OPTIMIZATION OF THE METHOD OF ASSESSING THE LEVEL OF HOUSING AFFORDABILITY IN THE RUSSIAN PRACTICE

[a]ROZALIYA R. GABITOVA, [b]GULNAZ S. GABIDINOVA, [c]OLGA N. BALABANOVA,[d] ILNUR I. MAKHMUTOV

Kazan Federal University, 18 Kremlyovskaya street, Kazan 420008, Russia
email: [a]rozaliagabitowa@yandex.ru, , [b]info@prescopus.com
[c]info@ores.su,[d]russia@prescopus.com

Abstract. Housing affordability is one of the main factors, determining the economic and social level of development in the country. So, one of the priorities of the Russian Federation government in the field of housing policy is the creation of conditions, allowing to increase the affordability of housing for its citizens. The article investigates the current methods of determining the level of housing affordability. The review of the assessment methods, existing in Russian scientific community, is given in the article. It is concluded, that a considerable part of the current methods has a number of shortcomings in the process of practical application, and insufficient reliability of the results obtained. Particular attention is paid to the analysis of the basic methodology for determining the housing affordability ratio, applied in Russia and included in the state program. Based on the considerations and conclusions, formed during the study of the existing methods, the authors optimized the calculation formula of basic methodology.

Key words: housing affordability, level of housing affordability, housing affordability ratio

1 Introduction

Own housing is one of the key components of the society welfare. Today, one of the main problems in Russia is the low affordability of housing. The income of most families does not allow saving their own capital, and a mortgage loan is also unavailable, due to significant risks and requirements for consumers.

The Decree of the President Vladimir Putin, dated May 7, 2018 No. 204, signed after the inauguration, defines the national goals of country's development for the period up to 2024. In this document, it was emphasized that one of the priorities of the Russian government in the field of housing policy is the creation of conditions, allowing to increase the affordability of housing for the citizens of the Russian Federation.

In the documents, concerning the implementation of the state program "Providing affordable and comfortable housing and communal services to the citizens of the Russian Federation", the actual value of the housing affordability ratio since 2015 is defined at the level 2.7. So, these figures indicate, that one family can save up money for almost 3 years in order to buy standard housing. But, unfortunately, the real situation in the domestic residential property market is completely different, and lags far behind international criteria.

It is assumed, that the methodology for the assessment of housing affordability, used today in Russia, does not take into account many of the baseline indicators and factors, which affect the housing affordability, and has a simplified formula. Such a calculation does not provide reliable results.

Thus, in order to appraise the situation objectively, and on the basis of the data obtained, new rational and effective methods for solving the housing problems were proposed. It is necessary to study the methods for assessment the affordability of housing and, if possible, to develop the methods of optimization.

2 Methods

The theoretical basis of the research was the scientific works and developments of mainly Russian scientists, dedicated to the study of methodological approaches to determining the level of housing affordability.

Normative legal acts of the Russian Federation, draft state programmers, databases of the Federal State Statistics Service and the largest information resource on living conditions in the world - "Numbeo", the materials of the legal reference systems Garant and Consultant Plus, as well as the author's researches were used as the empirical base.

In the framework of the study, the following theoretical methods were applied: structural analysis and generalization of scientific and theoretical literature, comparative-analytical approach and synthesis.

The author's approach was developed, using the comparison and the study of scientific and practical experience. Presentation and argumentation of the data obtained was carried out on the basis of general scientific methods of theoretical and empirical knowledge: cause-effect and abstract-logical synthesis, formalization and comparison.

3 Results And Discussion

3.1 Methodological framework for the assessment of housing affordability

In the course of the analysis, it was found that in the scientific field there were a number of indicators for the assessment of housing affordability, different in their orientation, interpretation and approaches to the method of calculation.

1. Housing affordability ratio (K_{ha}) (formula 1). Data on the household incomes and housing prices are used for its calculation.

This method can be considered as the traditional basic methodology, which is included in the state program "Providing a comfortable living environment for the population in the region". According to this program, housing affordability is estimated by the affordability ratio, which is a predicted value. It is calculated, based on the number of years, required to pay the full cost of an ordinary apartment with the total income of a standard family:

$$K_{ha} = \frac{P \times S}{I \times N_{st}} \qquad (1)$$

where P is the average price of 1 sq. m. of living accommodation;

S – is the area of living accommodation (the area of a standard apartment, equal to 54 sq.m., is taken for the calculation);

I – is an average per capita annual cash income;

N_{st} – is a composition of the family (according to the standard - 3 people).

It is elementary for the calculations, but there are a number of shortcomings. The definition of K_{ha}, without taking into account the expenditures of households, calculated on the basis of 100% of income, does not reflect the real level of housing affordability.

2. The representatives of the Institute for Urban Economics Kosareva N.B. and Tumanov A.A. proposed to determine the housing affordability ratio, taking into account the minimum consumption expenditures in the amount of subsistence minimum (Kosareva & Tumanov, 2011):

$$K_{ha} = \frac{P \times S}{I - R_{min} \times N_{st}} \qquad (2)$$

This method of assessment of housing affordability is a slightly modified form of the basic methodology. The algorithm of calculation is similar, however the disposable income is not taken at 100%, but excluding the amount of expenditures, equal to the total annual living wage of the household (R_{min}), from the aggregate family income.

It is certain, that the consideration of expenditures is necessary for a more accurate analysis of the housing market. This gives the advantage of present calculation method over its initial form. However, it is irrational to use only the cost of living as the household expenditures.

This indicator does not reflect the probability of savings absence in a household, if the total annual income is less or equal to the minimum consumption expenditures.

3. Ovsyannikova T.Yu. and Prazukin D.K. developed the methods for calculation of housing affordability, taking into account the investment of savings and the availability of housing for sale in the secondary market (Ovsyannikova & Prazukin, 2001).

The first method (formula 3) is aimed at determining the number of years, required to save up money for the purchasing of house, taking into account the investment of some part of the income in deposits.

$$T = \frac{\ln\left(\frac{(P_m \times S)\times i}{(I_a - R_{min})\times N\times 12}+1\right)}{\ln(i+1)} \qquad (3)$$

where T is the time, required to save up money for the purchasing of house, years;

P_m – is the cost of 1 sq. m. of living accommodation, rub.;

S – is an average housing area, m^2;

I – is an average annual rate on deposits;

I_a – is an average per capita monthly income, rub.;

R_{min} – is the cost of living, rub.;

N – is a composition of the family, people.

The second method (formula 4) is calculated taking into account the available housing, which can be sold in order to reimburse the cost of the acquired real estate property.

$$T = \frac{\ln\left(\frac{(P_m \times S - P_s \times S)\times i}{(I_a - R_{min})\times N\times 12}+1\right)}{\ln(i+1)}, \qquad (4)$$

where P_s is the cost of 1 m^2 of the available housing in the secondary market, in rubles.

This method gives a more distinct picture of housing affordability, but it does not take into account the annual and significant increase in housing prices, and the amount of initial household savings. It is quite informative and objective for the assessment of certain categories of consumers, but it is impossible to use for the definition of general situation with housing affordability in the real estate market.

So, in order to estimate a real situation with the affordability of residential property in the aggregate, it is necessary to consider the possibility of acquiring of square meters without taking into account the existing property of consumers. The authors believe, that the methods of Prazukin D.K. and Ovsyannikova T.Yu. are effective, but narrowly focused.

4. Due to the fact, that the use of a mortgage lending system is relevant for the solving of housing problems in modern market conditions, Sternik G.M. and Krasnopolskaya A.N. (Sternik & Krasnopolskaya, 2009). modified the standard formula for the calculation of housing affordability into a model with a loan (5).

$$k_a = \frac{d_{pc}\times V + V_a}{(I - R_{min})}, \qquad (5)$$

where $V=S\cdot P$ – is the cost of the real estate property, thousand rubles.,

S and P – are the total area and price of 1 sq. m, respectively;

d_{pc} – is the share of the down payment in the cost of the real estate property, %;

v_a - is the additional expenses of the consumer while obtaining a mortgage loan, thousand rubles.

The proposed model for the assessment of housing affordability is undeniably important and necessary for the modern housing market. But to obtain a more distinct picture, it is necessary to carry out a detailed analysis, taking into account the different classes of housing and income groups of population.

5. The indicator, used by the Russian analytical agency RWAY, which analyzes the information on all segments of the real estate market, should also be noted.

The specialists of this agency proposed such a concept as the indicator of commercial affordability of housing (formula 6). According to their statements, housing will be considered as affordable if the cost of the acquired property is no more than three annual household incomes (before taxes). At the same time, the main indicator is the average median income (The most significant market indicators, 2012).

$$k = \frac{I}{I_n}, \qquad (6)$$

where I is the annual income of a family, consisting of 3 people;

I_n – is the annual income, required for the purchase of the real estate property (54 sq. m.) for three years.

This calculation formula is rather conditional, and like many other methods it does not take into account the real composition of the family, minimum expenditures, as well as other factors and parameters.

Thus, there is a tendency of Russian scientists to use more accurate data and to create more informational, reliable and complex models. However, each of them has certain shortcomings, which do not allow to obtain complete and reliable information. This justifies the relevance of studies, focused on improving the methodologies for the assessment of housing affordability.

3.2 Optimization of the basic methodology for the assessment of housing affordability

Due to the fact that the formula, included in the state program and currently applied in practice, is taken as the basis for the determining and assessment the level of housing affordability in Russia, there is a need to optimize the basic calculation methodology.

The above results of the analysis allowed us to draw some particular conclusions:

1) The basic methodology, applied in practice, is not optimal, since it does not take into account the level of family expenditures, but considers only the income.

First of all, for the correct assessment of housing affordability, it is necessary to take into account the household spending. The analysis of the previously mentioned methods shows that they consider consumption expenditures at the level of minimum wage. We propose to use the data on the minimum expenses of an average family from the database Numbeo.

Also, it is necessary to specify and separate the total number of people in the family and the number of people, who have income, in order to achieve reliability and consistency of the results.

So, such parameters as the minimum expenditures per capita (R_{min}), the total number of people in the family, and the number of income earners (N and N_i, respectively) will be introduced in the basic methodology.

2) In our opinion, the calculation of the ratio for a family, consisting of 3 people, is the controversial issue. Perhaps today, the number of such families is predominant, but the task of the state is to orient towards the future. As it is known, to ensure the population growth, the standard family should consist of 4, 5 members.

3) Due to the fact, that the number of people in a family needs to be changed, the area of an apartment should also be larger, according to the norms. So, for the flexibility of application of the calculation formula, the apartment area indicator is replaced by the product of such parameters as the number of family members (N) and the norm of dwelling space per one person (S_n). Today, in Russia, this indicator is 18 sq. m. per one person.

4) It is known, that in world practice, the median values of household incomes and the median values of housing prices are used for calculations. In the scientific literature, there is very little support for the use of average values of these indicators in the calculations. Unlike the average per capita value, the median income indicator takes into account the number of income earners. This approach allows to use the real level of income, gaining by the majority of population.

In Russian reality, the median values are not available. The Federal State Statistics Service (Rosstat) calculates the median wage every 2 years, so the average values are used in practice. The application of the average per capita income instead of median is the main drawback. Firstly, this introduces some restrictions on the comparison of housing affordability indicators with foreign analogues; and secondly, it gives rise to unfavourable criticism and does not reflect the real situation on the housing market, due to the fact, that in the vast majority of cases, the value of median wage is less than the average by at least 20-25%. (Rubino, 2018: Burrows et al, 1998).

For example, in April 2017 in Russia, the ratio of the median wage (28,345 rubles) to the average wage (38,900 rubles) amounted to 72.9%. (The average and median values of the accrued wages of organizations' employees in Russia as a whole, and in the subjects of the Russian Federation, 2017) Based on this data, we can determine the value of median wage, taking into account the ratio of the average to the median at the rate of 75%, in order to obtain more reliable calculation results (Peres et al, 2018).

In addition, it is necessary to take into account, that Rosstat defines the average monthly nominal accrued wage, excluding income tax. This value of the indicator overestimates the real disposable income of the household, and increases the level of housing affordability. In the process of calculation of the housing affordability ratio, it will be more correct to use the values of both average (I_a) and median (I_m) wages, with the deduction of personal income tax.

Based on the partial conclusions, the authors structured an optimized formula for the calculation of housing affordability ratio (K) (formula 7), in order to eliminate some of the shortcomings:

$$K = \frac{P \times N \times S_n}{((I_m \times 0{,}87 \times N_i) - (R_{min} \times N)) \times 12}, \qquad (7)$$

where P is the average cost of 1 square meter of housing in the studied market (primary or secondary), thousand rubles;

N - is the number of people in the family;

S_n – is the norm of dwelling space per one person (18 sq. m.);

I_a, I_m – are the average/median wages, thousand rubles

N_i – is the number of family members, gaining income;

R_{min} – is the amount of minimum expenditures per one person, thousand rubles.

Such a calculation will make it possible to assess the real opportunity for the citizens of the Russian Federation to purchase housing at their own expense, and will allow the government, financial institutions and construction companies to evaluate the situation in interaction with one another, and to take all possible necessary measures.

To compare the final values, obtained as a result of application of the modified calculation formula, developed by us, and the preceding basic formula, we performed the calculations. The values of indicators and the results of calculations are presented in tables 1 and 2, respectively.

Table 1. The values of indicators for the calculation of housing affordability

Methods	N, per.	N_i, per.	S, m^2	P, thousand rubles *		I_a, th.rub.*	I_m, th.rub.**	$Rmin$, th. rub.***
				On primary market	On secondary market			
Basic	3	2	54	57.4	52.4	43.1	32.3	–
Optimized	3	2	54					42.1

* The figures are taken from the official data of Rosstat as of February 2019 (Federal State Statistics Service).
** The median wage is in the ratio of ≈ 75% of the average wage.
*** Data generated in the database Numbeo.

Table 2. Comparison of calculations, using the basic and optimized methods

Methods	Number of years, necessary to buy real estate property			
	By an average income		By a median income	
	On primary housing market	On secondary housing market	On primary housing market	On secondary housing market
Basic	2.9	2.7	3.9	3.7
Optimized	7.9	7.2	18.3	16.7

Calculation of the ratio, using the basic method, showed the possibility of saving up money for the purchasing of real estate property in the primary housing market for 2.9 years. While at the same time, we had the value, equal to 7.9 years, as a result of application of the proposed method.

The value of the indicator, obtained by the author's method, is almost 3 times higher, than the ratio, calculated by the formula, which is applied in the state program. So, it characterizes a more real situation on the housing market in Russia (Iravani & ShekarchiZade, 2014).

Such an excess indicates that the basic methodology, used today, does not take into account the real state of affairs, and confirms the need for its improvement.

There is also a difference between the values of the indicator, when using the average and median wages, that once again proves the inappropriateness of application of average values. Therefore, the State statistical authorities need to strive for the definition and application of median values in practice.

If we evaluate the final values of the ratios, according to the international classification of the housing affordability level, we can say, that the state of the residential real estate market in Russia meets international criteria, where the indicator of the most favorable level of housing affordability does not exceed 4 years (Steinhardt & Manley, 2016).

4 Summary

According to the results of the study, it can be concluded that in the process of the assessment of housing affordability for Russian citizens, the use of a simplified methodology, adopted by the state program, according to which the affordability ratio is calculated based on the fact, that all 100 percent of the population's income are saved for buying a real estate property, is an economic utopia. Each household, without exception, has its own basic needs, the satisfaction of which requires financial resources.

It is understood, that the determination of housing affordability ratio in this form is incorrect, and it does not make much sense.

After all, housing will not become affordable from reduction of the real value of this indicator, only to bring it closer to Western standards.

As a result, taking into account the shortcomings, identified during the study, the authors developed the calculation formula, on the ground of the basic methodology.

The main differences between the basic and author's methods were the following:

1) the transition from consideration of 100% of income to the use of the indicator, excluding the minimum expenditures of the family;
2) consideration the amount of accrued nominal wages, with the deduction of personal income tax, in order to determine the income, which is actually disposed by the family;
3) the possibility of calculation, taking into account the increase in the number of family members, as the main component of demographic growth.

5 Conclusions

The study of available methods for the assessment of housing affordability showed the presence of various approaches to the definition of this indicator. The authors paid special attention to the analysis of the method of calculation of housing affordability ratio, which is included in the list of indicators of the state programmer "Providing a comfortable living environment for the population in the region". So, the method of calculation, applied in practice, has several shortcomings.

The calculation form, developed by the authors as the methodological tool, can be used, first of all, by the state authorities, local self-government authorities, statistics bodies, as well as the representatives of the real estate market, analysts.

Further areas of the research may be connected with a more detailed study and extension of the author's methodology, for the differentiated assessment of various income groups of population, the class of purchased housing, territorial characteristics, and the creation of an automated system for calculation of the indicator.

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