

IMPROVEMENT OF METHODOLOGY FOR ASSESSING HOUSING AFFORDABILITY BASED ON REGIONAL CHARACTERISTICS

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Abstract

The article proposes to improve the methodology for assessing the affordability of housing for the population by expanding and clarifying the factors that influence the PTI. On the basis of logical-a priori analysis, the main factors that could affect the value of the PTI in the Russian Federation and the Siberian Federal District were identified, using the methods of correlation-regression analysis, the strength of the relationship between the identified factors and the effective indicator of the PTI was estimated. It is proposed to improve the methodology for assessing the affordability of housing in the Russian Federation and the regions of the Siberian Federal District by supplementing it with factors that were not previously considered, considering the calculations performed and the obtained values of the sensitivity of these factors on the PTI. The proposed methodology is based on an assessment of the effectiveness of factors affecting the PTI, as well as the transition from using average per capita incomes to median incomes, considering the size of the household.

Keywords: PTI (house-price-to-income ratio), UN-HABITAT, factors, methodology, SFD (Siberian Federal District).

1. INTRODUCTION

The need for housing is a basic human need. The importance of the sphere of housing construction and the human right to meet housing needs are emphasized in the law, which has the highest legal force on

the territory of the country - the Constitution of the Russian Federation (hereinafter - the RF). The social and economic stability of the development of the regions and the country as a whole depends on the possibility of improving the living conditions of the population, the solution of the housing problems of citizens should become a priority of state policy. It should be noted that the state is developing and implementing a housing policy aimed at increasing the affordability of housing, however, the achievement of planned indicators is under threat due to the use, in our opinion, of the incorrect methodology for calculating the PTI for urban development (UN-HABITAT). The UN-HABITAT methodology, in our opinion, has a number of shortcomings: it does not consider household consumer spending; changes in housing prices; ways to store savings; dynamics of incomes of the population; features of the regions, their socio-economic indicators of development. In our work, when reviewing the development of existing approaches to assessing the availability of residential real estate, we relied on the works of such scientists as: O.V. Grushina (Grushina, 2011), L.R. Musafina (Musafina, 2014), V.M. Paliy (Paly, 2011), E.L. Berezina (Berezina, 2013), G.M. Sternik, S.G. Sternik, A.A. Apalkov (G. Sternik & Apalkov, 2016, G. Sternik, S. Sternik & Apalkov, 2014), A.N. Krasnopolskaya (Krasnopolskaya & G. Sternik, 2009), A.A. Kolyev (Kolyev, 2005), N.B. Kosareva (Kosareva, Kopeikin & Rogozhina, 2010), M.P. Loginov (Loginov, 2011), N.N. Nozdrina, M.M. Minchenko (Minchenko, Nozdrina, 2013, 2017), I.M. Shneiderman (Shneiderman, 2014), Ya.V. Shchetinin (Shchetinin & Savinchenko, 2006), A.Yu. Shevyakov (Shevyakov, 2011), A.B. Gusev (Gusev, 2019), E.V. Ivankina (Ivankina, 2013), S.R. Khachatryan, N.Yu. Faerman, N.L. Fedorova, A.N. Kirillov (Khachatryan, 2001), D.K. Prazukina, T.Yu. Ovsyannikova, E. Ellenna, E. Vorzala (Ovsyannikova & Prazukin, 2001), V.N. Edronova, M.E. Shilov (Edronova & Shilov, 2008) and their methods for calculating the PTI. Systematization of existing methods for assessing housing affordability, analysis of their strengths and weaknesses with a focus on the region made it possible to identify additional factors that, in our opinion, have a significant impact on the PTI and which were not previously considered.

2. MATERIALS AND METHODS

The purpose of the article is to improve the methodology for assessing housing affordability, which can consider such factors as: housing market conditions with reference to regions; average per capita housing provision; the amount of household savings; real disposable cash income; utility costs; the size of households, which will allow focusing the vector of development and implementing strategies considering the interests of the population. Tasks that needed to be solved: to explore theoretical and practical approaches to assessing the affordability of housing; to analyze the residential real estate market; to evaluate the value of PTI in the Siberian Federal District using various methods; to identify the strengths and weaknesses of the existing methodology for assessing the PTI values; to perform analysis and

evaluation of sensitivity of factors that determine housing affordability; to develop a recommended multivariate methodology for assessing housing affordability; to verify this methodology. The studies were based on official statistics and the use of general scientific (analysis, generalization, description and comparison, graphical display of results, correlation and regression analysis) and special (logical-a priori analysis) research methods. The results of the work do not contradict the provisions of economic science, as well as legislative and regulatory legal acts of the Russian Federation.

3. RESULTS

The main indicators of housing affordability are considered to be: the PTI, the housing affordability index (HAI) and the proportion of families that are able to purchase housing that meets housing standards using their own and borrowed funds (Analytical report of the Institute of Urban Economics Foundation, 2018). These housing affordability indicators are regularly calculated and published on official portals, in particular by the Institute of Urban Economics. The standard methodology for calculating the PTI is considered to be the United Nations methodology for urban development (UN-HABITAT), however, this methodology does not take into account the peculiarities of socio-economic development of territories, such as: geographical features of the area; uneven settlement; distribution of income and the heterogeneity of construction, these factors, in our opinion, should be taken into account when calculating the PTI. The scientific community agrees on the need to improve the methodology for assessing housing affordability and developing new methodological approaches. Based on logical-a priori analysis, the main factors that could influence the value of PTI in the Russian Federation and the Siberian Federal District were identified: average per capita cash income, thousand rubles; living wage, thousand rubles; cost of 1 sq. m, thousand rubles; inflation, %; household size, people; average per capita housing supply, sq. m; real disposable cash expenditure, thousand rubles; amount of savings, thousand rubles; utility costs, thousand rubles; consumer spending, thousand rubles; obligatory payments, thousand rubles. Based on the presented data, a correlation analysis was carried out, with the help of which the degree of dependence of the PTI value on the selected factors was revealed, and the model was evaluated for a linear relationship. The correlation coefficient was calculated using the Excel "CORREL" function. When assessing the strength of the connection, the Chaddock scale was used (Ishkhanyan & Karpenko, 2016). According to this scale, a "very high" dependence (the value of the indicator is 0.9) is observed between the PTI value and the following factors: average per capita cash income; household size; cost of 1 sq. m. "High" dependence can be traced from the following factors (the value of the indicator is 0.8): the subsistence minimum; real disposable cash income; the amount of savings; utility costs; consumer spending; obligatory payments. In addition to studying the influence of factors using correlation, a regression analysis was carried out. With its help, the degree of influence of independent variables on the

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dependent variable was established. In Excel, the Regression analysis tool is used to fit observations using the least-squares method of weighting the selected factors to the PTI value. The size of the household, average per capita cash income and the subsistence minimum have the greatest influence on the above indicator.

Considering the calculations performed and the obtained values of the sensitivity of these factors to the housing price to income ratio, we propose an improved method for assessing the affordability of housing in the Russian Federation and the regions of the Siberian Federal District, the PTI should be expanded and supplemented with the above factors, then the formula will look like:

$$Kd = \frac{(Cm \cdot S) + (N \cdot 12)}{(B + T) \cdot Q} \quad (1)$$

where Cm – the cost of 1 m2 of housing, rub.;

S – average per capita provision of housing, m2;

N – amount of savings per year, rub.;

B – real disposable cash expenditure, rub.;

T – expenses for housing and communal services, rub.;

Q – household size.

The calculated values of the PTI according to the proposed method are shown in Figure 1.

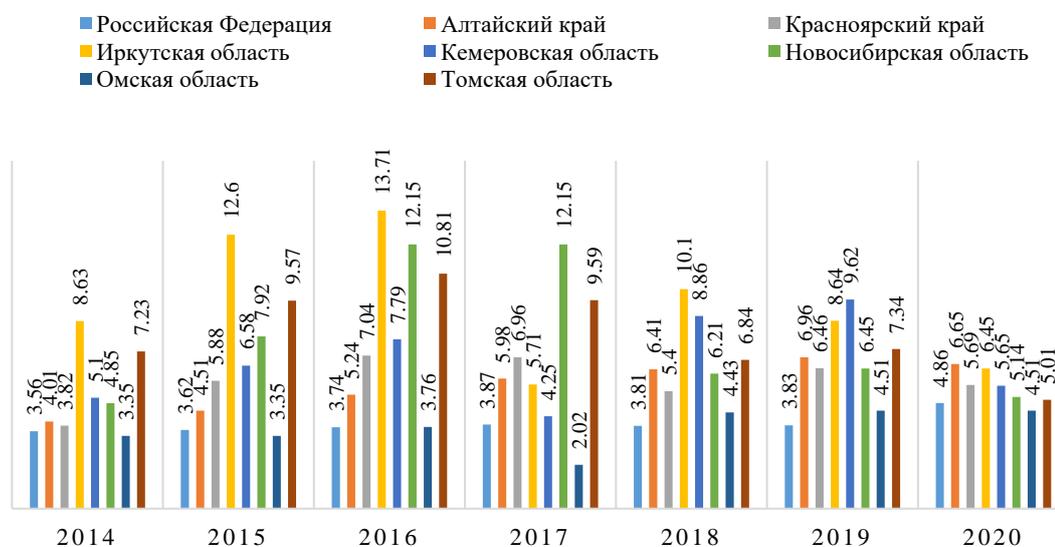


FIGURE 1 - CALCULATED VALUES OF THE HOUSING PRICE TO INCOME RATIO. SOURCE: COMPILED BY THE AUTHORS.

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To assess the forecast indicators of the PTI for Russia and the Siberian Federal District for the period 2021-2025, we made a forecast of indicators: average per capita income; subsistence minimum; square meter prices; inflation; average per capita housing provision; real disposable cash expenditure; the amount of savings, utility costs; consumer spending; mandatory payments using the built-in Excel "PREDICTION" function. This statistical function helps to calculate or predict future value from existing data, new values are predicted using linear regression.

Based on the data obtained, it can be concluded that the indicators of the average per capita income of the population, the subsistence minimum, the average per capita provision of housing, the real disposable cash expenditures and the amount of savings should continue to grow by 2025. However, positive dynamics is observed in the following indicators: the cost of 1 sq. m of total area of residential real estate; utility costs; consumer spending; obligatory payments.

To predict the value of the PTI in Russia and the Siberian Federal District, a linear regression equation was used based on the predicted factors and the results of the regression analysis that was described earlier. The linear regression equation has the following form:

$$y = a_0 + a_1x_1 + a_2x_2 + \dots + a_nx_n \quad (2)$$

where y – dependent variable;

x – various factors affecting the variable;

a – regression coefficients;

n – number of factors.

Y means the housing price to income ratio. The predictive values of eleven factors act as X_n in the regression equation. The results of the regression equation are presented in Table 1 - this is the forecast value of the PTI in Russia and the Siberian Federal District for the period 2021-2025.

TABLE 1 - RESULTS OF THE REGRESSION EQUATION (FORECAST VALUES OF THE HOUSING PRICE TO INCOME RATIO)

Reporting period	RF	Altai Territory	Krasnoyarsk Territory	Irkutsk Region	Kemerovo Region	Novosibirsk Region	Omsk Region	Tomsk Region
2021	4,24	5,94	5,12	5,96	4,95	4,98	4,15	4,65
2022	4,39	6,01	5,31	6,04	4,87	5,13	4,27	4,74
2023	4,42	6,14	5,42	6,17	5,05	5,24	4,38	4,85
2024	4,67	6,25	5,64	6,25	5,21	5,38	4,46	4,96
2025	4,89	6,41	5,87	6,47	5,49	5,45	4,58	5,12

Source: Compiled by the authors.

Thus, after making a forecast based on the regression analysis, we can conclude that in the next five years we should expect an increase in the estimated value of the PTI in Russia compared to the base year 2020 (Figure 1).

After analyzing the obtained forecast values for the regions of the Siberian Federal District, we can conclude that the PTI will continue to increase in the Altai Territory, Krasnoyarsk Territory, Irkutsk Region, Novosibirsk Region, Omsk Region, and Tomsk Region. As for the Kemerovo region, there is a downward trend until 2022, and starting from 2023, the forecast value of the indicator will increase by 3.7%.

Let's compare the results of the obtained calculations with the target indicators of the values of the PTI by the state program of the Russian Federation "Providing affordable and comfortable housing and communal services to the citizens of the Russian Federation" presented in Figure 2.

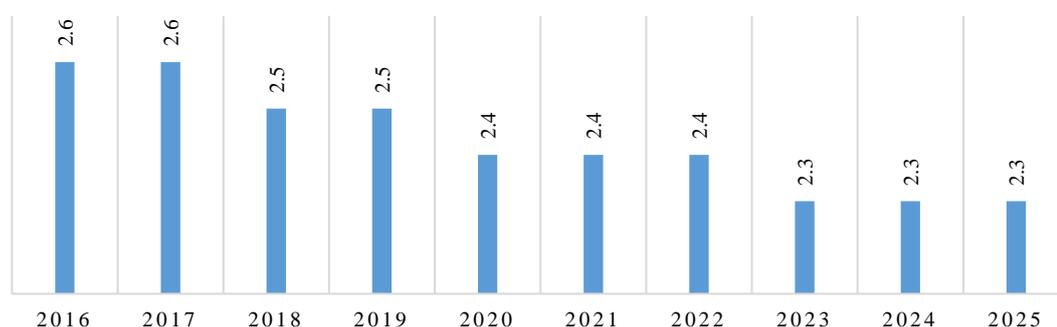


FIGURE 2 - TARGET VALUES OF THE PTI OF THE STATE PROGRAM OF THE RUSSIAN FEDERATION "PROVIDING AFFORDABLE AND COMFORTABLE HOUSING AND COMMUNAL SERVICES TO THE CITIZENS OF THE RUSSIAN FEDERATION". SOURCE: ORDER OF THE GOVERNMENT OF THE RUSSIAN FEDERATION OF DECEMBER 30, 2017 No. 1710

Thus, at the state level, housing for the population is considered affordable, starting from 2016, according to Table 3, the value of the PTI was 2.6 years. While the real situation in the housing market is not so optimistic and does not correlate with the calculations.

3. DISCUSSIONS

In the conditions of population growth in the Russian Federation, the demand for housing remains stable, however, the current problem for the economic situation in the Russian Federation is the low purchasing power of citizens. Another problem is the degree of affordability of housing. Real disposable money income tends to decrease. There have been changes in the structure of the use of cash income: the population began to spend more money on the purchase of goods, payment for services and mandatory payments and contributions due to rising prices in the market for goods and services.

After applying the most popular methods for calculating the PTI and the UN HABITAT basic methodology, it can be concluded that they do not reflect the real situation in the real estate market. The PTI calculated

using the basic method is 2.4 years for 2020 in the Russian Federation, while the PTI calculated using the proposed method was 4.86 years. The problem of insufficient objectivity of the PTI calculated according to the basic methodology is currently relevant, due to the fact that affordability indicators published in official sources are considered by the state when developing programs for the population. Therefore, in our opinion, as the economy develops, the existing methods for calculating the PTI need to be improved.

The housing need can be satisfied to a greater extent by ensuring the information completeness of the assessment of the affordability of housing for the population, which will expand the possibilities for analyzing the state of housing problems. Housing affordability for the population can be defined as an integral category that combines the main socio-economic, physical and demographic characteristics of the region, the parameters of the credit and financial system.

4. CONCLUSIONS

In the course of the study of calculations of the PTI values using well-known methods, it was found that the values obtained are several times higher than the data declared in official sources, as well as the values obtained using the UN-HABITAT methodology. This fact once again proves that the existing methods do not consider the real conditions of citizens when acquiring residential real estate. As a result, the strengths and weaknesses of the methods used were identified and the main factors influencing the PTI were integrated.

Correlation-regression sensitivity analysis made it possible to determine the number of theoretical factors that can influence the estimated value of the housing price to income ratio. The evaluation of this analysis showed that all of the proposed factors do have an impact on the value of the PTI in the country and the Siberian Federal District. The R-squared indicator in the regression analysis confirmed the quality and effectiveness of the constructed models for Russia and the Siberian Federal District.

A multifactorial method for assessing the affordability of housing has been developed, considering regional characteristics. In order to overcome the shortcomings of the existing methodology for calculating the housing price to income ratio, the proposed methodology is based on an assessment of the effectiveness of factors affecting the housing price to income ratio, as well as the transition from using average per capita incomes to median ones, considering the size of the household.

The conducted research is a recommended mechanism for a methodological approach to solving a problem that is relevant from scientific, practical and social points of view.

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