

Residential real estate value assessment considering the influence of various factors

Anna Minnullina¹

¹Tyumen Industrial University, Volodarskogo St., 38, Tyumen, 625000, Russia

Abstract. Interest in modern methods of assessing the value of real estate in the housing market is fuelled by the increased business activity, increased competition and changes in the taxation system. In this regard, the article proposes a method for assessing the value of real estate based on the analysis of various factors influence degree. The proposed recommendations are based on correlation and regression analysis. They allow for an absolute and relative adjustment of the residential property value. In order to confirm its practical application, a possible adjustment of the property considering the influence of the “quality of repair” factor is provided.

1 Introduction

In modern society, the residential real estate market and its participants represent an economic system that occupies an important place in the life of every person.

The development of the housing market in Russia in recent years and the increase in business activity on it have contributed to the demand for assessing the market value of residential properties necessary for executing various real estate deals (buying/selling, mortgages, pledge, etc.), as well as for analytical housing market research.

The real estate market experts have recently shown an increased interest in the methods of mass assessment of the housing objects market values, the relevance of which is emphasized by the change in the property tax calculation procedure. The transition to a new tax base calculation method based on the market value of the property necessitated a massive reassessment of the housing value throughout the country, and it is obvious that traditional assessment methods, in this case, turned out to be costly and time-consuming. Market experts are not able to rapidly deal with such scope of work with such methods. There are three main approaches to the real estate assessment presented in the educational and specialized literature: income, cost and market approaches (table 1) [1-3,5-8].

Table 1. The main approaches to real estate value assessment.

Approaches	Description	Benefits	Drawbacks
Income-based	Assessment of the current value of the expected income from the property (applies if a forecast of income and expenses can be made)	The expected future profitability and the situation in the real estate market are taken into account	The subjectivity of profitability assessment is to a greater extent used for forecasting, dependence on the correct economic

			evaluation
Cost-based	Property restoration cost assessment considering the accumulated depreciation (used for special-purpose objects)	An estimate of the most efficient use of the construction site, which is useful in assessing the system of taxation and insurance.	Not applicable when assessing the cost of old objects, the difficulty in assessing the depreciation of individual buildings, does not take the land plot deterioration into account
Market-based	Comparative assessment of the property value with the prices of similar objects (used in comparison with the prices of analogs for which the purchase and sale deals have already been executed)	A simple and understandable application of the method reflects the market ratio of supply and demand as well as market conditions.	The complexity of collecting information on prices, the difficulty in finding similar objects

The market approach is the most often used to assess the value of residential real estate. Moreover, this approach is often the only possible tool for assessing the cost of housing [1].

The market approach (comparative) is based on the method of comparing sales of real estate objects. This approach allows assessing the property in comparison with the similar object of the developer or with the object of competitors. The approach is relevant and objective in the case of a developed real estate market and the presence of competition in the region [4]. Otherwise, the use of the approach is inappropriate and may give an inadequate assessment of the real estate property value. Also, the uniqueness of the object or the unfinished construction process are both limiting the implementation of this approach.

As a rule, this approach is used for typical (houses, apartments, office and commercial premises) or close to market typical buildings [5].

When using this approach, changes or additions to the characteristics and location of the property can be applied.

As a result of assessing the value of real estate with the help of the market approach, the dependence of market prices on various factors and the degree of their impact can be determined.

However, it is important to note that in today's conditions of the real estate market development in Russia, secrecy of information in relation to similar real estate objects is noted along with the difficulty of determining whether the object and its analog belong to the same market segment [6]. These aspects must be considered when choosing an approach to assessing the value of the real estate property.

Main methods for analyzing and evaluating the residential real estate market have been proposed in the works of many authors, the main of which are: Joseph K. Eckert, S.V. Gribovsky, N.P. Barinov, S.A. Sivets, I.A. Levykina, G.M. Sternik, S.G. Sternik, I.N. Anisimova, A.G. Gryaznova, M.A. Fedotova, Y. Kochetkov, A.N. Asaul, S.P. Korostelev [1,2,4-11].

2 Methods

In Russia, an assessment method based on the correlation and regression analysis, the authors of which are S.V. Gribovsky and N.P. Barinov [6,7] has become the most common for the residential real estate mass assessment.

The essence of the model is that the market value of a residential property is represented as a function of its main market pricing factors and a constant value:

$$R_j = C_j \times \prod_{i=1}^n k_{ij} \quad (1)$$

R_j – the price of 1 sq.m. of the j -th property; C_j – the base price of 1 sq. m. of the j -th property; $i = \overline{1, n}$ – variables, that describe factors affecting the price of the property; k_{ij} – coefficient reflecting the influence of the i -th factor on the price of the j -th property.

An important condition for the application of this technique is the competent determination of factors affecting the residential real estate value. Many factors show the trend to reduce the impact on the cost of housing or even the reverse trend. Also, new factors appear that are relevant and require consideration when setting housing prices.

Most scientists classify factors influencing the market value of residential real estate according to certain parameters. Sternik G.M. [4] identifies 23 factors affecting the value of residential real estate (Table 2).

Table 2. Factors affecting the value of residential real estate, according to Sternik G.M.

Group of factors	Factor
Consumer factors	Housing demand (potential demand)
	Incomes of the population and their differentiation
	Volume of effective housing demand
	Tendency of the population to purchase housing and price expectations
Macro factors	Macro-financial factor (monetary base)
	Conditions and volume of housing loans to buyers, including mortgage, the number and proportion of mortgage deals
	Macroeconomic factors (GDP, industrial production, employment rate)
	Inflation and deflation
	Macro-financial factors (change in exchange rates)
	Prices of oil and other export goods
	Capital outflow
Regional market factors	Reputation of developers and objects
	Volume of housing supply
	Specific housing stock
	The volume of construction and housing commissioning, the pace of construction of objects
	Financing of housing construction with own funds, loans, public funds and other funds raised
	Cost and full (investment) cost of construction
	Resource provision of construction
	Administrative and economic conditions for the entry of the developer to the market and operation in the market
	Availability of land plots for construction and access conditions
	Investment strategy of developers
	Marketing and pricing strategies of sellers and developers
	Availability of alternative investment objects

Abbasov M.E. in his work [5] identifies a list of factors considering the medium-term and long-term housing cost forecasting:

- standard of living;
- level of solvency of the population;
- construction costs;
- credit conditions and housing subsidies;
- regional specific features of doing business;

- impact of administrative resources on the construction business;
- influence of macroeconomic factors.

Some authors refer the following to the main factors influencing the cost of housing: inflation, the level of physical depreciation of fixed assets of a construction company, land prices, home ownership, housing affordability indicators as well as exchange rates. [9-12]

Most factors affecting the value of residential real estate can be grouped depending on the scope of influence (macro, local, regional), according to market indicators, depending on the market participant, etc.

However, in market conditions, it is also important to assess the degree of influence of factors on the cost of housing, depending on consumer preferences and the demand level. In this case, it is recommended to rank the factors considering the impact assessment. The ranking of factors is advisable to be conducted by experts within a focus group or oral survey. Managers and top managers of house-building companies and residential real estate sales agencies can be the experts. So, the main factors affecting the value of residential real estate, considering regional specific features of Tyumen, according to the outsourced experts are:

1. cost of housing construction;
2. level of solvency of the population;
3. construction area;
4. area infrastructure;
5. reputation of the developer;
6. housing loans conditions;
7. conditions for the financing of housing construction;
8. degree of macro factors influence.

Top managers of the following companies acted as experts: 1st expert – LLC Partner-Stroy (Tyumen), 2nd expert – LLC Zeleny Mys (Tyumen), 3rd expert – Brusnika LLC (Tyumen), 4th expert – GK "Stroy Mir" (Tyumen), 5th expert – LLC UIT Tyumen (Tyumen) and 6th expert – LLC INCO and K (Tyumen).

Table 3 presents the results of the selected factors ranking.

Table 3. Ranking of factors affecting the value of residential real estate, selected by expert.

Factors	Experts						Total rank
	1	2	3	4	5	6	
Cost of housing construction	1	2	1	2	1	1	1
Level of solvency of the population	2	1	3	1	2	2	2
Housing loan conditions	4	4	2	3	8	5	3
District infrastructure	7	3	4	7	6	7	6
Reputation of the developer	3	8	7	4	5	6	5
Construction area	5	6	6	6	3	3	4
Conditions for the financing of housing construction	8	7	8	5	4	4	7
Degree of macro factors influence	6	5	5	8	7	8	8

During the expert assessment, the degree of consistency of opinions of 11 experts was determined using the Kendall (W) concordance coefficient according to the formula (2):

$$W = \frac{12S}{m^2(n^2 - n)}, \quad (2)$$

m is the number of experts in the group, n is the number of factors being analyzed, S is the sum of the squared difference of ranks (deviations).

$$S = \sum_{j=1}^n (\sum_{i=1}^n A_{ij} - \frac{1}{2}m(n+1))^2, \quad (3)$$

A_{ij} – assigned rank of the j -th expert to the i -th factor.

The concordance coefficient value falls within the range of $W > 0.6-0.8$, which means a high level of consistency and common opinion of experts.

Thus, according to the results of the ranking, the most important factors of pricing in the housing market were: the housing construction cost (1st place), the level of solvency of the population (2nd place), and the housing loans conditions (3rd place).

The cost of construction of residential real estate is the most significant factor in pricing. It takes into account the material and financial capabilities of the developer, the architectural conditions of the development area, the level of demand and consumer preferences in the material from which the property was built (brick, concrete, etc.).

Not the least important are the “construction area”, “area infrastructure” and “builder's reputation” factors, which are taken into account by the housing market consumers. In this case, it is advisable to conduct a social study of the consumer housing market in Tyumen on the significance of these factors among the others.

A set of factors taken into account in the consumer market when executing various real estate deals (purchase/sale, pledge, rent, mortgage, etc.) also needs to be ranked. In this case, the potential buyers of residential real estate ready to make a purchase should be the experts.

So, among other parameters taken into account when buying residential property, the main ones are the district, the location within the district, the type of housing, the wall material, the area of housing, the number of rooms, finishing, the number of floors and the occupied floor. In addition, many buyers set more precise criteria for choosing residential real estate, namely: the location of windows ("on the sunny side", "facing south"), the location of rooms on the plan, the presence of a playground, developed infrastructure in the area, etc.

Many developers today take into account the stiffening of consumer preferences in the housing market and include all the necessary social infrastructure facilities at the planning stage of development of the territory, which subsequently affects the competitiveness of the construction project and, accordingly, the cost of housing.

Thus, applying the assessment methodology based on correlation and regression analysis (formula (1)), it is important to form the right set of factors and assess the degree of their influence on the price.

Selected factors can be represented in the model by the following types of variables [14]:

1. k_{ij}^r – describes the quality characteristics of real estate objects and take discrete values - 0 or 1 (or -1, 0, 1, 2, etc., depending on the degree of influence). The qualitative characteristics include the number of rooms, the walls material, the level of finishing, etc.

2. k_{ij}^q – describes the quantitative characteristic of the object (deviation of the current object area from the area of the base object) and is expressed in %, sq.m.

3 Results

The concept of the proposed model implies that all factors considered in it affect the object under analysis multiplicatively. However, there may be cases when the influence of some factors is desirable to take into account additively since their multiplicative accounting can lead to some distortion of the results, which can be particularly noticeable with a significant variation in prices within the selection.

Apartment improvement may become an example: it is quite logical to consider a constant for all real estate objects, regardless of the price of 1 sq.m. as an adjustment for “good home improvement”.

As a rule, the construction of a hybrid model is proposed in such cases, including multiplicative and additive one. However, there are certain practical difficulties associated with the impossibility of directly calculating model parameters and the lack of a generally universal method for calculating them when constructing such models.

Thus, in order to assess the value of residential real estate, it is proposed to minimize the possible errors without changing the structure of the proposed model, partially solving the problem described above.

Let the base price for 1 sq.m. of the property is 40 thousand rubles, and the value of the k coefficient ("home improvement quality" factor) is 1.1. Then we get that for a more expensive property with a price of 45 thousand rubles price per 1 sq. m. the influence of the "home improvement quality" factor will increase the price by an average of 4.5 thousand rubles, and for a cheaper property, with the price of 35 thousand rubles per 1 sq.m. – will reduce the price by 3.5 thousand rubles. In order for the "home improvement quality" factor to increase the price by 4 thousand rubles for both real estate objects, it is necessary to adjust the corresponding values of the variable – to decrease it for a more expensive real estate object and to increase for a cheaper object.

The adjustment of variable values (different from 0) should be made based on how much in relative terms the actual price of 1 sq.m. of the current property is different from the base price of the property.

Table 4 presents the estimated values of the variable, coefficient and adjustment.

Table 4. Calculation of price adjustment for the "home improvement quality" factor.

The actual price of 1 sq.m. of real estate object, thousand rubles.		Indicator value		
		Variable	absolute adjustment	relative adjustment
Base price	40	1	4000	1,1
Higher price	49	0,889	3995	1,0884
Lower price	35	1,143	4027	1,1151

Figure 1 clearly shows the comparative assessment of the values of the variable and the relative price adjustment for 1 sq. m of property subject to the influence of the "home improvement quality" factor.

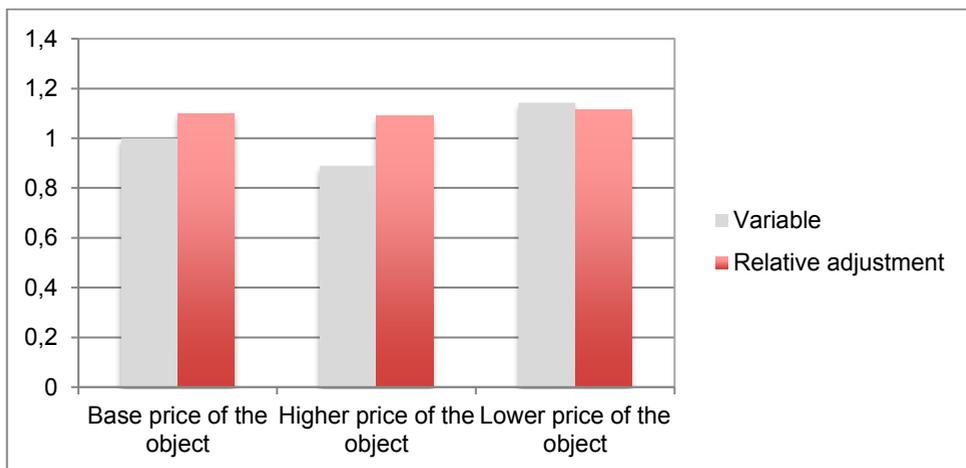


Fig. 1. Comparative assessment of variable and relative price adjustment of 1 sq. m. of the property values subject to the influence of the "home improvement quality" factor.

Thus, the model for assessing the value of real estate will not change, but it will consider the amendment that the k_{ij}^r factor will only affect the property with a base price.

The relative adjustment value for real estate with different prices will be recalculated by changing the values of k_{ij} and the value of the final absolute adjustment will remain at about the same level.

4 Conclusions

The assessment methodology based on the correlation and regression analysis is quite dependent on the quality of the analyzed factors. However, this technique is quite simple, and the resulting model variants can be easily applied in practice.

Thus, in the conditions of increasing competition in the residential real estate market and the taxation system changes, the need to assess the degree of influence of various external factors on the cost of housing is justified. In this case, the paper proposes a methodology for analyzing pricing factors, taking into account consumer preferences in the housing market.

It is important to emphasize that this methodology will be useful both to residential property appraisers and to homebuilding companies, which include all the necessary social infrastructure at the planning stage of territory development in order to increase the competitiveness of the construction object and, accordingly, the cost of housing.

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