Forecasting target volumes of housing construction in the Stavropol territory

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Abstract. The article substantiates the necessity of determining the housing construction target volume in the Stavropol Territory, taking into account the development investment attractiveness, the regional authorities’ policy, the land resources availability, engineering networks, the availability of building materials under various scenarios of economic development. A model of the regional housing market with a planning horizon of 3 years development medium-term forecasting has been launched. The problem in obtaining the market development (the price ratio, housing demand and supply) quantitative estimates when changing the planned volume of housing construction and macroeconomic indicators is solved.

Introduction
The housing shortage situation was historically formed with the transition to a market economy and the new socio-economic relations development in the Russian regions. This was manifested in two main indicators:

1) relatively low increase by European standards (the average provision of housing per inhabitant in the Russian Federation in the amount of 25.2 m² [1, p.132] is the 32nd in the world and one of the last in Europe);

2) the relatively low quality of the input housing (about 40% of the population are not satisfied with their living conditions) [2].

This situation has forced the state leaders to increase their attention over the last 5-7 years to the problem of accelerating the pace of housing construction and improving the quality of housing being built. In the period under review, significant regulatory, organizational and economic measures were taken to stimulate regional authorities and businesses to solve this problem [3]; the target volumes of housing input growth were defined - by 2020 this value should reach 150 million square meters [4, p.65], the joint work of the Ministry of Construction and Housing and Public Utilities of the Russian Federation and the Ministry of Economic Development of the Russian Federation is planned to determine the target volumes of housing construction in each subject of the Federation. The article attempts to solve this problem for a separate territory: the region of the Russian Federation - the Stavropol Territory.

One of the priority tasks for the region development, reflected in the Strategy for the Social and Economic Development of the Stavropol Territory until 2020 and for the period until 2025 [5], is to provide the region’s population with affordable and comfortable housing, an increase in housing construction in the region with an overall decrease cost in the primary market, promoting the building
materials production availability and development by the introduction of energy-saving and environmentally friendly technologies. The main direction of the state housing policy is the priority national project implementation “Affordable and Comfortable Housing - to the Citizens of Russia”, which tasks are aimed at creating conditions for the development of housing construction in the region, balanced stimulation of supply and demand in the housing market [6].

In the course of the “Regional target program “Housing” implementation in the Stavropol Territory for 2013-2015”, legal and organizational bases were created for the state housing policy implementation, its priorities were determined, and mechanisms for its implementation were developed [7]. However, a number of factors, such as a shortage of land resources within the boundaries of large municipalities, restrictions on production capacities, available volumes of building materials, availability of utilities at the boundaries of housing construction sites were identified, and the changes in the policies of regional authorities, did not allow the Program to achieve its targets. Moreover, the dynamics of this indicator in the region for the period under review turned out to be negative: after the maximum reached 1248.3 thousand square meters in 2015 the volume of housing construction fell to 899.2 thousand square meters in 2018. In terms of housing construction, the Stavropol Territory took a modest 25th place among the Russian Federation regions. The heightened attention of the state leaders, the media, the public to the problem of increasing the pace of housing construction, the priority of this indicator in evaluating the performance of regional administrations and municipalities again stimulated the leadership of the Stavropol Territory to find ways to increase housing construction, increase effective demand for housing, develop the regional development.

**Purpose and methods of the research**

The purpose of the work is to study the regional primary residential real estate market development dynamics in the event of a change in the target volumes of housing commissioning relative to those previously planned under various scenarios of macroeconomic development.

The object of the research is the primary housing market of the Stavropol Territory.

The paper contains statistical research methods and the main points of the medium-term forecasting model for the primary housing market development with a planning horizon of 3 years and a step of 1 year. The model includes such indicators as the housing construction and housing commissioning volume, the demand presented and realized, price dynamics in the primary housing market, taking into account the predicted changes in macroeconomic and sectoral regional indicators, market conditions in terms of demand and supply at each forecasting step.

**Formulation of the problem**

After reaching the maximum volume of housing commissioning in 2015 in the amount of 1,248 million square meters, the subsequent drop in 2016 and 2017 (1.101 and 0.882 million square meters, respectively) and a slight increase in 2018 to 0.899 million square meters, the regional authorities are planning to build in 2019 at least 1.05 million square meters of housing and further increase this volume up to 1.4 million square meters, i.e. up to 0.5 square meter for each resident of the region, by 2021 [8; 9, p. 131]. However, in our opinion, such plans may not be realized. In addition to the above-mentioned supply factors, affecting the possible volume of housing construction, a group of demand factors has a smaller impact:

1. The same market trends are observed in the Stavropol Territory as in many other regions of the Russian Federation [10, pp.53-64], but with a longer inertial period - in recent years the investment attractiveness of development has decreased, which was a result of changes in market conditions after the rise in 2013-2014. As a result, the price dynamics for 2015–2017 in the primary housing market turned out to be negative [1, p.200], the final investment profitability and construction projects decreased significantly, and not all regional developers were ready for such a situation.

2. Monetary income of the population of the Stavropol Territory in the analyzed period decreased (92.0% in 2015, 91.5% in 2016 and 99.7% in 2017 to the previous period, respectively) [9, p. 57], but the market demand and the volume of absorption were quite high. The average price in the market
grew at low rates. On the other hand, if there is a positive trend in the growth rate of incomes of the population and supply restriction, a rapid rise in prices and a decrease in the volume of demand are possible due to the withdrawal from the market of buyers with lower incomes. As a result, there will be a decrease in the rate of housing construction, which will not allow to realize the stated target indicators for housing construction.

It is proposed to increase the housing construction volume on the supply factors to check the demand factors [11-18]. It is necessary to obtain quantitative estimates of the housing market development when both macroeconomic indicators and planned housing construction volumes change. This possibility is represented by the local residential real estate market medium-term forecasting method [19, p. 1] using the example of forecasting the indicators dynamics of the Moscow market in 2011-2016 under various scenarios of macroeconomic development. In future, it was improved, a retrospective verification of the prediction results based on actual data was carried out, and the positive results were obtained [20, p. 91].

**Initial data**

The Stavropol Territory market was taken as the residential real estate local market. The selected analysis period (2015–2018) and the forecast period (2019–2021) are justified by the periods of the federal target program “Housing” 2016–2020 [6] and the state program of the Stavropol Territory “Development of housing and communal services, protection of the population and territory from emergency situations” [21]. There are four possible development scenarios:

- Scenario number 1 - corresponds to the government optimistic development forecast;
- Scenario number 2 - parameters are set that exceed the optimistic scenario;
- Scenario number 3 - a realistic scenario;
- Scenario number 4 - pessimistic development scenario.

The main macroeconomic baseline data varied by scenarios and calculation options, and justified in the author’s dissertation research [10, p. 56-59], are given in Table 1, and sectoral nature - in Table 2.

**Table 1. Macroeconomic Baseline Data for Four Scenarios**

| Indicator | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|-----------|------|------|------|------|------|------|------|
| Inflation, % | 14.9 | 5.6 | 2.9 | 4.5 | 4.0 | 4.0 | 4.0 |
| Growth rate of real incomes of the population, % | -8.0 | -8.5 | -0.3 | -1.9 | 1.2 | 1.1 | 1.0 |
| Dollar exchange rate, rub. | 72.8 | 60.9 | 57.6 | 69.3 | 66.4 | 67.2 | 67.8 |

| Indicator | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|-----------|------|------|------|------|------|------|------|
| Inflation, % | 14.9 | 5.6 | 2.9 | 4.5 | 4.0 | 4.0 | 4.0 |
| Growth rate of real incomes of the population, % | -8.0 | -8.5 | -0.3 | -1.9 | 1.5 | 3.0 | 4.0 |
| Dollar exchange rate, rub. | 72.8 | 60.9 | 57.6 | 69.3 | 65 | 62 | 58 |

| Indicator | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|-----------|------|------|------|------|------|------|------|
| Inflation, % | 14.9 | 5.6 | 2.9 | 4.5 | 5.5 | 5.5 | 5.5 |
| Growth rate of real incomes of the population, % | -8.0 | -8.5 | -0.3 | -1.9 | -2.6 | -2.0 | -1.5 |
| Dollar exchange rate, rub. | 72.8 | 60.9 | 57.6 | 69.3 | 66.4 | 67.2 | 67.8 |

| Indicator | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|-----------|------|------|------|------|------|------|------|
| Inflation, % | 14.9 | 5.6 | 2.9 | 4.5 | 7.0 | 7.0 | 7.0 |
| Growth rate of real incomes of the population, % | -8.0 | -8.5 | -0.3 | -1.9 | -4.0 | -4.0 | -4.0 |
| Dollar exchange rate, rub. | 72.8 | 60.9 | 57.6 | 69.3 | 72 | 74 | 76 |
The macroeconomic parameters are taken:
- for 2015-2017 in all scenarios based on actual data of the North-Caucasusstat;
- for 2018 - according to preliminary (unspecified) data of the Office of the Federal State Statistics Service in the North Caucasus Federal District;
- for 2019-2021: in Scenario number 1 (basic) - the government forecast estimate of the Stavropol Territory, the Ministry of Economic Development and Trade of the Russian Federation and the Central Bank of the Russian Federation; in Scenario number 2 - the population income level increased relative to the baseline scenario against the background of the dollar depreciation against the ruble; in Scenario number 3, a lower income level, increased inflation, and the dollar exchange rate - according to the Central Bank base scenario; in Scenario number 4 (extremely negative) - a high level of inflation, a lower income level and an unfavorable forecast of the dollar rate for the domestic economy.

**Table 2.** Variants of sectoral input data for each development scenario

| Variant | 2015     | 2016     | 2017     | 2018     | 2019     | 2020     | 2021     |
|---------|----------|----------|----------|----------|----------|----------|----------|
| 1       | 1.248    | 1.101    | 0.882    | 0.899    | 1.05     | 1.22     | 1.4      |
| 2       | 1.248    | 1.101    | 0.882    | 0.899    | 1.15     | 1.32     | 1.5      |
| 3       | 1.248    | 1.101    | 0.882    | 0.899    | 0.95     | 1.12     | 1.3      |

Sectoral parameters for 2015-2017 were taken based on the actual data of the North-Caucasusstat, for 2018 - the Russian Federation Developers Unified Register, for 2019-2021:
- the state policy indicators on housing construction and housing affordability implemented in the Stavropol Territory (variant 1);
- from 2019, the target housing construction volume increases by 100 thousand sq. m relative to the planned data - an optimistic development option (variant 2),
- the housing construction target volume has decreased from 2019 to 100 thousand sq. m relative to the planned data - a pessimistic development option (variant 3).

**Calculation results and their interpretation**

As it can be seen from Table 1, scenario number 1 is distinguished by a consistently low level of inflation, an insignificant growth rate of the population real incomes and a fairly stable rate of the US dollar against the Russian ruble. With a basic level of targeted housing commissioning in the region, there will be some mismatch in supply and demand in the primary real estate market, since the outlined trend of rising prices will weaken the effective demand value, even in the context of a certain increase in household incomes and lower mortgage rates (Figure 1, var. 1).

**Figure 1.** The primary housing market indicators dynamics for scenario no. 1

It is possible to correct the situation within the government forecast framework by increasing the target volume of housing commissioning in the period under review (Figure 1, var. 2). The increased supply will stabilize prices and create prerequisites, albeit minor, for growth in demand. However, this
situation can not last long, because it does not provide investment attractiveness to regional development and in the long term will not allow the investors to develop exactly this market segment. Variant 3 of the considered scenario has the opposite effect in comparison with variant 2.

The optimistic development scenario (scenario no. 2) with the basic volumes of housing commissioning is characterized by positive dynamics of macroeconomic indicators affecting the value of demand (Figure 2, var.1). There is still an imbalance of supply and demand on the market, but it is no longer so obvious within the planning horizon. The most interesting forecasting variant in order to match supply and demand under the scenario is variant 2. However, in our opinion, it is not very obvious due to the developer low attractiveness and the stated macroeconomic indicators achievement.

Figure 2. The primary housing market indicators dynamics for scenario no. 2

The most likely in terms of implementation is scenario number 3 (Figure 3). Negative growth rates of the population real incomes in the stable inflation conditions in the amount of 5.5% per year, given the exchange rate of the ruble predicted by the Central Bank of the Russian Federation and the volume of planned mortgage loans will lead to a decrease in effective demand. The dynamics of such a decrease is predicted in options 1-3, depending on the decision taken in terms of the target volume of housing construction in the region.

Figure 3. The primary housing market indicators dynamics for scenario no. 3

The indicators’ performance under scenario no. 4 will lead to an even greater mismatch in supply and demand in the housing market, a fall in the development investment attractiveness as compared to scenario no. 3, and will indicate the need and feasibility of using active measures to regulate the regional economy.

Summary
Thus, the macroeconomic parameters dynamics for the variants 1 and 2 of scenario no. 2 will help to balance the market and ensure the necessary regional development profitability. However, the execution of such a scenario is considered as “unrealizable”. Scenario no. 1 and scenario no. 4 are
considered unlikely in all variants. Under scenario no. 3, it is proposed to use variant 2, which implies an increase in housing construction by 2021 in the region to 1.5 million square meters.

The data obtained can be used in the Federation socio-economic policy development, the regional budget formation for the planning period, the development and implementation of programs to provide affordable and comfortable housing for the population and the housing development in the region.

The results of the forecasting were tested by the authors and presented in the framework of the International Scientific and Technical Conference “Construction and Architecture: Theory and Practice of the Development of the Industry 2018” (CATPID 2018, October 8-12, 2018, Nalchik) [22].

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