorial competition cannot be understood as a process that is contained within national boundaries. Thus it can be argued that urban housing markets are at least as legitimate a topic to study as national housing markets. After successful research on two 'Western' and 'Old-European' urban housing market areas, Helsinki (see Kauko et al., 2002; Kauko, 2002, 2004a) and Amsterdam (see Kauko, 2004b), both of which have already shown the inadequacy of generalising results of US-based modelling studies into European conditions, the idea was to broaden the variation to a more 'Eastern' and 'New-European' context. This contribution reports the research of the first part: overall city-level housing market analysis using neural network classification together with a brief qualitative investigation on urban regeneration in relation to the housing market at a neighbourhood level.

The starting point for the Budapest housing market analysis was to acquire data, relevant expertise and background literature. The next step then was to run spatially identifiable house price data with the classification method based on two neural network techniques: the self-organizing map (the SOM) and the learning vector quantification (the LVQ), applied in earlier research. *The institutional analysis* mode was chosen as a supporting theory for the empirical models, because the Budapest housing market is a very rare case, where the role of change is substantial. Thus, even though my work focuses 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 extraordinary immense and impulse like, and make a good example of path-dependency in socio-spatial analysis. *The theory of evolutionary dynamics* was chosen as a second supporting conceptual framework for the empirical analysis. This is a mode of analysis, which emphasises the element of change organically rather than step-wise, as in institutional analysis.

For the presentation of the method of housing market data analysis, the SOM, the reader is advised to the textbook by Deboeck and Kohonen (1998), where the method is presented as a sophisticated alternative to traditional methods for clustering and visualization 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 to 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. This was achieved in Kauko et al. (2002) and in Kauko (2002) and (2004b). This study, however, attempts to abstract the discussion to a more theoretical picture.

After the empirical modelling has been carried out the transparency between theoretical aims and results is increased by making use of local knowledge collected through casual observation, expert interviews and discussions, marketing surveys, official statistics and published reports. The crucial theoretical notion here is that, as a consequence of the 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 more relevant discriminating feature for a given spatially and temporally defined housing market context: (hedonic) prices or other objective socioeconomic 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 depending 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 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).

On the other hand planning and policy effects cannot be modelled without a temporal (and arguable also a more qualitative) perspective focussed on processes. Therefore, a case study was carried out on two adjacent neighbourhoods in the inner city of Budapest, which involve urban regeneration.

The following conclusions of 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), and to 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 one and 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 say: even chaotic – than in the other two European cities under study.

The outline of the study is as follows: the sections 2 (description of the context and the data) and 3 (presentation of the modelling results) present empirical material of Budapest; section 4 makes connections with institutional and evolutionary theory within urban economics and housing market analysis when appropriate; section 5 focuses on the case of urban regeneration in Budapest using qualitative empirical material of two areas; and section 6 makes the conclusions and reveals some plans for immediate follow-up.

2. Information about the Budapest housing market

According to Kiss (2002), the Hungarian capital is among Eastern European capitals one of the most economically dynamic. Further, when looked from a national perspective, the pole-position of Budapest in economic and socio-demographic terms cannot be overstated: the per capita GDP was 186% of the country average and comprised 34% of the whole country; in 1998, the share of the 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 map 1), the role of Budapest as the economic and cultural centre of the country is undisputable.

Map 1: The division of administrative spatial units at the countrywide level.

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.

2.1. General background about the Budapest housing market context

The Hungarian housing market is a case 'in-between' Eastern and Western settings, with its distinctively own path-dependence – its development pattern does not resemble any other system. As all post-socialist urban housing market contexts, also the Budapest housing market is all about change[1]. For example, the change in the most common type of new constructed dwelling has proceeded, stepwise, from state and individual house building, to centralised state provision, and then to private building (Locsmándi et al., 1993, p. 12). At least three waves characterise this evolution:

(1) *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, 1998).

(2) *The fundamental changes of the 1980s*, such as the massive 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

[1] Ott (1990) for example concludes that this category of cities have some general "lasting spatial effects of transition", namely the 1990 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.

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 the 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) *The anticipated trends of a future system*, where the privatisation is completed, and optimistic views are presented following Hungary's access to the EU in the spring 2004. The current system of 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, are 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.

2.2. Distributional consequences and submarket formation

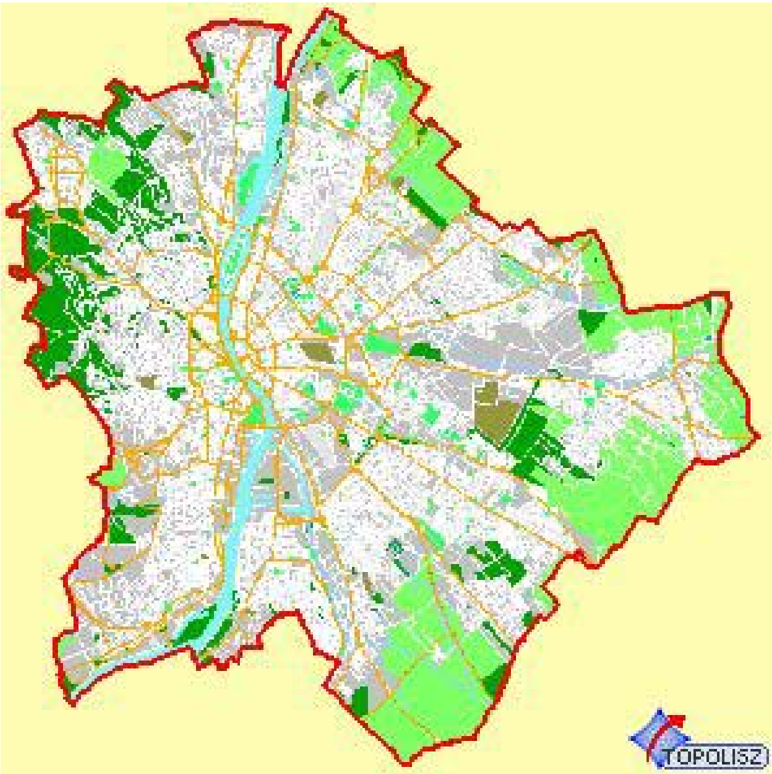
Kovacs (1998) has noted that during the first five years after the privatization the income inequality increased in Budapest so that approximately one third of the population was living below the poverty line. Furthermore, the socialist middle class had experienced downward mobility, but in contrast, the very narrow top strata had managed to increase their incomes substantially. Kovacs 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 in the outskirts of the city (see photos 1-2 and map 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 give-away privatization (1990-94), there were even more pronounced differences between the good and bad areas. (Cf. Kok & Kovács, 1998)

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, the 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 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 de-regulation.[2]

[2] 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 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 creating). According to Douglas: "different neighbourhoods within districts will have very different futures".

Photo 1: View of Buda from the Castle Hill.

Photo 2: Riverfront of Pest inner city.



Map 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 on the left; Pest suburbs on the right; in between these areas is the transitional zone including 'green city' areas.

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 WW2.
- A large share of multi-storey buildings; small share 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.[3]
- The large-scale housing estates constructed in the 1960s were for the higher echelons in the society, and of better quality, whereas those constructed in the 1970s had a welfare aspect and were of poorer quality. After 1983, substantial reductions took place in public housing, but private housing construction was not encouraged either.
- In the 1940s-50s the prestigious houses and quarters were found in the inner city, in the 1960s in the modern housing estates, in the 1970s-80s in the new owner-occupied flats and villas in the suburbs.
- Like elsewhere in Eastern Europe, mobility was low compared to west, and further reduced after 1990.
- The conclusion is that the residential patterns were partly result of institutional, and partly economic reasons.

The ownership of private property was actually tolerated since 1963 – 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 for a tenancy was agreed to be half of that of market transactions[4] (see Hegedüs et al., 1994). According to Hegedüs and Tosics (1994) privatisation of state rental was theoretically possible since the year 1969, but only from the mid 1980s onwards regulations were lifted and subsidies offered in the form of massive price discounts. Douglas (1997) observed that during the housing privatisation 1982-90 state dwellings were sold for 11% of the 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 was already 50%. In 1997 the share of the three main housing forms was: owner-occupied ca. 87% (and rising); private rental ca. 2% (and declining); public rental 11% and declining – Locsmandi (2004) evaluates that the situation in 2004 is around 7%. Unsurprisingly, the best parts of the city (inner Buda) were clearly leading the privatisation race (Hegedüs and Tosics, 1994).

When observing the area density and quality levels of the existing dwellings in the old tenement blocks inside and around the Grand Boulevard (see map 2), all kinds of densities are associated with high and low quality inside the inner city area of Budapest[5]. Douglas (1997, p. 123) noted that there was always segregation in Budapest (like in other Eastern European cities); however, the segregation was lesser than in many western cities. According to Locsmándi (2004), the main spatial characteristics of the Budapest residential patterns are the following:

[3] 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).
[4] In addition, there was also a co-operative housing form for the workers of a state-owned company.
[5] For example, low building efficiency along Vaci Út (district XIII) is associated with poor quality, along Városház utca (V) with average quality, and on the Castle Hill with relatively good quality, respectively; likewise, high building efficiency along Korvin O. utca is associated with poor quality, whereas it at Jászai M. tér is associated with good quality. For this I am indebted to Gábor Locsmándi's collection of planning related data from Budapest.

- The closeness to Danube, the main traffic arteries, squares and parks, and in a negative sense, closeness to the sites of heavy industry 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.
- That 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.

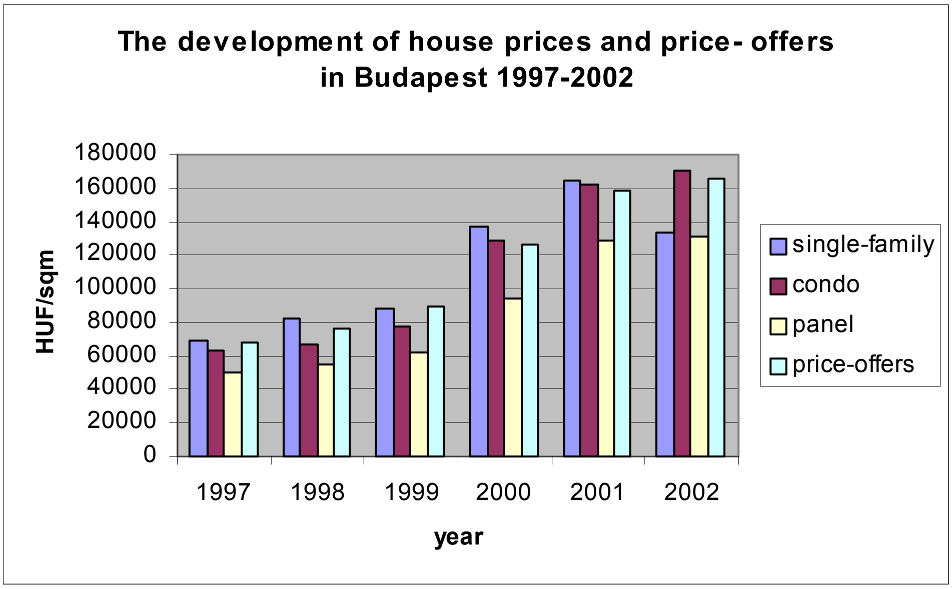
In the most general sense, the spatial structure or functional distribution is modelled as follows, following Bedőcs et al. (2001): I. Inner residential area and CBD; II. Transition zone including the outer residential areas; III. High prestige green residential areas of Buda Hills; IV. Peripheral districts. Using this categorisation as a basic guidance, further observations regarding the urban morphology can be made as follows. The inner city is inhabited by middle-class as well, even if it 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 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 good quality residential construction or regeneration pushes away old industry along the Danube in both north (Óbuda, Újlipótváros, Vizafogo and Angyalföld) and south (Kelenföld, Ferencváros, Józsefváros) directions (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, or 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 map 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 (see section 5 and map 3 further below); (3) residential use replaces industry and sprawls along 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.

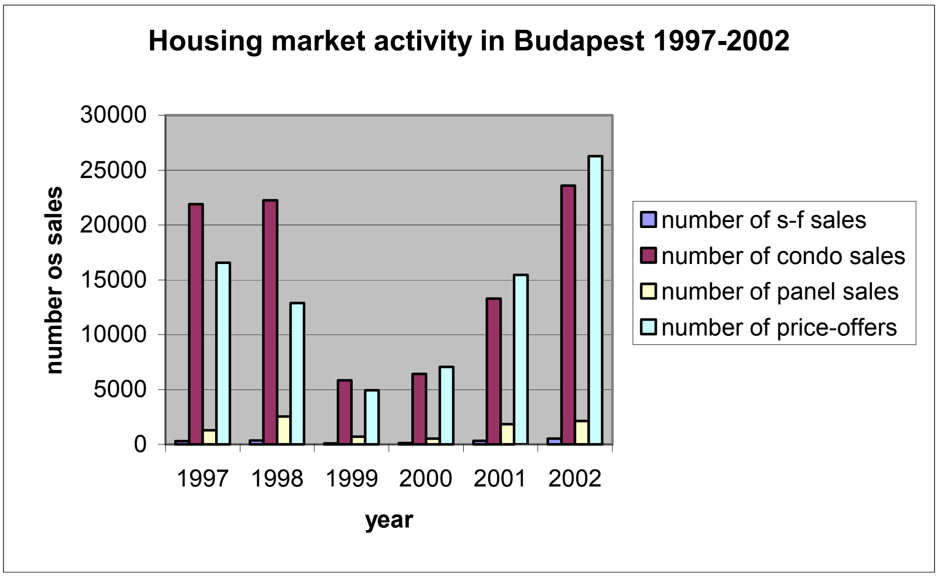
Another very general way to look at the Budapest housing market structure is to form a variable based on the dwelling format, building efficiency and 'general prestige'. This would comprise the following segments: (1) családi ház (CH): single-family housing including all price categories, mostly along 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 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.

2.3. Some recent observations on market processes, migration and new construction

The graphs 1 and 2 show the trends of average price levels and the market activity for Budapest during the observed six-year period of data collection 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; 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. The sales volume in turn rose steadily from 1999 onwards in all categories. Before that, the graph shows a dip in volume 1998-1999; it is ostensibly due to a lesser portion of transactions recorded.



Graph 1: House prices in Budapest by year and house type, and price offers.



Graph 2: House sales volume in Budapest by year and house type, and the volume of price offers.

Sóóki-Tóth (2002) observed that the average size of new constructed dwellings in the whole city is increasing, that new construction is favoured over constructing in existing buildings, and that, as from the early 1980s, the city has had a negative migration balance. Sóóki-Tóth et al. (1999) observed that until the 1980s, a population increase occurred in the city, when population moved from the small towns and the countryside; from the 1980s onwards the direction of the tide changed: a population decrease took place in the city, as the population moved from the city to the conglomeration and the suburbs.

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 new constructed dwellings are lower in Pest than in Buda. On the Pest side the highest output of construction and sale were in the districts IX and XIV. On the Buda side, this was in the districts II and XII, and there are expectations that this will spill-off to the adjoining districts III and XI, as developers will increasingly look for more reasonably priced alternatives in these districts. In 1997 the costs for land and new housing construction was 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.

Soóki-Toth and Geröházi (2000) compared the marketability prospects of two Buda-side districts XI and III. Thet found that the 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 the district III single-family and garden city dwellings were substitutes, whereas in the district XI they were not. In both districts people expressed their intentions to stay on the Buda side. People were satisfied with what they possessed, except the price and the quality of construction. People wanted green and peaceful environments plus well-designed layout of the flat. On the other hand Bedőcs and Soóki-Toth (2000) concluded that the district III comprise all kinds of areas: inner city, (traditional or luxurious) garden city, single-family, prefab, and industry.

2.4. Conditions for statistical research

As a case to study, Budapest has its benefits and drawbacks: the time period required to monitor socio-spatial changes does not have to be very long, because the pace of changes is fast: on the other hand, the data infrastructure and research culture is yet underdeveloped (compared for example with Helsinki and Amsterdam). 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 standardized data collection. Therefore, expectations were about using a relatively small sample of data compared with earlier analyses of Helsinki (two cross-sections: 18,000 and 19,000 observations) and Amsterdam (a panel set of 46,000 observations).

According to Locsmándi (2004), in Budapest, some aspects of this research have been covered in early studies. Notably Tosics, Hegedűs and Ekler (1980) carried out a socio-ecological analysis of housing quality and neighbourhood characteristics in Budapest using maps and census data of 1970; after this work was criticised by Ladanyi for a lack of detail, follow-up to this 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 analysis reported in the remainder of the paper, some individual level data on Budapest housing market was acquired two years ago. (The provider is ECORYS Hungary, formerly known as Kolpron Budapest.) The data comprises 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 reasons mentioned above. The description of the variables is as follows[6]:

1 Market value (HUF per sq.m /1000)
2 Collateral value (HUF per sq.m /1000)
3 Age of building (years*3 + 50)
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 (sq.m.)
7 Inflation effect (time of sale * 1,5 +100; 0=11/5/2001)
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 where added as follows:

8 Park area per capita, sqm
9 Retail shops (N)
10 Change in dwelling stock: (built - ceased) / stock in district (1/1000s)
11 Population per sq.km
12 Resident population per 100 dwellings
13 Population 0-18 years/total district pop.
14 Population 60- years/total district pop.
15 Migration within the city/total district pop.
16 Active enterprises (N)
17 Mean sales price, fts/sqm.
18 Dwelling transactions /stock.

An examination of the dataset tells that the most expensive areas are the district II single-family areas, both measured by market value and collateral value; the cheapest areas are also single-family areas: in the 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.

3. The results of the neural network analysis of the determinants of spatial housing market structure

3.1. The analysis with individual level data

As explained in the introduction, 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-

[6] The text in brackets indicates the field-range of the variable; transformation into roughly equal field-ranges is recommendable for the neural network processing.

specified by the analyst. This makes the SOM a feasible tool for exploring complex datasets with. 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. This way, the SOM generated a landscape of the Budapest housing market structure based on the 215 observations assembled by ECORYS.

The SOM was run using the following parameters: the map size 12 by 8; the shape is a hexagonal topology; the neighbourhood function is of the type ‘bubble’; the running length is 4800 for the initial run and 48000 for the fine-tuning run; the learning rate (alpha) is 0.05 (initial) and 0.02 (fine-tuning); and the initial radius of the map 10 (initial) and 3 (fine-tuning).

Two different maps were generated in two different runs with datasets labelled by location: one based on the district (model 1, with labels ker1-23, see appendix A) and the other based on street name (model 2, with ca 200 labels, see appendix B). 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.

Here the most challenging task of the analysis is to interpret the feature maps visually, layer by layer. The neuron is labelled after a certain data category that corresponds with a certain combination of attribute levels similar to the combination of attribute levels of the observations associated with this neuron. The key property here is that, in one and the same map, the position of the neurons is fixed across all layers. When we look at the structure of the data layer by layers, and observe the labels based on location (street and district), we note the following:

- All the 23 Budapest districts are represented (i.e. these labels show up on the map, see app. A). The problem with this labelling is that most districts are very large areas and contain locations and housing stock of very different character.

- The highest price (i.e. value) levels are found in the Buda districts I (Var – the old city – and Viziváros on the river), II Rózsadomb (under communist times the most prestigious area), and the Pest district XVIII (Pestszentlőrinc or St. Laurenz single-family area[7]). 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, see section 5). The Pest-side inner city district VI is represented by two relatively different neurons in terms of value levels.

- Some of the locations in the district XI (southern and central Buda) show a spread between market and collateral values: these are Brassó út, a very long and curly street in the neighbourhood of Sashegy in model 1, and Bánhida utca in Kelenvölgy as well as Szüret utca in Gellerthegy in model 2 show rates of 23-27% difference between these two price estimates. This may be due to the fact that this district contains a wide

[7] 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.

range of locations: both prefab (i.e. panel) housing estates and the up-market Gellert Hill, which can make in between locations notably risky cases, if considered for investment. The situation is much the same in the district VIII, where ¼ of the neurons that indicate old stock and low collateral values show a relatively high market value.

- The old age of the building is shown in the upper-middle cluster of neurons with light shading (these also are cheap areas): districts I, II, V, VI, VII, VIII, IX and XIX in particular. In the 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 the 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 (as with the two-valued format indicator above). The suburbs with predominantly housing estate character are captured on the right side of the map: the 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: the 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 of the center): these are labelled by the districts II, XXII, XX, XVIII, XI, III, XIX, XII, X and XIV. We knew in beforehand that the new multi-storey housing areas on the slopes of the Buda Hills (in the districts II, III, XI and XII) comprise the single most common type of expensive locations in the city. App. A 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 the districts II, XI, XV, XVII, and to a lesser extent in the districts III, XVI, XXIII. Small houses in turn are found elsewhere on the map, and on 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 the districts XXI, XI and III. The sales from the summer 2001 are found on the lower side, and also more on the left side of the map.

The problem with the streetwise labelling is that one and the same street may cut through two or more districts, or then there are several streets with the same name (e.g. Nádor u. or Baross u.) in districts with very different character. For the streetwise labelling the situation is as follows (see app. B):

- The most expensive streets are found on the Buda side and comprise new buildings (in the 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. ter (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, including Bánhida u. and Brassó út; 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), Paskomliget 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 app. A), Csarnóta u. (XVIII; cf. footnote 10: 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 Antál u. (III, Mocsáros). These are all suburban locations.

- Because of the short time period of the data set, the 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 Paskomliget u. , Böszörményi út (XII), Tátra u. (XIII) and Szüret u. (XI; this supports the findings of app. A with respect to the same layer).

While distinct clusters were found on the feature map 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, using the LVQ algorithm. This is never a straightforward task based on the visual analysis of the maps only, 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 possible exceptions to this are only the small inner city districts I (Castle), V (city centre) and VII (Erzsébetváros), and plausibly also the suburbs IV (Újpest), XXIII (Soroksár), and XXI (Kispest) are homogeneous enough in this respect. However, even this cautious a claim may not be true, if we use a larger dataset for the SOM analysis. (Work in progress confirms that the districts I, V, VII and IV are not that homogeneous.)

The next procedure then 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. As shown in table 1, of the *a priori* selected labels the house type (2 labels), the prestige of the stock (the four label classification of house type), and the age (three 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 the house – also generated a high accuracy result.

Table 1: The classification accuracy of 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/sqm, 2 labels	90.23%
Market value: < 150.000 >=150<250.000 or >= 250.000 huf/sqm (1000 Euros), 3 labels	78.14%
Market value: < 150.000, >=150<250.000, >=250<350.000 or >= 350.000 huf/sqm, 4 labels	77.21%
Collateral value: < or >=160.000 huf/sqm, 2 labels	93.49%
Collateral value: < 135.000, >=135<225.000 or >= 225.000 huf/sqm, 3 labels	79.07%
Age of the building: 0-34 years or > 34years, 2 labels	95.81%
Age of the building: 0-20 years, 21-61 years or >61 years, 3 labels	85.12%
Format: Single family or multi storey, 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 sqm or => 80 sqm., 2 labels	88.37%
Size: < 49 sqm, 50-149 sqm or >= 150 sqm, 3 labels	81.86%
A posteriori clustering based on house type (sf/mst) and size roughly +/- 100 sqm, 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%

Overall, the most important *a priori* selected discriminant of the dataset is the format as indicated by the 100% accuracy. 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 than merely using the division between 'low density high prestige' and 'high density low prestige' areas.

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 already could be suspected based on the visual analysis: that district location is *not* an important discriminant of the dataset.

3.2 The analysis with district level variables added

The new analysis with eleven district variables added (thus in total 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 in the following (three of the map layers are shown in app. C.):

- The market value is not a strong discriminant, which can be seen from the organisation of the map:
    - 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 neuron labelled after district II has the highest prices; the neurons labelled after districts VIII, IX, XI (the one on the lower side of the map), and XVIII have relatively high prices; 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 amidst the twelfth district – a symbol of affluence and luxury, and XVII have relatively low prices (a peripheral and transportation-wise poorly connected area).

- The change in the dwelling stock:
    - Most in the district VIII;
    - Least in the district I

- The population per sq.km.:
    - Most in the districts VIII and XI (upper side of the map, which also was low priced
    - Least in the 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).

- The age is also not important; the cluster with then three neurons (VIII, XVIII, XI/lower) with high market value are also ‘old’; oldest areas have low collateral values; only in the 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 the districts XI (both types), XVII and XVIII; most multi-storey dwellings in the 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 reasonable 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 little 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. Second, 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. Third, 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. Fourth, partially, the relations across neurons and map-layers can be linked with reality (if not to the input variables) after this analysis too. However, the many ‘new features’ cannot be fully defined based on the available information (input data and domain expertise).

4. A heterodox economics framework

4.1 Generalisation of the processes

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 reminded 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 continues 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 experience an upward (for example, Andrassy út in district VI), or downward development in value (for example, the 'Chicago' of the district VII). The investment or lack of it will either enhance the potential of that location, thereby attracting further investment, which increases the value further, or lead to dilapidation, a loss in potential, absence of investment and a further decrease in the value. In either case, the trend may however be reversed: inappropriate structures may generate a downward trend in value formation and development activity, and gentrification of a neighbourhood will lead to an upward trend.[8]

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. Maclennan and Tu (1996) point out that spatial arbitrage may or may not hold in a given urban housing market context.

At present, the local housing market is partly quality-based, especially for the prestigious areas. It is indeed characterised by a competitive market-led price formation, but it is also burdened with huge transaction costs; further, here negotiation is far more important than government regulation for the market outcome. For example, in the 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.[9] To this can be added that, even though decentralisation was carried out heavy handed, there is still no preconditions for a Tiebout effect type of differentiation between the twenty-three Budapest districts, because, contrary to what fitting with neoclassical urban economic text-book theory necessitates, here income taxes are levied by the state government, and the local business tax is relatively minor for any firm.

It is exactly because of such strong element of change involving friction and discontinuity that the institutional and evolutionary approaches fit the Budapest housing market well.

[8] The character of an area depends on during which time-period 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 to this. Perhaps, since location is a rather important factor, those areas that received more attention from developers are good locations, but it is 'the egg and the hen' type of situation: which was first, the locational quality or the development activity? (I am indebted to Gábor Soóki-Tóth for this point.)

[9] This is ostensibly the situation in many other districts too, but the dataset used in the previous section was too coarse to confirm that.

The following two conclusions may now be drawn about the Budapest housing market structure:

- Up to the late 1980s it was largely driven by costs, with a strong prevalence of both informal and formal institutions.
- From the early 1990s onwards the driving force was market pricing, but with substantial transaction costs. There is also evidence of agency, for example how to mobilise oneself among the residents for attracting funds for urban regeneration.

After documenting the empirical material, theory was sought for as a tool for organising the findings. This 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.

4.2. A selection of institutional and evolutionary economic theory perspectives

The main thing to note in this particular analysis is that the two paradigms: mainstream/neoclassical economics (traditional perspective), and heterodox economics (emerging perspective), have fundamentally different ontological and epistemological underpinnings. The former subscribes to a closed model and ideal situation; the latter in turn subscribes to an open model, which enables carrying out more realistic and practically relevant, but less elegant analysis. The ontology (what the phenomenon is in reality) of mainstream economics is abstract whereas its epistemology (how the phenomenon is explained or constructed) is operational. Therefore, this methodology is suited for exact calculations, although the very objective of these analyses in fact is questionable. The ontology of the heterodox line in turn comprises concrete events, although its epistemology only comprises conceptual reasoning. The ability to look at the world holistically then the comparative strength of the heterodox perspective although the results cannot be quantifiable. The SOM actually covers a middle-level: as already demonstrated, it allows to some extent both conceptualisation and quantification of the phenomena under study: housing markets and property values.

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.

To the extent that we deal with the evolving physical structure and the increased certainty protected by written norms, there is an obvious overlap with mainstream microeconomics. The difference however is also obvious: in this model the value is a stepwise escalating and path dependent (irreversible) process. Apart from more direct process related costs that arise, land speculation, in the negative sense, may lead to a troublesome outcome. Here speculation is seen as a cost, that depends on the macro-government structure in general and the planning and landownership system in particular; if these regimes are in different hands, then different interests cause conflict, which has transaction costs.

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.

We may conclude that the determinants of the outcome in terms of the level of price speculation are related to the macroeconomic situation, availability of alternative sites, general property and planning legislation, possibility for covenants, the arrangements with regarding the responsibility of the planning and land development, and last but not least, the attitudes of the owner of the developable land towards speculative and risk aversive behaviour – the feedback link between decision-making and market outcome. The inconvenience however is that these arguments are often only treated implicitly by current theory. When Maclennan and Tu (1996), for example, emphasise adjustment processes, market disturbances and price dis-equilibrium, one can make the conclusion about the origin of their position: The Austrians!

These processes are path dependent, which justifies the use of another heterodox line of reasoning and modelling within economic theory: the evolutionary dynamics. Following this interpretation, the processes are assumed more continuous than in the institutional approach(es); the course of which depends on ongoing investment in specific places and during certain eras. The intensity of such processes may be increased or reversed depending on contingencies, according to what has been elaborated above. Evolutionary dynamics in research on economic organization is based on the metaphor of self-organization. According to this metaphor a far-away equilibrium prevails, where endogenous factors determine economic sequences. The right timing and placing creates a self-organization, and the processes are not reversible. The dynamics of the model are non-linear. Small alterations in the parametric values of the presumptions transform the qualitative properties of the system. According to this model, regularities and linear predictability may exist only on the macro level, otherwise the world is chaotic and evolving. On macro and micro levels prevail a complex feedback-mechanism between objective structures and subjective human agency. (Pantzar, 1991, pp. 1-32)

In this stream of thought, the idea is that nonlinear dynamics will bring an element of change and that, while the detail in these processes cannot be controlled, allowing for the dynamics is helpful in appraising whatever is emerging at the aggregate level. Specific history and lock-ins dependent upon co-incidents would thus bring these changes, with different outcomes in different time-periods and places as the target of analysis. Indeed evolutionary dynamics and path dependence (a derivative of evolutionary dynamics) might be relevant approaches, in order to be able to approximate the non-linearities prevailing in the dynamic history of an urban housing market segment or residential area. For example, prices may increase, although the quality of the environment declines. (see Kauko, 2001)

We may conclude that these concepts support the empirical analyses of the Budapest housing market, in the way presented in section 2, and that the heterodox economics view is useful for carrying out an investigation of the connection between house prices and both formal and informal aspects of planning. Within the general features of the Budapest planning and development context noted above, the next task is to ascertain certain local processes and key relationships involving market and land use regulation of some sorts. The analysis is therefore deepened by focussing on a smaller area within the broader Budapest housing market, where the processes evolving are put under scrutiny.

5. Case: planning practice in relation to local house price development in specific urban renewal areas

5.1. The general story of urban renewal in Budapest

The fate of the historical quarters of Budapest was determined by the neglect and destruction of nationalised residential buildings after WW2, as development programmes and construction funds avoided the inner city for several decades (with the consequence of pipe bursts etc.). Instead huge blocks of flats were built in the outskirts. On the other hand, the inner city is where the most valuable historical buildings are concentrated. (Palatium Stúdió Kft. and Városkutatás KFt., 2002)

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 neighbourhoods, 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 nonlinear framework presented in section 4.

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 subsidizing of urban regeneration that usually is rather piece-meal. According to Locsmándi the lobby groups involved in housing development compete for the available finances, with a bias for funding the less affluent districts.

According to Soóki-Tóth (2002), due to problems in attracting investment, too high construction costs and low affordability, the volume of new housing construction is lagging behind West 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 seen also in the pace of development of the traditionally less prestigious districts III and XI, which are becoming part of the same market.

5.2. The case-study areas

The qualitative investigation on the districts IX and VIII pertains to one urban renewal area in each:

- Ferencváros (IX) is considered a 1980s and early 1990s success story; and
- Józsefvarós (VIII) where projects commenced only recently, from 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). Here two aspects are of interest (as suggested by Locsmándi, 2004): the physical development and price levels; and the management of the urban renewal project. The Amsterdam analysis of Buurt Negen (see Sluis and Kauko, 2003) serves as a model here.[10] In both districts the areas under study are the middle parts. These cases illustrate

[10] This was however a much smaller area, and one with a different urban renewal strategy.

the regeneration of an old but dynamic urban area with partly inner city, partly transitional zone character. The story here is piecemeal rather than total renewal of neighbourhoods. The specific aim is 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).

While the two areas under study, the middle-Ferencváros and the middle-Józsefvarós, respectively, are adjacent, and share the same history of lower-class neighbourhood image and more recently, anti-privatization municipal housing policy, the differences between them today are like that of night and day. The former is considered a (relative) success story. The latter faced and still faces serious problems – external as well as internal. First, the area is much more heterogeneous and much bigger than the neighbouring middle-Ferencváros; second, since the consensus of the eighties and early nineties transition period, the times have changed so that both the political and economic climates are unfavourable; third, 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; and fourth, the image of the area is the most unfavourable in the city, although is anticipated to change eventually.

The next task is to carry out a case study in the middle parts of the districts IX and VIII using the subset of the 215 observations acquired from ECORYS that falls with the boundaries of the urban renewal areas. After examining of the data, eight useful observations were found: at four locations in two pints 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 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 (se map 3).

Map 3: 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 of it is district VIII; the area south of it is district IX.

When we observe the increase in property value along Üllői út, it was as 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 comparable dwelling in the 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 same magnitude as for the target case for the same time-period: 10-15% in the district III, and only 2-5% in the district XI, respectively. This finding indicates an element of value premium related to the effect of urban infill. However, given the modest set of evidence this conclusion remains speculative.

6. Conclusions

The classification of spatial housing market structure with the SOM and the LVQ involves the assumption that Budapest is different to the earlier cases: Helsinki and Amsterdam. This entails expertise of the Budapest market, gained from previous surveys and literature, together with own explorations, with regard to evaluation and comparison of the urban residential areas. Furthermore, an evaluation of planning (in Budapest: subsidies involved in urban regeneration) are based on a case study regarding how planning, in its administrative and quality dimensions, and economic factors relate to house prices at the neighbourhood level.

Budapest turned out to be an especially interesting case 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. That this context is 'a case of its own' does not deny many of the same basic relationships that are found elsewhere: premium for low area density, good traffic connections and that certain neighbourhoods are, for various historical reasons, very specific and are considered more attractive than others, even in the close geographical proximity. The most attractive housing locations are the modern, garden city type multi-storey areas on the Buda side. Further, 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 size, and building age. However, adding eleven district variables only distorted the picture, which suggests that location is not an important feature of housing market structure, at least not when measured on this coarse level.

Due to the strong role of development processes and the special nature of the urban housing market context, institutional and evolutionary economics were selected as theory frameworks, instead of a more common neoclassical/equilibrium economics framework. This mode of analysis emphasises the element of change: organically in evolutionary dynamics and step-wise in institutional analysis. Indeed, Budapest exemplifies both perspectives remarkably well. 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 potential of places.

Two conclusions can be made: first, about what affects the segmentation; and second, 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 Ladanyi, 1989); but in the whole city's housing market there is a substantial heterogeneity. Also this study concurs these findings; the type, age and size of the house and its immediate vicinity really matters 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 it can be concluded that there is no notable association between price-level and the 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 posses dwellings that are typically cheap because of one reason or another.

A mixed, mosaic-like housing pattern does not correspond to location modelling here. No urban model works – not the single equilibrium, nor the multiple equilibria (in the absence of a significant housing middle-class, probably not behavioural-cultural models either, although for this we need to undertake interview based research on consumer tastes). Instead, the trend in housing and land use patterns is rather individualist, and is predicted to be even more fragmented in the future due to new designs, especially on the Buda side.

After modelling the urban housing market on the overall city level, and then scrutinising the results in relation to theory, the last task was to look for planning-related price effects in two interesting areas within the total structure. To summarise the analysis, indeed, an artificial 'extra' price element is found here too, in addition to the more standard price-effects found in the SOM analysis. However, as the sample of individual house price data assembled is too small for any definitive conclusions, a similar analysis needs to be carried out with a much larger dataset and for a longer time-period. In principle, this kind of analysis is a promising means of evaluating a government-initiated change in quality of the built environment from a micro-level market point of view.

As it stands, the analysis has only reached the halfway mark. Another dataset has recently been assembled based on the stamp duty calculations of KSH (2003). From this nationwide database 2400 recorded observations fall within the boundaries of the 23 districts of Budapest (in 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, and the separate case-study undertaken on this dataset, too. The results will be reported in forthcoming papers.

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