DETERMINANTS OF LAND PRICES IN ISTANBUL : A CASE STUDY

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ABSTRACT

Urban policy and planning may be improved by a better understanding of the determinants of urban spatial structure. In rapidly growing metropolitan areas where there is a strong pressure on serviced urban land the distribution of population densities and land prices are expected to show basic differences from standard models. Istanbul is one such metropolitan city where population increases at the rate of 4.5 % per year, adding an average of 250 000- 300 000 new inhabitants. The lack of any effective planning control causes the metropolitan area to develop under peculiar dynamic forces.

The data set used in the analysis is based on data collected for a Research Project (Bolen et. Al.) which was sponsored by TUBITAK (Turkish Scientific and Technological Research Institution) during 1991-1995. The data sets are organised at two different levels of aggregation : i) the ward (mahalle) level comprising the total of 553 wards within the boundaries of Greater Istanbul Municipality and, ii) the street level, comprising 150 randomly selected streets within the boundaries of Greater Istanbul Municipality.

The dependent variables used in the analyses consist of land rents which have two different parameters i.) increases in land values based on real estate tax rates, ii.) increases in maximum rent of a 100 sq.m. house on the randomly selected street. As independent variables, characteristics of the site such as i.) scenery, ii.) status, iii.) proximity to green areas, iv.) proximity to the seaside v.) distance from CBD, vi.) the building coverage, vii.) the floor area ratio, are used. Relationships between various variables and their capacity to explain the special spatial structure of Istanbul are tested using a logistic regression model.

INTRODUCTION

The most significant feature of urban systems with complex structures is the characteristic of irregularity observed in other non-linear systems. Urban systems do also display an irregular structure (e.g. instant differences in population density from one area of the city to the other). However, it has been emphasized by several researchers that this irregularity has a certain order and that following the disorders which unbalance the system it again returns to a balance situation, in other words, oscillations seen in other dynamic systems are also seen in urban areas (Dendrinos, 1978, 1985,1992, Capozza and Hersley, 1989, Brueckner, 1980, Heikkila et.al., 1989, Rosser, 1991, Cassetti, 1981, Puu, 1982 and Montagnana et.al., 1992).

The matter having an importance both from theoretical as well as the point of view of planning practice is whether the oscillations or fluctuations are long-termed and periodic or at random related to certain unknown events. While, the first one is a regular position meaning a dynamic balance, the second one is an instant burst or decrease of population which means significant increase/decrease in certain points of time and/or place. Cities display fluctuations which are affected by the national economy, the rate of population increase and economical conditions of other cities and even by the economical conditions of other cities around the world. Similar fluctuations/oscillations are also valid for different parts of urban areas. While some parts show improvements compared to the others, some are observed to be declining. In several metropolitan areas, while older centers loose population and attraction, new places of residence and centers are grown in their vicinity. Consequently, following this sprawl of population and business to the outskirts of the city in various instances the return of business to the old center has been observed.

The important part of this development is that the actors, in other words the individuals and organisations, involved in decision making related to the location of dwellings and business, formulate their strategies according to their expectations of one another's decisions. In other words, decisions affecting the system are formed under constant uncertainty and estimations of other decision maker's preferences(See, Strazheilm, 1975, Healey, 1990). This has to be well understood when assessing the future of an urban system.

During its historical evolution, the movement of Istanbul through repeated cycles toward a steady state in the long term, has been demonstrated in an earlier study (Bölen et.al., 1994). The present study aims to analyse a short term development period of the urban system. The data sets employed in the analysis have been complied during two research projects carried out by the authors and supported by Turkish Institute of Science and Technology (TUBÝTAK) in 1992 and 1995. The basic assumption of the present study which aims to aid the planning decisions to monitor the spatial structure of the city is that land rent is one of the basic factors in the location decisions taken by residential and business firms. Land rent is both the determinant and the result of location and investment decisions. The changes in land rent within a short term are analysed to examine the fitness of a short term cycle of the system to a numerical model based on classical physical theory.

GENERAL DISTRIBUTION OF LAND VALUES AND INCREASES IN ISTANBUL

In the project No INTAG-408, supported by TUBITAK, the land values and the spatial distribution of increases in land values within the metropolitan area of Istanbul were examined using the data sets based on tax rates for the years 1990 and 1994. According to the results of the research, land values in Istanbul, were irregular and nonhomogenous in detail but showed a decrease in average values at equal distances from the center. As a result of factor analysis that was included in the same study, it was established that the land values were related primarily to the status of residential area, its proximity to a green area its proximity to the seaside, and its view. This distance of a site to the Central Business District was of second or third degree importance. However, increases in land values, show a different behaviour. High increase rates were found areas in the eastern and western ends of the city, 12.5-25.0 Km away from the center. Multiple regression analysis did not establish any direct relation between the street's physical characteristics and increases in land values.

METHOD OF RESEARCH

Although the multiple linear regression analysis used in the TUBITAK-INTAG No.408 project, examining the spatial distribution of land values and increases revealed certain tendencies in average value increases in districts, it was insufficient in establishing the effects of basic characteristics of the site (scenery, status of land, proximity to green area) on land values at street level. In this research, due to the irregularity of the urban system, it was favourable to apply a logistic regression analysis. By using this technique which ensures the probability of realization of a certain case and helps to establish non-linear relationships, it was aimed to establish the probability of increases in land values related to certain characteristics. What is questioned in the study is whether the conditions that establish the land values are also valid for land value increases. For this purpose, the relationship between the 7 variables which are presumed to affect land values have been examined.

Map 1: Distribution of Standardized Increases in Land Values in Istanbul (1990-1994)

Source: Bolen at al, 1995
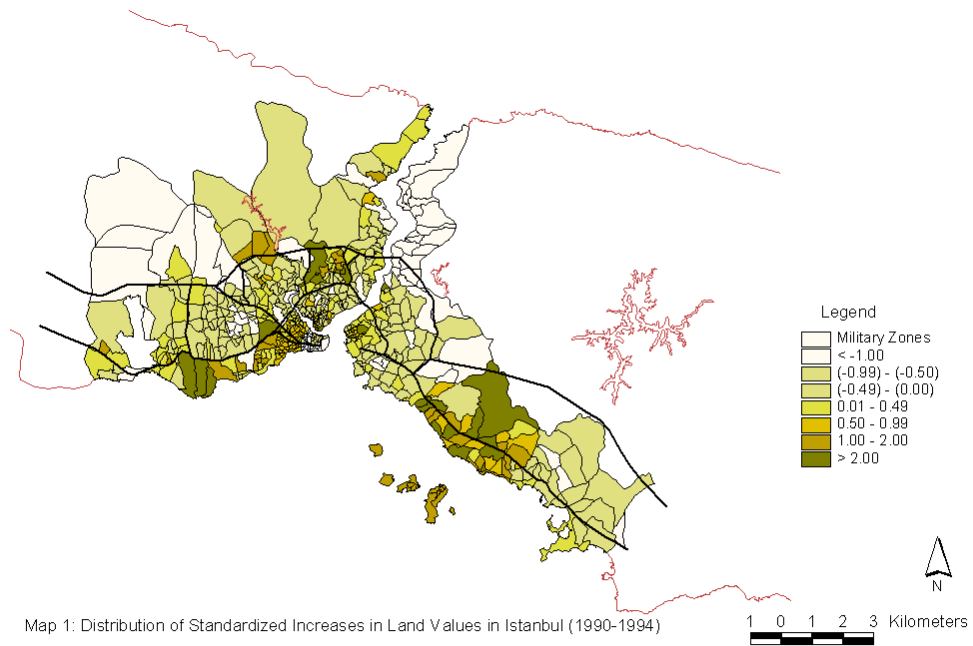
Variables Used in the Analysis

Two different parameters were used in the analysis as the dependent variable, i.) increases in land values based on Housing Tax rates, and ii.) increases in maximum rent value of a 100 sq.m. house on the street. The independent variables showing the characteristics of the street on which the site is located such as i.)scenery, ii.) status of the neighbourhood, iii.) proximity to a green area, iv.) proximity to the seaside iv.) distance from CBD, v.) the building coverage and, vi.) the floor area ratio. In the analysis each dependent variable (tax value increase and rental value increase) is separately processed with the 7 independent variables.

Database Used in the Analysis

In the analysis, the database related to 150 randomly selected streets and sites from the TUBITAK-INTAG No: 401 Project were employed. The land values compiled in the database were renumareted for the logistic regression analysis and were given the values of 0 and 1.

The values of the dependent variables were first standardized using group averages and standard deviations for each quintile (20% category). For the purpose of standardization, groups of 20%, from the highest 20% slice through to the lowest 20% slice, were created

separately for both the land values and residential rents by subtracting the group's average value from the value of each parameter and dividing by the standard deviation in that group. Values found in this form showed how each parameter's value increase differs from the average value increase of the group it belongs and at what rate it is over or under the group average.

The data were processed by coding the parameters greater than the group averages as (1) and, the ones smaller as (0). The values related to each Independent Variable used in the analysis were grouped according to a scale assumed to affect the increase in land value. They were recoded by giving (1) to the values within these levels and by giving (0) to the others. For instance, sites within 500m. to a green area were coded as (1), others as (0), sites with scenery were coded as (1), without scenery as (0), sites with a status were coded as(1), others as (0), sites close to the seaside (in cases where the distances to the seaside are 100m., 250m., and 500m., each one was used separately as variables) were coded as (1), others as (0), sites where the distance to the CBD is less than 60 min. were coded as (1), others as (0), sites where the building coverage value is below 0.25 were coded as (1), others as (0), sites where the floor area ratio is below 1.0 were coded as (1), others as (0).

APPLICATION OF LOGISTIC REGRESSION ANALYSIS

During the study a Logistic Regression Analysis was employed to examine the relationship between the 7 Independent Variables and the increases in land values. As two different measurements were used to represent the land values, two separate logistical regression analysis were carried out using each one separately as Dependent Variables.

Information gathered from the Real Estate Agencies concerning the land values of streets in 150 points during the years 1990 and 1994, were also available in the research. However, difficulties were experienced in establishing land values because of the lack of unoccupied land in most of the streets surveyed in the study. Therefore, it was not found appropriate for the land values obtained from the Real Estate Agencies to be used as independent variables in this analysis. Instead, it was found appropriate to use the real estate tax rates as a dummy variable because, even though they did not show the actual values, they showed an internal

consistency in relative values. In order to obtain more reliable values from the Real Estate Agencies, the highest rents for a 100 sq.m. standard dwellings on the 150 streets were included in the analysis. Again, it was found more appropriate to use them as Dependent Variables instead of land values.

1. INCREASES IN LAND VALUES BASED ON REAL ESTATE TAX RATES (1990-1994)

The distribution of the absolute increases in the real estate tax rates of each quintile following are the increases, from lowest 20% slice to the highest 20%, are given below:

1st Quintile (0- 20000 Turkish Liras) : Average Absolute Increase 2522%

2nd Quintile (20- 40000 Turkish Liras) : Average Absolute Increase 1062%

3rd Quintile (40- 800000 Turkish Liras) : Average Absolute Increase 544%

4th Quintile (80- 300000 Turkish Liras) : Average Absolute Increase 934%

5th Quintile (above 300000 Turkish Liras) : Average Absolute Increase 693%

When the rates of increase for each group are examined, it is observed that the absolute increases gradually decrease showing the lowest value at the top quintile. Nevertheless, the third group, shows a significant deviation from this tendency and, displays the lowest absolute increase rate.

In this analysis where the real estate tax rates are used as dependent variables, the logistic regression was applied in two steps. In the first step, 150 points were included into the analysis in total and their relationships with the independent variables were established. In the second step, analysis was made taking quintile (20%) groups into consideration separately.

During the first step administering the total analysis, it was established that the logistic regression model had accurately estimated 83.72 % of sites with no value increase and 29.69% of the areas with value increase and, 60.67% in general.

During the analysis where the 20% groups were used, a meaningful relationship was observed within the 4th quintile with the Independent Variables and proximity to the seaside. Also, in the 5th quintile with the highest land values, a meaningful relationship with a low confidence level (90%) was observed with the Independent Variables and proximity to a green area.

2. INCREASE IN THE HIGHEST RESIDENTIAL RENT OF A STANDARD DWELLING UNIT ON THE STREET (1990-1994)

Distribution of absolute increases in the highest residential rent values of each quintile, with the 1st 20% showing the lowest rental value through to the 5th 20% group with highest rent values are given below:

1st Quintile (0- 499999 Turkish Liras) : Average Absolute Increase 7.76%
2nd Quintile (500- 699999 Turkish Liras) : Average Absolute Increase 5.37%
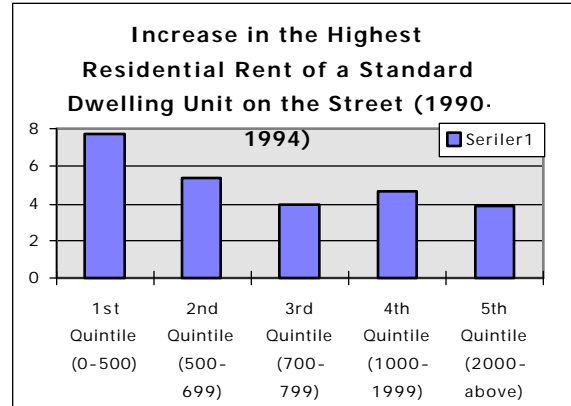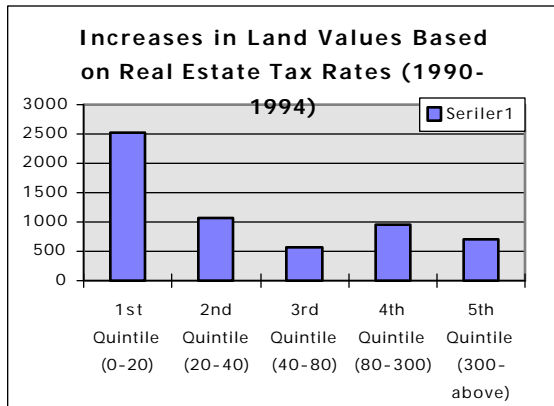3rd Quintile (700- 999999 Turkish Liras) : Average Absolute Increase 3.94%
4th Quintile (1000- 1999999 Turkish Liras) : Average Absolute Increase 4.63%
5th Quintile (above 2000000 Turkish Liras) : Average Absolute Increase 3.85%

When the group averages are examined, it observed that from the lowest rental value up to the highest the absolute increase rates decreasing from 7.76% to 3.85%, but again the 3rd group display a deviation in the sequence.

As was the case in the previous study, this study, where the highest residential rents are used as Independent Variables, the analysis was carried out in two steps; first the database consisting of the highest rental values (100 sq.m. dwelling units) in the streets located at 150 sites were included in the analysis altogether, later the database consisting of 20% groups was taken into the analysis.

Increases in Land Values Based on Real Estate Tax Rates (1990-1994)

Increase in the Highest Residential Rent of a Standard Dwelling Unit on the Street (1990-1994)

In the first analysis, it was observed that 69% of sites without increase and 75% of the areas with increase matched the logistical model and that the model accurately estimated 72.6% of the cases observed.

In the second step, where database was included in groups of 20%, a meaningful relationship within a confidence limit of 99% was observed only between the residential rent increases in the highest quintile and the independent variable of distance to the CBD. Accordingly, it is understood that the residential rent increases in the highest quintile are more related to being within max. 60 min. distance to CBD, compared to the other variables.

CONCLUSIONS

The study which aimed to contribute to the interpretation of the complex and dynamic structure of the urban systems and which was conducted on a sample drawn from the Istanbul Metropolitan Area, has come up with the following results regarding the urban system's irregular structure:

- The increases in land rents appear as a result of supply and demand relationship in which the decision making individuals or organizations are simultaneously interacting and there seems to be no meaningful relationship between these decisions and the positive physical

characteristics of the site. This situation shows the difficulty of making logical, rational estimations related to the future structure of the system.

- The decrease in average absolute values of land rents (tax rates and residential rents) in the 3rd quintile of both databases demonstrates the system's irregularity.

- Similar results have been obtained for both of the two dependent variables used in the analysis; this indicates the reliability of the results.

In conclusion, the logistical regression analysis carried out within the scope of this study has meaningfully explained only certain increases in land rents. These discontinuities observed in short term analysis have shown us the difficulties to be encountered in making estimations related to the spatial structure of value increases within short term, thus pointing to the necessity of long term dynamic analysis and critical issues related short term planning decisions.

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