# Reasons of Local Housing Market Price Differences in Hungary

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The article presents the examination of factors influencing local housing market price levels, carried out on a database of nearly two hundred Hungarian towns and the twenty-three Budapest districts.

The analysis is based on the simple assumption that local housing markets are more isolated than other goods markets. Consequently, the differences of local price levels may be explained by the various social, economic and geographical characteristics of settlements.

According to the results of calculations, even a quite limited set of indicators can effectively explain the differences of mean house prices. Of the available indicators, the local income level has a fundamental impact on house prices, whereas other factors, like mobility or tourism, have only additional effect.

KEYWORDS:
Housing market.
Market price.
Multivariate regression.

In 2007, Hungary joined a Eurostat pilot program that aimed at involving house prices in consumer price indices. Within the framework of this program, the national statistical offices were asked to collect owner-occupied house price indices, which are suitable for preliminary calculations. This requirement shed light on an old-standing debt of the Hungarian housing statistics, namely on the fact that the HCSO is unable to produce an official housing market price index at the moment. Our case is quite similar to that of many other post-socialist countries, where house price indices are not available either. Although almost all interested partners, like banks, investors, and real estate agents, try to make calculations for their own use, and even if the necessary information exists somewhere in some form, it is extremely difficult to make its statistical utilisation possible. The major problem with the available indicators produced by housing market actors is that they are generally restricted to certain submarkets or geographical areas and are usually carefully hidden from competitors and also from statisticians. In these circumstances, the EU requirement might be a useful reference to get better access to data files, to stimulate the statistical analysis of housing market data, to investigate the possible methods of index calculation, and in general to speed up the elaboration of basic housing market indicators.

## 1. General background, data sources

Data on housing market transactions are available from Duty Offices. Buyers of used dwellings pay 2-6 percent of the purchase price as stamp duty, and the information collected during the tax-office procedure is transmitted to the Hungarian Central Statistical Office. This data stock is now the only acceptable source of information on sales prices. Other possible sources of housing market information, such as data bases of property agents or banks, are inaccessible for statistical utilisation at the moment.

However, using Duty Office data has some disadvantages. One of them is that our data are limited only to the used dwelling market: the transactions of new dwellings are not registered by the Duty Office since new home buyers do not have to pay transfer tax. Besides, various techniques of tax avoidance reduce the quality of data. For example, it is quite common to state a lower price in purchase contracts in order to reduce the amount of tax. Moreover, the most valuable dwellings are owned by companies and their sales may remain unseen by the Duty Office. On top of it all, the

quality of data records is quite poor: essential pieces of information are missing, only the size, the street name and the building type of sold properties are known, and we only get the data records of towns. The fact that settlements with village status are excluded from the data transfer also implies certain restraints for the analysis. Fortunately, the situation is expected to improve in the near future since all data are transmitted to the HCSO hopefully with less missing details from 2007 onwards.

With respect to our calculations, tax avoidance results in underestimation of the price level, which - assuming that it is more or less constant in time - will not affect the price index. However, another problem, namely, the incomplete data stock appears to be more serious: many of the influential attributes are missing and this limits the accuracy of calculations.

There are many possible ways to calculate a house price index from a simple comparison of averages to the more sophisticated methods like the repeated sales- or the hedonic methods. Considering the characteristics of the Hungarian housing market, the hedonic method appears to be the most feasible solution to produce the house price index.[1] It is generally applied to produce price indices of products with many different characteristics. The fundamental idea of the hedonic price index method is that the prices of consumer goods – and also those of dwellings – depend on their usable attributes. Therefore, if the influence of quality changes is controlled, the 'pure' effect of the price level change can be determined. To obtain this, the impact of a series of characteristics (indicators) on property prices has to be explored by using, for example, a regression model. In the case of property prices, the most influential characteristics are perhaps the ones being in connection with the location, either in general, defined by the actual settlement, or in particular, meaning certain features of a neighbourhood. A very similar calculation was carried out when the results of the 1999 and 2003 Housing Surveys were processed. During these surveys the respondents were asked to estimate the market value of their dwellings. Then, based on their estimations, a regression model was set up to recalculate personal evaluations and to replace missing values. Both models proved that location had the most fundamental impact on prices.

In the following I concentrate on the general effect of the settlement characteristics on prices and examine the connection of the local property prices with the social and economic indicators of Hungarian towns and cities. Here, the examination of aggregated data of towns is focused on. The interconnections of individual data, which are generally the subject of the regression analysis of housing market data, are beyond the scope of this paper.

[1] For example, the low housing mobility of Hungarian households makes the repeated sales method inapplicable. According to estimations based on the 2003 Hungarian Housing Survey, an average dwelling is sold only once every ten years.

In the present study the sales data of 2006 were used and aggregated at settlement level. Then mean prices of all sold dwellings were calculated for 193 towns and for Budapest from the tax office data stock. These averages were taken as dependent- and the series of settlement-level indicators as independent variables. For Budapest the district level aggregates were used (twenty-three districts). Thus, the aggregated data file includes altogether 216 records.

As regards the independent variables, the statistical office produces hundreds of indicators of all Hungarian settlements, so actually the abundance of these possible explanatory variables presents a real difficulty. Obviously, a certain degree of correlation of the house price level is perceptible with almost all social or economic indicators, therefore it is quite important to consider beforehand what factors we seek and in what way they affect the local house prices. Moreover, these factors can not be fully isolated. As it will be shown, they are all interconnected in many ways, and though the statistical analysis may easily detect cause-effect relationships, we must be more careful with such interpretations.

In the following sections the settlement characteristics affecting theoretically the local house prices are reviewed, and the available indicators are assigned to them. The effects and interactions of incomes, income distribution, unemployment, population changes, mobility, geographical factors, business activity, tourism, demand for holiday houses and new dwelling constructions are also discussed.

It must be emphasized that the paper concentrates only on a single year and it is not intended to investigate the dynamics of prices or to consider dynamic effects on price formation. As housing market transactions are normally made within a few months, it seems reasonable to focus only on the actual characteristics and to neglect the long-term effects.

## 2. Incomes, income distribution, unemployment

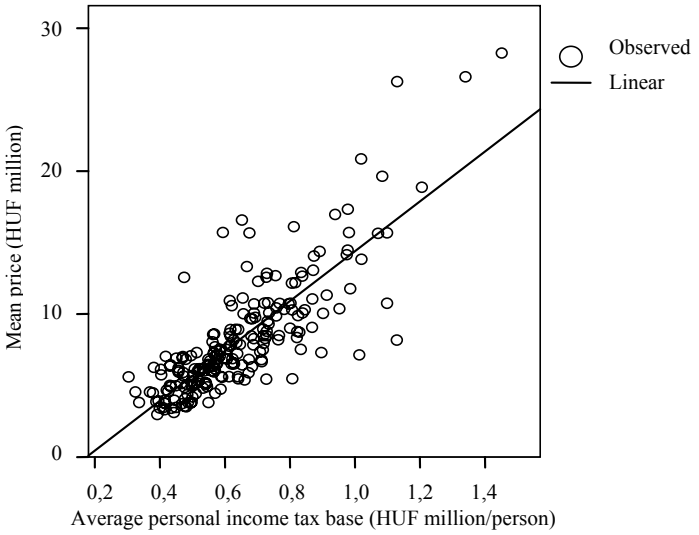
The idea that incomes affect house prices is quite evident. In the 2003 Housing Survey we asked the respondents to estimate the share of different income sources used in their property purchase. From this, we calculated the share of components within the total price. Accordingly, 46 percent came from the sale of other dwellings, 13 percent from family transfers, 28 percent from own savings, and another 12 percent from loans. It is quite general that family transfers are put up by selling the parents' home or a holiday house. This means that presumably more than half of the money spent on used dwellings is in fact the accumulated housing wealth of families, which therefore moves around within the housing sector.

Not only own savings but also loans can be regarded as sources connected directly to family incomes. The higher the income of a household, the greater its members' chance to get bank loans or subsidised housing loans (*KSH* [2005]). Consequently, at least 40 percent of the money involved in the housing market transactions may be closely linked with incomes.

The connection between incomes and house prices is perceptible at the level of aggregated data too: the plot of prices by average income proves the foregoing and depicts a strong positive linear relationship ($r$=0.82, $b$=1.74).

Figure 1 represents the idea that local housing markets are more or less isolated, and therefore the local incomes meet the local supply of properties and their balance sets the price level. According to this way of thinking, some outside effects may break the isolation of the local housing market in settlements falling far from the regression line.

*Figure 1. The mean housing market price of Hungarian towns by per capita personal income tax base, 2006*




Looking at the outliers in Figure 1, three groups can be separated. Each might be regarded as different examples of deficient isolation:

*1*. Medium or lower income level (HUF 0.5-0.8 million/person) with high property prices (over HUF 13 million): this group usually includes towns in resort areas, mainly in Lake Balaton region (Hévíz, Balatonföldvár, Balatonfüred, Siófok, etc.). In their case, apparently,

there is a substantial demand based on non-residents incomes, which results in higher prices.

*2*. Relatively high incomes with low prices: 'socialist industrial cities' with a large share of high-rise housing and a limited supply of better quality houses belong to this category. The demand for higher quality dwellings is generally supplied in the surrounding villages. Its typical example is Dunaújváros, where the industry together with the town itself successfully survived the economic transition. Now, the incomes are high but the demand for better housing can not be met within the boundaries of the town since it is built in with housing estates from the 1950s and 1960s. As a result of this situation, a real suburban ring developed around the town. This example also shows the limits of the settlement-level analysis: the administrative boundaries do not cover the actual residential community of the area, which is represented by the town's outlier position, too. Other examples of this type of outliers are: Tiszaújváros and Paks. In these towns the income tax base is between HUF 0.9-1.1 million/person, while price averages are between HUF 7-7.5 million.

*3*. Extreme incomes with top prices well above regression line: the most expensive towns in the Budapest suburbs and the three most expensive districts of Budapest (2$^{nd}$, 5$^{th}$, and 12$^{th}$ districts) fall into this category. In the latter ones the mean prices are above HUF 26 million while, for example, Szentendre and Budaörs are in similar position with somewhat lower prices (around HUF 20 million).

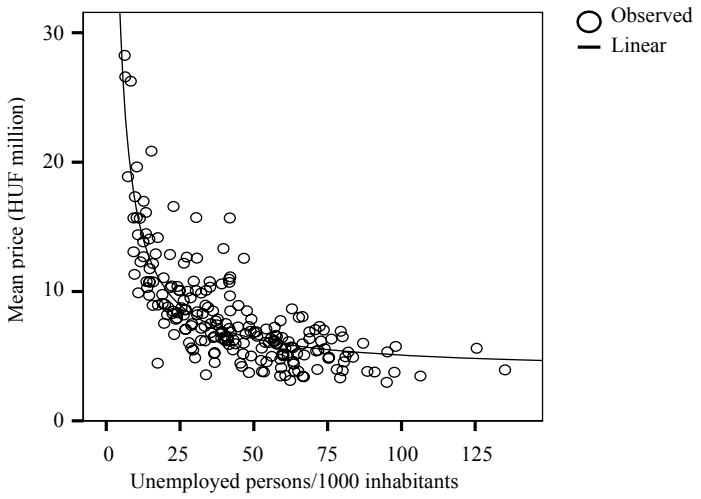
The effect of income inequalities on the housing market and housing conditions is again a field that has not yet been fully understood. The rate of unemployment represents at least some aspects of income inequalities, and for this reason may have a role in price formation. It must be stressed, however, that it is used in absence of a better indicator of income inequality.

The next figure shows that the higher the unemployment rate, the lower the price level is. According to the curve estimation, data are best fitted to an inverse line ($R^2$=0.69).

Not surprisingly, the correlation between the unemployment and income levels is quite high ($r$=0.82). Therefore it is useful to make it clear whether the unemployment variable provides any extra information, or we see exactly the same phenomenon, namely, the differences of average incomes via a different variable. The model calculation (see later) shows that besides income, the residual part of unemployment (which is not explained by mean incomes) also has a relevant contribution to the

model. Consequently, unemployment affects the local price level, which is independent of the effect of average incomes.

*Figure 2. The mean housing market price of Hungarian towns by rate of unemployment, 2006*




The outliers above the curve are towns in the Balaton region (Balatonföldvár, Siófok, Balatonfüred, Balatonalmádi, Balatonlelle, Keszthely), where the prices are higher than in other towns with similar unemployment rates.

## 3. Demographic factors, mobility

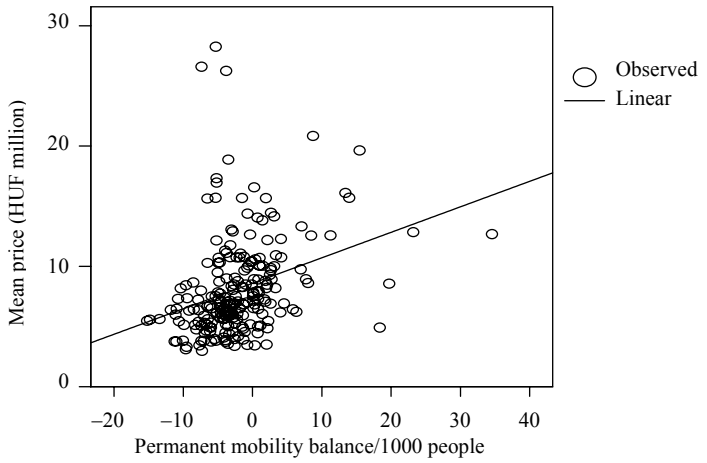
Residential mobility has a more perceptible connection with housing market prices than the total population change ($r$=0.31, $r$=0.22, respectively). In fact, the connection of prices with demographic changes is far more ambiguous than and absolutely not as unidirectional as the connection with incomes.

The 2003 Housing Survey reinforced that the share of moves (especially the ones to other settlements) is relatively low in Hungary. Generally, large social transformations are accompanied by increased mobility, as it was experienced after the Second World War or after the 1956 Revolution. Conversely, the 1989 transformation did not have such an effect. Mobility has remained constantly low ever

since then (*Dövényi* [2007]) and this might be an explanation for its weak influence on prices.

In this case, however, it is important to note that we can not generalise our observations for all settlements since we only have data of towns. However, based on available information, it can be assumed that normally moves influence prices. At the same time it is also typical that low prices attract poor families in segregated rural areas. Accordingly, the relationship is just the opposite in these latter cases: prices influence moves, and more than that, low prices may even generate population growth. Another association is also typical of underdeveloped areas: low house prices may limit mobility since the owners are unable to buy a flat elsewhere from the money they could get for their property (*Dövényi* [2007]). Figure 3 represents the uncertainty and weakness of this connection.

*Figure 3. The mean housing market price of Hungarian towns by mobility balance, 2006*




In 2006, only less than one-third of the Hungarian towns (or Budapest districts) had a positive mobility balance. A high level of mobility accompanied by high property prices is mainly the characteristic of the suburbs and resort areas accessible easily from Budapest, where both the effect of suburbanisation and the relatively new so-called sun-city phenomenon are perceptible. This latter one means that the better-off families move to the Balaton region after retirement (*Kovács* [2006]).

At the same time, there are also examples, where the positive mobility balance is combined with relatively low prices (presumably mainly in rural areas). Since mobility by itself has quite a weak influence on prices, it is often overcome by

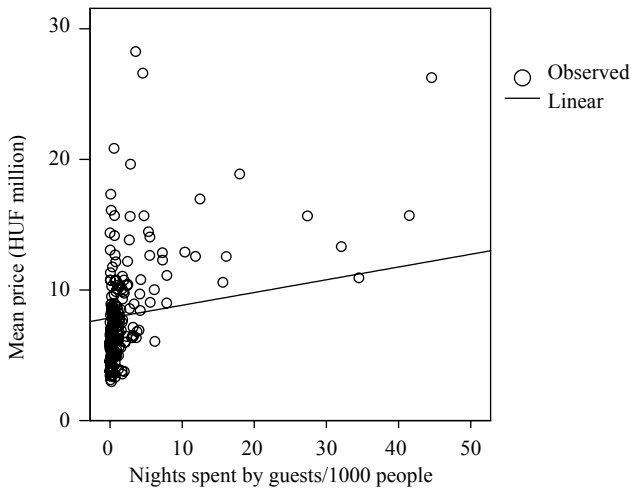
other factors having a stronger impact. If for other reasons the prices are low, it may generate moves of poor families. Therefore the direction of the relationship changes for the opposite. Low prices stimulate poor households to sell their valuable dwellings in cities and to move to cheaper areas either on the edge of the suburban belt or farther on. "‹Suburbanisation of the poor› can not be identified with the original concept of suburbanisation, but it should rather be understood as an escape from cities; however, they are both related concerning the directions of moves." (*Dövényi* [2007]).

## 4. Tourism

The resort areas have already been mentioned as examples of the positive permanent mobility balance. Apart from this, the incomes of non-residents also have an impact on the property market of these areas via the demand for holiday houses. Therefore the house prices are also expected to be above the regression line in resort areas. (See price level by mean income on Figure 1.)

To measure the role of tourism, the number of nights spent by guests per thousand people was used. Figure 4 demonstrates that there are only a few towns, where tourism has an effect on the housing market. In these cases a positive medium correlation ($r$=0.33) was experienced.

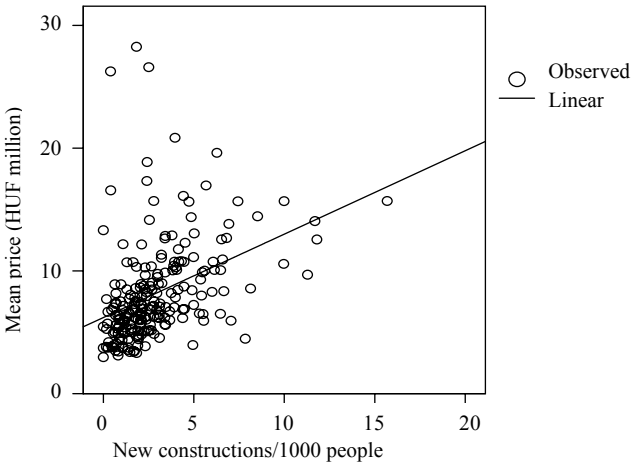
*Figure 4. The mean housing market price of Hungarian towns by tourism, 2006*



## 5. Connection with the market of new dwellings

Concerning the new dwelling market, the impact of the market of used dwellings works the other way around: high prices in the used dwelling market stimulate new housing investments. More precisely, the gap between the prices of building lots and those of new dwellings determines profits. It might be the reason that we find high investment rates in cheaper suburbs (with Szigetszentmiklós on the very top). Unfortunately, we don't have data on land prices at all, so we have no other choice but to check the connection of house prices with new constructions. (See Figure 5.)

*Figure 5. The mean housing market price of Hungarian towns by new dwelling construction,2006*

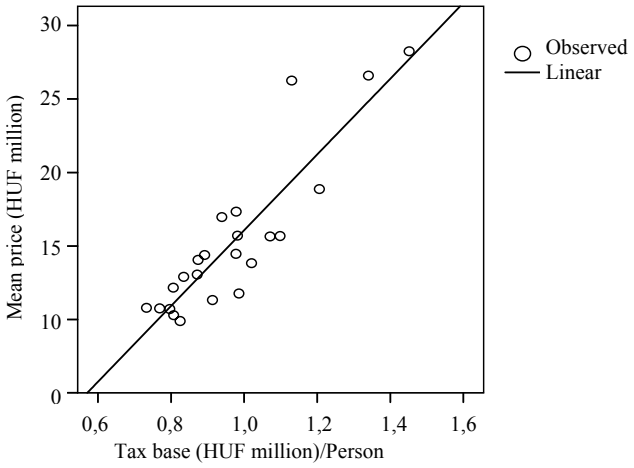



There is a medium correlation between the new constructions and the house price level ($r$=0.39). Unless a retroactive effect is presumed, involving the rate of new constructions in a regression model of properties might be questionable. Primarily the prices influence the investments, but the new dwellings may also have an impact on the used dwelling market via transaction chains. According to *Hegedüs* and *Teller* [2006], 100 new dwellings generated 140-150 further moves in the used dwelling market of Hungary in the period of 1998–2005. However, even if there is an effect at the micro level, we do not know how these moves influence the overall price level of settlements. In any case, using the rate of new dwellings might contribute to a better estimation. Therefore it has a place in price estimation models, even if its role in the explanatory models is doubtful.

## 6. The case of Budapest

In Budapest, the effect of incomes on house prices looks even stronger: the observations of the twenty-three districts fall closer to the substantially steeper regression line ($r$=0.89; $b$=2.58). (See figure 6.)

*Figure 6. The mean housing market price of Budapest districts by per capita personal income tax base, 2006*



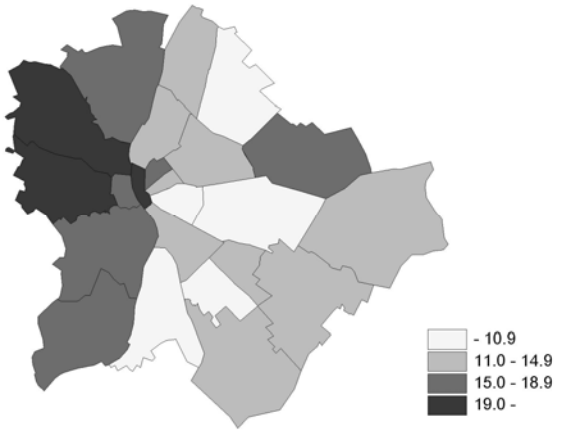

However, it is important to note that these districts are not isolated at all. On the contrary, moves to another district for the sake of a better environment or cheaper prices are more probable than moves from one town to another. The better areas attract the wealthy households from other districts, or the other way round, it is easier for low-income households to move to cheaper districts. Thus, in Budapest there is much rather a two-way connection between the housing market and average incomes. (Of course, the same can be observed between different neighbourhoods within other towns, too.)

In the previous figures, three points far above the others can be noticed. These points actually represent three districts of Budapest, the average price of which is at least around HUF 8-10 million more than that of any other district or town. (See Figure 7.) Two districts (2nd and 12th) of them are traditional upper class areas on the Buda side, a green hillside milieu of generally high housing quality. The third one is the city centre (5th district), where neither the housing quality nor the environment explains such extreme prices. But in this part of the capital, there is an enormous demand for offices, which is often met by converting dwellings to offices. According to the 2001 Census, only some 75 percent of dwellings were used for housing, the

rest were presumably offices, so "households" looking for dwellings have to compete with the business demand for offices.

The foreign investments also affect the property market of Budapest, which may further contribute to the higher prices.

*Figure 7. The mean housing market price of Budapest districts, 2006*
(million HUF)




With some simplification, all the price-raising impacts could be regarded as the "capital" effect. The following model calculations prove that a simple "yes" or "no" "Budapest variable" contains additional information not represented by any of the characteristics discussed earlier. Thus, neither income differences nor other variables explain fully the higher prices of Budapest.

## 7. The multivariate regression model of local price levels

To assess all the effects detailed previously, a linear multivariate regression model was developed. Its dependent variable is the average house price of settlements, the natural logarithm of which is used. (The logarithmic transformation makes the distribution of prices normal and will result in a better fitting model.) The independent variables are the previously introduced indicators in standardised form. Besides, some new variables are also introduced: one of them is the share of "bad" dwellings in the town (for example the ones without bathroom, sewage and toilet, with clay or wooden walls according to the 2001 Census) to represent the overall

housing quality, and the others are the dummies of geographical attributes, such as the Budapest agglomeration, statistical regions, Budapest and the Balaton resort area.

The calculations resulted in quite a strong model accounting for 85 percent of the variation of settlement-level averages, which is at least partly due to the fact of using aggregated data. The stepwise method involving variables in a way that their sequence depends on their partial correlation was applied. The final model included eight variables in the following order.

Table 1

*Details of the regression estimation model of aggregated house prices, 2006*

| Model (Stepwise) | *R* | *R* square | Adjusted *R* square | Std. error of the estimate | Durbin–Watson |
|---|---|---|---|---|---|
| 1 | 0.814 | 0.663 | 0.661 | 0.254 | |
| 2 | 0.862 | 0.744 | 0.741 | 0.222 | |
| 3 | 0.889 | 0.790 | 0.787 | 0.202 | |
| 4 | 0.898 | 0.807 | 0.804 | 0.194 | |
| 5 | 0.911 | 0.831 | 0.826 | 0.182 | |
| 6 | 0.914 | 0.835 | 0.831 | 0.180 | |
| 7 | 0.917 | 0.840 | 0.835 | 0.178 | |
| 8 | 0.919 | 0.845 | 0.839 | 0.176 | 1.818 |

Table 2

*Coefficients of the regression estimation model*

| Coefficients | Unstandardized coefficients | | Standardized coefficients β | *t* | Sig. |
|---|---|---|---|---|---|
| | *B* | Std. Error | | | |
| Constant | 15.64 | 0.03 | | 534.53 | 0.00 |
| Tax base/person | 0.17 | 0.03 | 0.40 | 6.35 | 0.00 |
| Permanent mobility rate | 0.09 | 0.02 | 0.20 | 6.06 | 0.00 |
| Balaton region (dummy variable) | 0.05 | 0.02 | 0.11 | 2.88 | 0.00 |
| Inverse of the unemployment rate | 0.08 | 0.03 | 0.19 | 2.88 | 0.00 |
| Share of bad dwellings | –0.09 | 0.02 | –0.21 | –4.98 | 0.00 |
| Budapest (dummy variable) | 0.04 | 0.02 | 0.10 | 2.24 | 0.03 |
| Tourism | 0.03 | 0.01 | 0.10 | 2.98 | 0.00 |
| Rate of new constructions | 0.04 | 0.01 | 0.08 | 2.43 | 0.02 |

*Note.* Dependent variable: ln(mean price). Independent variables are used in standardised form. Excluded variables: Budapest agglomeration dummy, dummies of six regions.

Table 1 shows that the size of the per capita tax base remained the most influential attribute in the multivariate model. The higher rate of mobility, new constructions and tourism, as well as the location in the Lake Balaton resort area or in a Budapest district can cause an increase in property prices, whereas the growth of the unemployment rate and that of poor quality dwellings reduce prices. Actually, these are the only regional characteristics which in themselves have an effect on the market price level. All other variables were excluded from the model showing that the regional differences or the impact of the Budapest agglomeration had already been represented by other variables.

## 8. Conclusions

The foregoing analysis of the local housing market price level is based on the assumption that the available properties have to meet the available financial sources, and their actual balance determines the price level in the local housing market. This explains why local incomes can have a fundamental effect on prices. Even the interference of outside effects can be explained in this way as the available amount of money is raised by the extra-settlement demand both in the suburbs and in the resort areas.

Apart from the moves to the suburbs or resorts, the rate of mobility between settlements is generally low. This fact may contribute to the result that although only a few settlement indicators were used, a fairly good estimation could be achieved for the local price level.

The findings of this analysis may be used in the future price index calculations.

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