Relationship of age and market value of office buildings in Tirana City

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Abstract— Immovable properties, lands and buildings, are diversified. There are many factors that influence rental market value and they can be divided in market factors and factors of property itself. On the other hand the factors of property that influence rental value can be divided in site factors and buildings factors. This paper deals with “age” factor and tries to get the relationship between age and rental value of office buildings in Tirana City. This paper concludes that age is a factor that influences value, but it is not the only one and so it can’t be used to explain differences in values. Through this paper is underlined the conclusion that other causes of depreciation provides a superior explanation to one which relates depreciation rate of rental value to age alone. Building quality is a better explanation of depreciation than is age. (Abstract)

Keywords— immovable property, age of building, quality of building, rental value.

I. INTRODUCTION

Immovable property is most commonly defined as land and any improvement made to or on the land, including fixed structure and infrastructure components, thus land and buildings. It’s constitutes one of the most valuable assets for the state and individuals and therefore its valuation assumes a special importance. The properties are diversified and there are numerous purposes a property is valuating for. Regardless of the purpose of valuation, the market value is the most required kind of value and the main basis of evaluation of the land. Market value is the estimated amount for which a property should exchange on the date of valuation between a willing buyer and a willing seller in an arm’s-length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion [1] [2].

Factors that influence the market value can be divided in market factors and factors of property itself. This paper attempts to give the answer to the question: What is the impact of age in value and can the age be seen as the only factor that affects the value?

II. METHODS OF EVALUATION OF IMPACT OF AGE ON MARKET VALUE

The methods for analyzing the impact of age in market value are a) longitudinal analysis, b) cross-section analysis and c) Hedonic Price Model.

A. Longitudinal analysis

A longitudinal analysis, holding site factors constant, would track the performance of a sample of buildings over time [3].

Immovable property has to be considered as a unit land-building, therefore market values as well as values of lease and sales values, can be seen as a function of the participation of both these components.

B. Cross-section analyses

A cross-section analysis examines properties of different ages at the same point of time [3] and tries to explain the differences between properties values as a result of differences of age.

Having information for the same category of properties of different ages in the same location and at a given moment of time, we can calculate the annual rate of depreciation in rental value by reference to the following equation (1) [4]:

\[ R_n = R_0 (1 + d)^{-n} \]  

where:

- \( R_n \) is rental value of building \( n \) years of age
- \( R_0 \) is rental value of building 0 years of age
- \( d \) is annual rate of depreciation in rental value

Both the methods mentioned above have their limitations. It is not possible to hold site factors constant over time. It is difficult to find a large data sample with full evidence on rental values over a sufficiently long period. The impact of site factor can’t be perfectly isolated when buildings in different sites are compared.

Since the land factor cannot neglect, the value of the lease should be studied under the view of two factors, age and location and because of that it is not possible to use longitudinal analysis or cross-section analysis. The appropriate method to analyze the impact of age and location is hedonic price model.
C. Modeli hedonik i cmimit

The heterogeneous nature of real estate properties justifies the use of the Hedonic Price Model for estimating their value. The Hedonic Price Model takes into account the properties of real estate separately and estimates prices based on the assumption that these properties could be separated into characteristics as attributes of spatial units, location attributes, quality of design and architecture, etc. Regression analysis and related estimation approaches are common in Hedonic Price Models [5].

The model of multiple linear regression is well known and widely used in the valuation of real estate. The regression model is presented as an equation, with the dependent variable on the left-hand-side of equal sign, and a sum of terms on the right-hand-side consisting of the explanatory variables each multiplied by a parameter whose value is estimated by hedonic regression and that relates each explanatory variable to the dependent variable. This model identifies the degree of importance of each variable, indicates the relative importance of each variable in the order of entry into the equation and shows how well the model works [6].

The model of multiple linear regression is:

\[ Y = b_0 + b_1 x_1 + \ldots + b_n x_n \]

where:
- \( y \) is the dependent variable
- \( x_1, \ldots, x_n \) are \( n \) independent variables
- \( b_0 \) is constant

The model has to be understandable and explainable and it should predict rent value as close as possible market prices. Accuracy of the model depends on both the variables included in the model replicating market value and the market data used for calibrating the model.

III. Determining the Model of Dependence of Rent Value from Age

A. Data sample and data preparation

The data includes 12 office buildings (Fig.1) involving the office areas of 80 to 200 square meters. These are the main and the most important Business Centers in Tirana City.

The data was obtained by carrying out a survey among the current users of the rental office space and are summarized in Table I.

Location cannot be evaluated quantitatively, but only qualitatively. Location is evaluated on the perceptions of appraisers on its importance, the significance of the road where the property is situated, accessibility, the connecting with the center and main roads, etc.

Every building is unique. Notwithstanding the differences between individual buildings, it has been determined that many buildings follow a similar pattern as they pass through different stages in their respective lifecycles. In this regard, five general lifecycle stages have been identified and, using the analogy of human body, they are summarized conceptually in Fig. 2 [7].
reconstruction, reconstruction according to the change in their use destinations and their adaptations for offices. These buildings belong to the '50 years. We have accepted that the reconstruction has passed their age from Stage 5 “old age” into Stage 4 “adulthood”.

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>RENT</th>
<th>LOCATION</th>
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<tbody>
<tr>
<td>ETC</td>
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**B. The model**

The model of determining the rent as function of age and location is:

\[ R = b_0 + b_1 \cdot A + b_2 \cdot L \]

where:

- \( R \) is rental value
- \( A \) is the age of building
- \( L \) is location of building

The goodness of fit of the model should be evaluated by some statistical tests:

**Coefficient of determination (R²)**

This is the proportion of variation of rent value explained by the regression model. The values of R² range from 0 to 1. Small values indicate that the model does not fit the data well. On the other side, when the R² equals 1, all variation in values are explained by the regression equation.

**F-statistic**

The F-statistic is used to test whether or not individual regression variables are significant in predicting the dependent variable, rent value. In general, an F-statistic of 4.0 or larger indicates that a variable is significant in predicting rent value at 95% confidence level.

**Critical probability (p-value)**

It is the measure of the probability that the result is "worse" than actual outcome (renting with deviations larger than those observed)

If \( P_{kr} < \alpha \), hypothesis is rejected and if \( P_{kr} > \alpha \) hypothesis is accepted.

**IV. Results of a survey of the impact of age on rental value**

Table II, Fig. 3 and Fig. 4 gives a descriptive statistics for rent, age and location.

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Using data from Table 1 and using regressive analysis, we get the following results (Fig. 5):

The equation that gives the relationship between rental value, location and age is:

\[ R = 24.5918 - 0.284 \times \text{Age} - 2.82 \times \text{Location} \]

V. DISCUSSION OF THE RESULTS

By examining the data resulting from the linear regression (Fig. 4), the coefficient of determination \( R^2 = 0.556 \) indicates that the equation explains 55.6% of the distribution of observations. The equation obtained is valid, statistical probability \( F = 0.02588 < 0.05 \). An explanation of the factors affecting the rent is sufficiently satisfactory.

Both of the variables have the expected signs, and the linear form of the equation means that the individual coefficients can be interpreted as showing the contribution of a one-unit increase in the level of the to the overall price [8].

The coefficient at "age" is very small. It shows that the impact of age in rental value can be negligible.

Buildings deteriorate and become obsolete as they age. However, some depreciate more quickly than others. The depreciation rate is a function of age but also of building quality or qualities [3]. Despite the actual age of a building, what affects mostly the value, is the useful economic life and the remaining economic life of building. There are three fundamental qualities of a building which are affected differently by physical deterioration and building obsolescence as the twin causes of building depreciation, external appearance, internal specification, configuration [9].

Because depreciation of value is related to the quality and age, let us try to find the relationship between them following the same reasoning as for finding the dependence rent value = \( f(\text{age}, \text{location}) \).

The model of determining the rent as a function of age, quality and location is:

\[ R = b_0 + b_1 \times \text{Age} + b_2 \times \text{Location} + b_3 \times \text{Quality} \]

where:

\( R \) is rental value
\( A \) is the age of building
\( L \) is location of building
\( Q \) is quality of building

Quality of building can’t be evaluated quantitatively but only qualitatively. It is evaluated based on physical inspections. It is assessed using the scoring system. Thus 5 = very good, 4 = good, 3 = fair, 2 = bad and 1 = very bad (Table III). The quality is evaluated by taking into consideration not only the actual conditions, but and the expectations of stakeholders.

<table>
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<tr>
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Using data from Table I, Table III and using regressive analysis, we get the following results:

The equation that gives the relationship between rental value, location, age and quality of building is:

\[ R = 7.72 -0.118 \times \text{Age} -1.84 \times \text{Location} +3.61 \times \text{Quality} \]

By examining the data resulting from the linear regression (Fig. 5), the coefficient of determination \( R^2 = 0.797 \) indicates that the equation explain 80% of the distribution of observations. The equation obtained is valid, F statistic probability is very small (significance F = 0.003778 < 0.05). The coefficient at "age" is very small. Formulate relevant hypothesis (coefficient = 0). Since the critical probability \( P\)-value = 0.228 > 0.05, the hypothesis is confirmed. This means that the variable "age" can be removed from the list of variables exploratory. It has an impact virtually insensitive compared with the impact of location and quality of the building. Such an outcome could be expected if we would have provided that the quality of the building is a function of age.

VI. CONCLUSIONS AND RECOMMENDATIONS

Immovable property is one of the most valuable assets for the state and the individuals. It consists of land and buildings and each value should be seen as the participation in it of both of these components. It is not possible to hold site factors constant over time. The impact of site factor can’t be perfectly isolated when buildings in different sites are compared. Because of that, the location is a factor that has to be included in any evaluation process. This paper concludes that age is a factor that influences value, but not the only one. It can’t be used to explain differences in values alone.

Quality in real estate must be connected to site and/or building. Buildings deteriorate and become obsolete as they age. However some depreciate more quickly than others. The depreciation rate is a function of age but also of building quality. Age and quality of building cannot go together as factors that explain differences in value.

Through this paper is underlined the conclusion that other causes of depreciation provides a superior explanation to one which relates depreciation rate of rental value to age alone. Building quality is a better explanation of depreciation of rental value than is age.

To provide a better explanation of the depreciation of the rental value, I recommend considering not just the quality as a single feature of a building, but three basic qualities, which are affected by physical deterioration and building obsolescence: external appearance, internal specification and configuration.

REFERENCES