Analysis and Forecasting of Housing Prices Considering Particulars of Vladivostok Real Estate Market

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Abstract. The present article is dedicated to the problem of price forecasting with due consideration for particulars of local real estate market. Economic and geopolitical features of Vladivostok determine the particulars of real estate market, and the high level of housing prices was duly considered. A brief overview of approaches and methods used for forecasting of prices for residential property was performed. A special monitoring study of the real estate market was carried out; the general trends of price changing were identified, and time trend was evaluated. Methodological approach has been substantiated, and the model of forecasted housing prices has been developed with due consideration for the particulars of real estate market at the municipal level. The forecast of for residential property price changes was carried out with reference to the basic scenario of the socio-economic development of Vladivostok up to 2025. Practical application of the proposed model would allow investors and developers to evaluate the effective demand in a more objective manner, and thereby to provide adequate offers in Vladivostok primary housing market; and would allow the municipal government to develop and undertake specific measures of state regulation and support.

1. Introduction

Problems associated with the evaluation of residential property take special place in any economic system and affect both directly and indirectly the interests of three main market participants: investors, construction companies (developers) and the state. The main critical issue for residential real estate market is the price of housing and objective assessment of its value.

According to the RosRielt Company data, Vladivostok takes the third/fourth place among the cities of the Russian Federation in terms of property purchase prices, second only to Moscow, St. Petersburg, and sometimes Sochi. As of January 2020, the average cost of 1 sq. m. of property in Moscow equaled to 241,465 rubles/sq.m, St. Petersburg - 126,003 rubles/sq.m, Vladivostok - 102,909 rubles/sq.m. High prices and low incomes of the population are the main reasons for low affordability of housing. In terms of housing affordability, Vladivostok takes the 52nd place, in terms of average salary among cities with a population of more than 500 thousand people, it takes the 17th place, and the level of housing provision in 2018 was around 22.5 sq. m per person, which is lower than the average value in the Russian Federation.

Following the adoption of state programs for mortgage lending: "Far Eastern Mortgage" for young families with 2% interest, and "Mortgage with State Support" with 6.5% interest, the demand for housing has slightly increased. However, according to the research performed by Rosbank in January 2020, Primorsky Krai was among the regions with the most inaccessible mortgages rates. Experts have calculated that a resident with regional average salary will be able to buy 34.4 sq. m of property, while...
the leaders of the rating in terms of housing affordability can afford three times larger area [1]. This situation is even more typical for Vladivostok.

According to the earlier study, it was found that the average housing provision in Vladivostok is 12.7% lower in comparison with average values in the Russian Federation and 26.5% lower in comparison with the international standards (30 sq. m of total housing area per person). Existing rates of construction and commissioning of housing in Vladivostok are insufficient to solve the housing problem and require acceleration [2].

Given the long-term nature of investment decisions, the issues of forecasting housing prices are of particular importance for all participants of real estate market: the population solving their housing problem, developers planning construction, state and municipal authorities developing measures of state regulation and support.

The purpose of this article is to develop methods for predicting of housing prices, taking into account the characteristics of real estate market and indicators of socio-economic development of Vladivostok.

2. Data, methodology and results of pilot studies

The price for housing is a reflection of its value and is formed depending on both supply and demand in the real estate market. Currently, there are many interpretations of the real estate market made by many authors [3]. In our opinion, the essence of real estate market is most accurately reflected in the following definition: “The real estate market is a set of mechanisms through which property rights and associated interests are transferred, prices are set, and space is allocated between competing options of land usage” [4].

The real estate market has a local character, which is primarily formed under the influence of economic, social, demographic, geopolitical and other factors. Therefore, regional markets are significantly differing in terms of prices, risks and efficiency of investments in real estate [5].

In the course of researching the residential real estate market of Vladivostok, specific features that affect the price level were identified and systematized. Vladivostok has always been featured with an intensive economic activity and investment attractiveness due to its geopolitical position (the main seaport of the Far East, the center of crossroads of borders with the countries of the South-East Asia). Housing prices developed historically in the 1990s, when Vladivostok was the center of attraction for capital and “big money”, and there were people with a high level of income who could afford to buy housing in private ownership without privatization. They set the “price limit” that has not decreased anymore.

Currently Vladivostok is in constant focus of the Government and the international community. Since 2012, APEC Summit has been held annually here. Vladivostok recently became the capital of the Far Eastern Federal District. Vladivostok is a center of attraction - 50% of total population of Primorsky Krai lives here and young people from all over the region tend to come here. These factors determine the growth in demand for housing and the high level of prices at the residential real estate market.

According to RosRielt data, analysis of dynamics of price changes at the residential real estate market of Vladivostok was made [6]. Various trends have been examined: linear, polynomial, power logarithmic, and exponential. As a result, a significant linear dependence of weighted average cost per square meter of residential property per the time period was established, which is confirmed by the highest value of determination coefficient (0.9183). An analytical alignment of period was performed using the linear trend (see Fig. 1).
Figure 1. Average price for 1 sq.m. of housing total area, RUR.

For the period throughout 2010 to 2019, a tendency of growth in the cost of 1 sq. m of residential property was revealed. Through the recent 10 years, the price has increased by 43.8 thousand rubles. (from 57.9 thousand rubles up to 101.7 thousand rubles), i.e. by 75.4%. The average annual growth rate was 108.4%. This obtained trend was used as the basis for price forecasting model of residential property at the municipal level in the long term.

Long term forecasting of prices requires an assessment of changes in the situation and factors that may affect the level of prices at the real estate market. Many researchers identify the following factors: income level of the population, inflation rate, mortgage rate, dollar exchange rate, etc. [7, 8, 9, 10, and 11]. Based upon the study, a group of factors has been identified affecting the dynamics of housing prices at the local real estate market:

- changes of structure of proposed housing and characteristics that affect its cost (comfort class, space-planning solutions, quality and type of finishing, etc.) [12];
- change of indicators of socio-economic development of a particular municipality;
- change of volume of construction and commissioning of housing.

Taking into account the peculiarities of local real estate market, the projected housing prices at the level of the municipality are proposed to be calculated using the formula:

\[ P_t = P_1 + K_i \times K_j \times K_h \times \Delta P_t \times t, \]

where \( P_t \) is the predicted average price for 1 sq. m. of housing in the t-th forecast period;
\( P_1 \) - the actual average price for 1 sq.m. of housing in the 1st period of the time series;
\( K_i \) - coefficient that considers structural changes of offers;
\( K_j \) - coefficient that considers the indicators of socio-economic development of municipality;
\( K_h \) - coefficient that considers the rates of new housing commissioning;
\( \Delta P_t \) - average annual price increase in a time series, calculated according to a linear trend;
\( t \) is the estimated year of forecast period.

Based on this model, the forecast of housing prices in Vladivostok for the period up to 2025 was made. During this period the structure of the proposed housing will not change significantly; therefore, the planned indicators of social-economic development and commissioning of housing in Vladivostok urban district will have the primary effect on the formation of prices [13]. The calculation of chain index was carried out based upon the development of city’s economy (see Table 1).
Table 1. Chain index of social-economic development and expected housing prices for Vladivostok urban district for the period until 2025.

| Parameter title                                      | Report, % | Annual prediction, % |
|------------------------------------------------------|-----------|----------------------|
|                                                      | 2019      | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
| Price for 1 sq.m. of apartment area, thousand rubles | 101.7     | 106.5 | 111.4 | 116.6 | 122.1 | 122.8 | 127.8 |
| Index of price change for 1 sq.m. of apartment space | 108.4     | 105.0 | 105.1 | 104.5 | 104.3 | 104.5 | 104.5 |
| Population change index                              | 100.0     | 100.0 | 100.1 | 100.2 | 100.4 | 100.6 | 100.8 |
| Average salary change index                          | 106.1     | 105.8 | 106.8 | 106.8 | 106.8 | 106.8 | 106.8 |
| Consumer price index                                  | 104.3     | 103.8 | 104   | 104   | 104   | 104   | 104   |
| Housing commissioning change index                   | 100.0     | 100.0 | 100.1 | 100.2 | 100.4 | 100.6 | 100.8 |
| Deflator index for "Construction"                    | 103       | 103   | 102.5 | 101.8 | 101.8 | 101.8 | 101.8 |

Analysis of the obtained results shows that the average annual population growth index was 100.35%, average salary change index was 106.8%, and considering the growth of consumer prices, growth index of real income of population will be only 102.7% per year. It can be concluded that during the analyzed period no significant growth in demand for housing is expected. The quickly changing terms and drastic decrease of mortgage rates were the main driver of growth in demand for 2019-2020, however, the effect of introduction of governmental programs was mainly reflected in sales growth in 2019-2020.

Given the identified dynamics of social-economic development indicators and the prevailing actual prices of the time trend as per the above formula, price forecast for the period up to 2025 was carried out. The average annual price growth index for 2020-2025 will be equal to 104.68%, which is lower than actual values formed over the previous 10 years (108.4%).

Market prices are formed as a result of demand and supply balance. For a long time, the situation in the housing market in Vladivostok was characterized by the fact that market prices were formed in the secondary housing market, and prices at the primary market were simply adjusted to them. In 2019 for the first time the primary market began to set an upper price limit. If the prevailing preferential terms of mortgage lending for the purchase of housing in new buildings will be maintained, in our opinion, the primary market and volume of supply will determine the level of housing prices.

In Vladivostok, there is a growing shortage of new housing in the middle price segment. The average annual rate of housing commissioning over the past 9 years was around 210.6 thousand sq. m. For the period of 2020 ~ 2025 a slight increase in housing commissioning is expected, and the average annual index is 101.6%. Given such construction & commissioning rates, by year 2025 no target indicator of housing provision of 27.6 sq. m per person as set forth in the National Project “Housing and Urban Environment” can be achieved. According to the most approximate calculations, in order to achieve the average Russian indicators, it is necessary to increase total volume of housing construction in Vladivostok in 3 times [2]. Increase in volume of housing construction and commissioning of new housing can as well prevent the unjustified growth of retail prices.

The main factors that increase the attractiveness of investing in housing construction in Vladivostok are the low level of competition and the prevailing price level, which ensures a high level of marginality. According to the Union of Estimating Engineers in Primorsky Krai, the marginal income at the primary housing market is 48.8%. According to this indicator, Primorsky Krai takes the 2nd place after Moscow. On average in the Russian Federation, the level of marginal income is 8.8%
According to analysts, the marginality range of development business should be in the range from 12% to 20%, in order to cover the risks associated with changes in market conditions or any other events that involve unaccounted costs. Therefore, housing construction in Vladivostok is a highly profitable business and this attracts developers from other regions of the Russian Federation. Growing competition may have a positive effect on prices at the housing market and will contribute to increase of housing affordability level for residents of Vladivostok.

3. Conclusion
Solving the housing problem is one of the top priority tasks for further development of Vladivostok, and high housing prices at the real estate market make it quite difficult.

The present article proposes a methodological approach and develops a model for predicting of housing prices based on the analysis of local real estate market particulars, both prevailing and predicted time trends in terms of price change and social-economic indicators of municipal development. The forecast of prices for housing in Vladivostok for the period till year 2025 has been performed.

A generalization of conditions necessary for retaining the growth of housing prices in Vladivostok was made. First of all, the total volume of housing construction has to be increased, primarily in the middle price segment. Among the other required conditions for development of housing construction are: further development of local construction materials industry within the territory of Primorsky Krai, stimulation of competition by attracting experienced developers from other regions, improvement of terms for housing loans and decreased down payment (10-12% only); maintenance of preferential terms and further reduction of mortgage rates, especially for young families; provision of favorable conditions for development of small and medium-sized businesses and overall increase of income of the local population. The problem of choosing land plots for construction is very acute, especially in connection with introduction of integrated sustainable development territories (ISDT), occupying about 60% of the territory of Vladivostok. Construction in these zones leads to additional costs, long periods of approval, and increase of period for implementation of housing construction projects and decrease of marginality for developers. Solving these problems will increase the affordability of housing, facilitate inflow of new labor resources, and ensure further development of Vladivostok as the capital of the Far Eastern Federal District.

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