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MEDIUM-TERM PROGNOSIS OF RESIDENTIAL REAL ESTATE MARKET PRICE INDICES IN TBILISI, GEORGIA

Abstract:

The importance of real estate market could not be overstated for economics in countries like Georgia, where the share of the construction and real estate sectors is totaling 30% in whole economy. The real estate market is far from being perfect market and this imperfection defines the peculiarity of the research methods. Performing high quality analytical work on real estate market is very difficult and complex task, which brings together working out the methodology relevant to the accessible data (every country has its own difficulties regarding the quality and accessibility of real estate market data), also the rules of interpreting the data and algorithm of drawing out the recommendations.

The methods of prognosis of real estate market indices could be classified as follows:

1. Expert's prognosis based on the methods like intuition, deep knowledge of local market, method of analogies;

2. Heuristic prognosis – quantitative and qualitative analysis of factors, method of scenarios;

3. Fundamental prognosis of factors (construction volume, supply, demand) – based on the analysis of economic situation and its influence on real estate market;

4. Prognosis based on Regression models – regression analysis, statistical modeling;

5. Prognosis based on multi factor models and Neural Network modeling.

In the current article are given the prognosis based on the regression model and the heuristic prognosis of residential market in Tbilisi, Georgia. The outcomes are than compared and checked against the real situation, finally are given the recommendations.

The results suggest that the best solution is to use the method combining both heuristic and statistical approaches.

Keywords:

Real estate market, real estate market indicies, prognosis, residential market

JEL Classification: A10

1. Introduction

Among others, Brooks (2010) claims, that the complexities of the real estate market, its linkages to the economy, also the importance of real estate in credit and investment spheres have showed the necessity of study of the dynamics of the real estate market. In emerging economies, like Georgia creating the models of real estate and prognosis of development can have even greater importance as the real estate and construction have bigger share in economy of country than in developed countries. The recognition of real estate as an asset class by the investment community is another challenge for closer look to real estate market forecasting. All methodologies used for other asset classes could be used for real estate market forecasting, but here is another challenge connected with non-homogeneity of real estate, also the fact that there are different problems connected with data accessibility and data quality in every country. The aim of this study is to examine real estate forecasting models for price indices and suggest the one which suits best the local data quality and the data sources.

The countries with emerging economies are characterized by the following features:

1. Low accessibility of real estate data;
2. Low quality of data;
3. Low rate of information exchange;
4. Restricted number of transactions in some real estate market segments;
5. Drastic difference in real estate market development in different regions;
6. Frequent changes in legal environment.

The real estate market in Georgia has many similarities with the Eastern Europe and post-Soviet countries. But there are some significant differences as well. In Georgia In the last decade we are witnessing the strengthening the democratic institutions and elimination of bureaucracy. I will mention only one aspect of it regarding real property rights – if you buy property in Georgia registration of property rights takes only one day. Information about real property ownership rights could be obtained online and data is absolutely transparent. National agency of public register also provides the database of transactions. Of course the user should have solid knowledge of local market to verify and use this information.

Molchanova (2011) gives the classification of the methods of prognosis of real estate market indices:

1. Expert's prognosis based on the methods like intuition, deep knowledge of local market, method of analogies;
2. Heuristic prognosis – quantitative and qualitative analysis of factors, method of scenarios;
3. Fundamental prognosis of factors (construction volume, supply, demand) – based on the analysis of economic situation and its influence on real estate market;

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All above mentioned methods could be divided into two groups: 1. Methods based on Heuristic approach and 2. Mathematical methods.

Heuristic methods (Asaul, 2008) are based on the analysis of events and processes which could not be formalized. They analyze the quantitative and qualitative data, price factors and derive the tendencies on the market.

The methodology of heuristic prognosis method has the following steps:

1. Defining the current situation on the particular real estate market segment (residential, retail, office, etc.) and the main tendencies of price change;
2. Defining the economic condition of the city and the tendency of the changes in prices;
3. Analysis of previous results and defining the aggregate tendency of price change;
4. Prognosis of the changes in macroeconomic parameters and adjusting the results.[1]

The mathematical (statistical, technical) prognosis methods chose the model corresponding to the research problem and define the variables of the model. In this case the main task is to solve the equation, which defines the model for the given moment.[2]

The analysis of financial markets use either fundamental or the technical analysis methods, but in case of real estate market analysis more robust results show the combined methods, which use both approaches.

Only technical prognosis without considering the economic situation may give the bad results. At the same time, analysis of factors can detect the market development stage and help in predicting upcoming tendencies, while the dynamics of price indices and supply-demand volumes are the sphere of mathematical modeling.

Data

There are two main sources for real estate transaction and offer data in Georgia:

1. Transactions Database of National agency of public register;
2. Online and printed sources of Sales data (offers).

For the current study the data of residential real estate offer prices was collected from the online real estate web pages (www.myyhome.ge and www.place.ge) using the data

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[1] Стерник Г.М. Методическое пособие «Как прогнозировать цены на жилье». Библиотека риэлтора. 1996

[2] Бережная Е.В., Бережной В.И. Математические методы моделирования экономических систем: Учеб. пособие. — 2-е изд., перераб. и доп. — М.: Финансы и статистика, 2006. - 432с.

scraping technique, collecting data automatically into the access database. Data sample was limited to Tbilisi residential property. Sample was then cleaned up of errors and null values, adjusted considering the data of National Agency of Public Register. In the study for the period from February 2013 till February 2015 were used 12322 observations.

Methodology

Methodology of the study is based on following postulates:[3]

1. Real estate market is inertial system and is not characterized by the drastic changes of prices; Time lag is 2-3 months; Calculating the average price for month or week can give the false impression of big price changes, due to the statistical noise;
2. The secondary market gives the best picture of general market behavior, because this sector is more competitive than other sectors of the real estate market; New constructions (supply factor) of course affects the real estate market, but does not reflect the general tendencies; The price of new construction depends more on the marketing policy of the developer, than on market conditions;
3. Real estate price indices are functions which characterize the residential real property price levels in given city and reflect the dynamics of the market; Price dynamics of different property types in one city are similar and the changes occur in fact proportionally.

For the reasons listed above to identify the dynamics of real estate market the study uses the price indices of residential real estate of Tbilisi.

There were identified two groups of factors affecting most the prices on Tbilisi residential real estate market: local factors and global factors.

Local factors are:

- Location;
- Technical condition of the property;
- Planning;
- Type of building;
- Area;
- Floor;
- Existence of heating and conditioning systems in the apartment.

And the global factors are micro and macro-economic factors affecting the price:

- The consumer price index;

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[3] В.А. Воронин, Моделирование рынка недвижимости в условиях финансово-экономического кризиса, Киев, 2009;

- capital investments in fixed assets;
- The trade turnover;
- Volume of foreign direct investment;
- Mortgage lending rate;
- US dollar rate;
- Incomes of population.

Study focuses on the Laspeyres index, Paasche index and Fisher index, which is the combination of the two.

Laspeyres index

$$P_L = \frac{\Sigma(p_{c,t_n})*(q_{c,t_o})}{\Sigma(p_{c,t_o})*(q_{c,t_o})} \qquad (1)$$

Paasche index

$$P_P = \frac{\Sigma(p_{c,t_n})*(q_{c,t_n})}{\Sigma(p_{c,t_o})*(q_{c,t_n})} \qquad (2)$$

Fischer index

$$P_F = \sqrt{P_L * P_P} \qquad (3)$$

These indices heavily depend on the available sample and do not take into account sample volatility across time (for example, the quality of purchased units in the sample may increase over time, which will be reflected in higher prices). One way of remedying this issue is to construct a *standardized real estate unit* in each time period and to use this unit to obtain quality-adjusted indices.

For this reason was used the regression model considering several characteristics of the property - floor, quality of repair, number of rooms, existence of balconies, central heating, district.

The offer price of property through regression could be expressed using the following equation:

$$P_k(t,p_i) = G(t) + L_k(p_i) \qquad (4)$$

where $P_k(t,p_i)$ –is the unit price of particular apartment at t-time;

$G(t)$ – reflects the impact of global economic factors

$L_k(p_i)$ - reflects the influence of particular characteristics of the property (floor, number of rooms, number of balconies, ets). For this particular purposes we consider that $L_k(p_i)$ does not depend on time period.

Mathematically this approach lets us to divide the variables. The first part of the equation depends on the general level of prices in town and allows seeing the dynamics of market and the second part is the adjustments of the price to find out the price of particular apartment. In calculations of the indices was used the first component of this equation.

After the calculations of the indices were performed the extrapolation of the data for the next 3 months and results were checked over the real situation.

Results

The market data in period February 2013 and February 2015 showed:

Table1. Real estate indices of residential real estate of Tbilisi, February 2013- February 2015.

Month	Adjusted average price per m^2	Laspeyres index	Paasche index	Fisher index
Feb-13	760.5	1.00	1.00	1.00
Mar-13	783	1.03	1.49	1.24
Apr-13	765	1.01	1.05	1.03
May-13	873	1.15	0.94	1.04
Jun-13	729	0.96	0.80	0.87
Jul-13	828	1.09	1.02	1.05
Aug-13	819	1.08	1.51	1.28
Sep-13	882	1.16	1.00	1.08
Oct-13	801	1.05	0.79	0.91
Nov-13	889.2	1.17	1.24	1.21
Dec-13	810	1.07	1.13	1.10
Jan-14	814.5	1.07	1.14	1.10
Feb-14	813.6	1.07	1.13	1.10
Mar-14	864	1.14	1.20	1.17
Apr-14	819	1.08	1.14	1.11
May-14	814.5	1.07	1.13	1.10
Jun-14	819	1.08	1.14	1.11
Jul-14	810	1.07	1.12	1.09
Aug-14	814.5	1.07	1.13	1.10
Sep-14	816.3	1.07	1.13	1.10
Oct-14	810	1.07	1.12	1.09
Nov-14	823.5	1.08	1.14	1.11
Dec-14	839.7	1.10	1.16	1.13

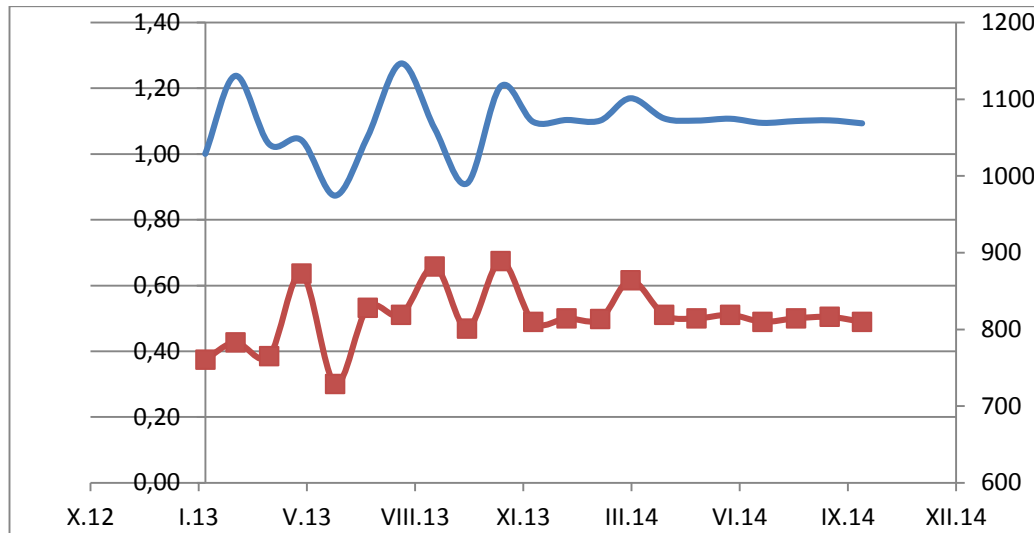| Jan-15	780.3	1.03	1.08	1.05
Feb-15	819	1.08	0.91	0.99

Source: Own calculations.

Figure1. Tbilisi Real Estate Market Indices, February 2013- February 2015.
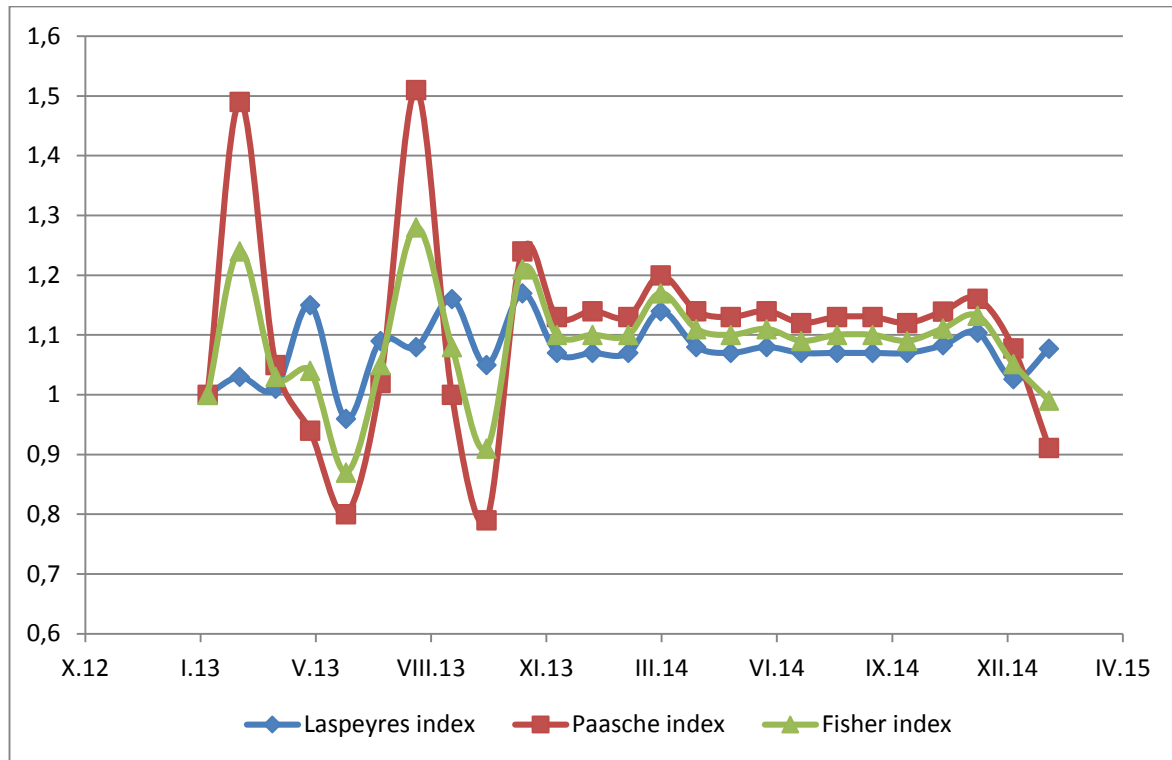

Source: Own calculations.

Figure 2: Fisher index and adjusted average price per sq.m. of Tbilisi residential real estate in February 2013- November 2014 period.

Source: Own calculations.

Prognosis of real estate indices for the next three months (December 2014-February 2015) was performed first by the extrapolation of the real estate data.

Figure 3.Fisher Index prognosis, December 2014-February 2015 – Extrapolation.
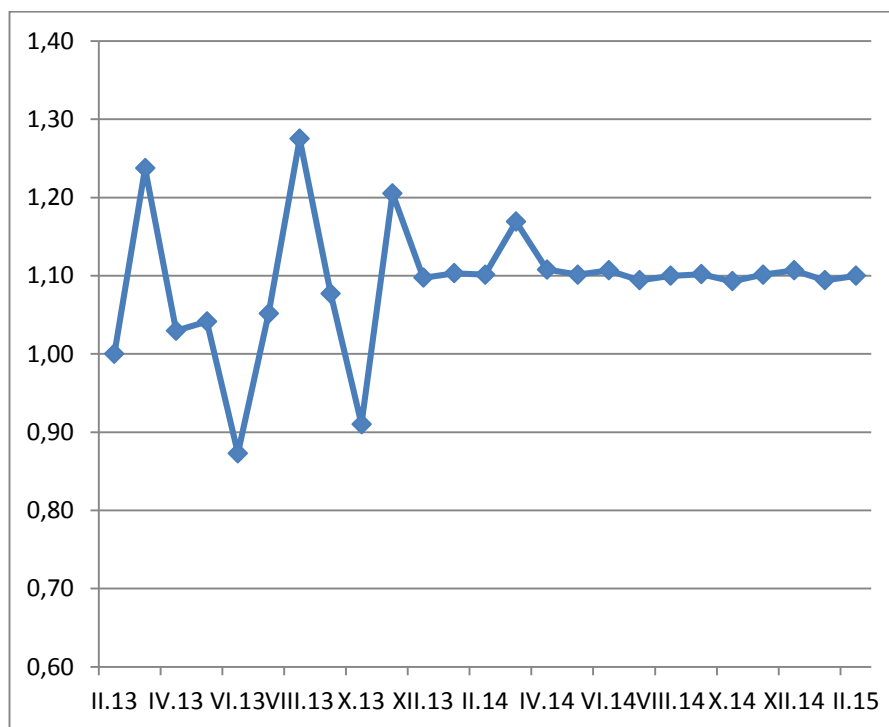
Source: Own estimations.

The following step was to determine the macroeconomic factors influencing the residential real estate market prices in Georgia, to build the time series and assessed the correlation between the macroeconomic factors and the price indices.

The research showed very weak correlation between residential real estate prices and the Refinancing rate of the National Bank of Georgia, The consumer price index, Investments in fixed capital and Retail turnover.

More robust correlation was shown by following macroeconomic indicators: Volume of direct foreign investments, the amount of mortgage loans, the US dollar rate, nominal incomes of population.

In the course of research were considered 2 possible scenarios of development:

First scenario – Optimistic, same trend of real estate market development and stable macroeconomic environment;
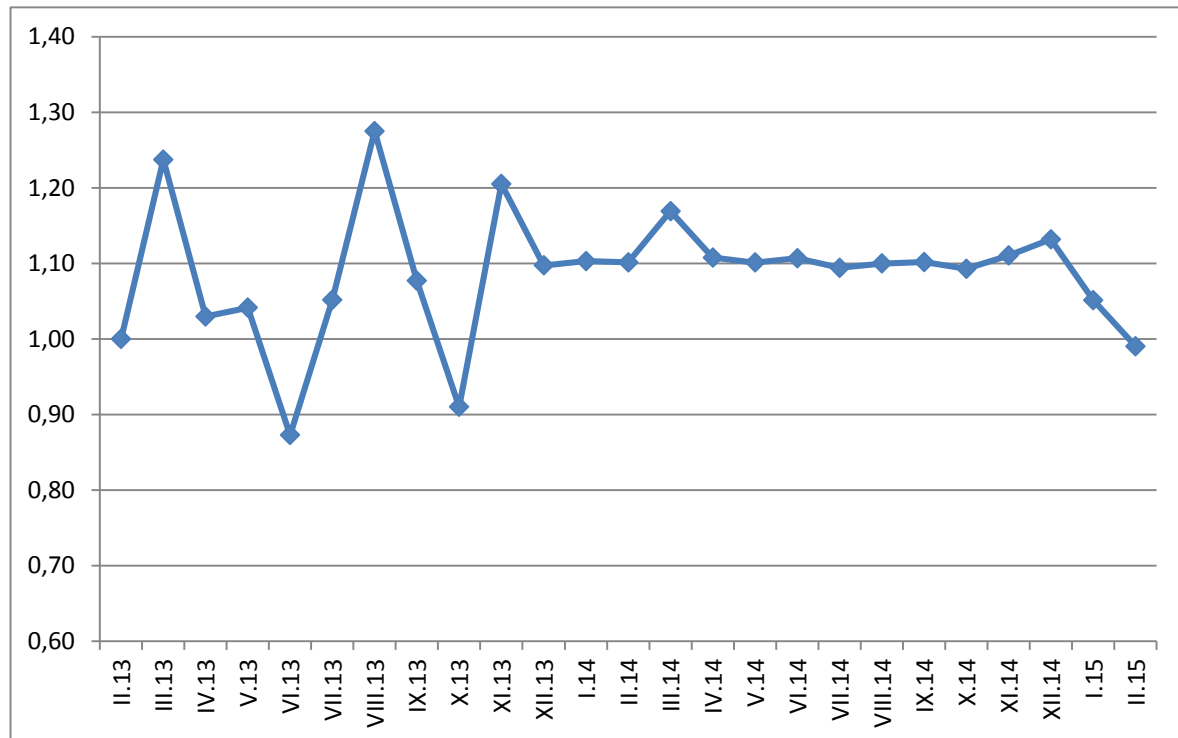
Second scenario –Pessimistic, sharp decline of macroeconomic situation with lowest peak at the beginning of IV quarter of 2015;

Figure 3.Fisher Index prognosis, December 2014-February 2015 – first scenario.
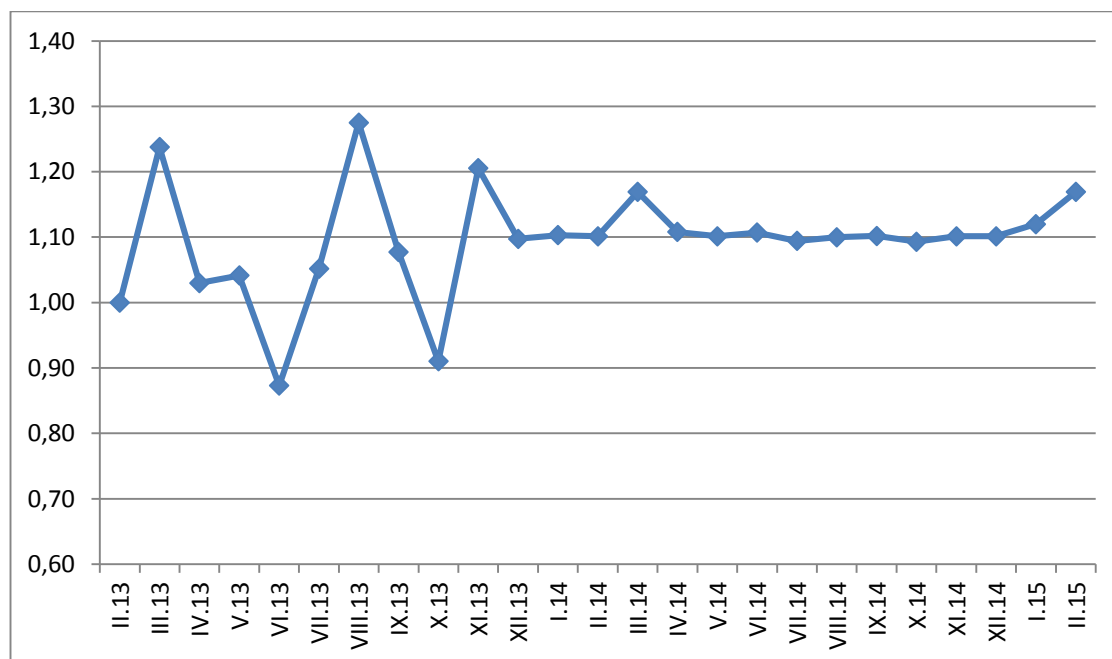
Source: Own estimations.

Figure 4.Fisher Index prognosis for the period December 2014-February 2015 – second scenario.

Source: Own estimations.

The outcomes were compared and checked against the real situation.

Conclusion

Simple extrapolation did not show good outcomes of the prognosis, while the combined method of technical and heuristic approaches using the scenario analysis gives better results.

Next step in the research will be the use of Neural Network modeling for forecasting the real estate indices. This methodology has number advantages compared with more traditional ways of modeling. The artificial neural networks generate significantly lower pricing errors, have greater pricing precision out-of-sample, and extrapolate better from more volatile pricing environments.

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