Development of methodological approaches to housing investment market competitive environment assessment

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Abstract. The article is devoted to the problem of housing investment market competitive environment assessment. The aim of the research is to systematize and analyze various methodological approaches to assessing competitive environment in commodity markets. Development of theoretical views on the market’s competitive environment as one of the most significant factors of national economy growth is presented. Classification of methodological approaches on competitive environment assessment based on utilized mathematical tools and comprehensiveness of market coverage is compiled. Market concentration assessment methods are systematized; their advantages and disadvantages are analyzed. It is also revealed that the most crucial issue in competitive environment assessment is the accessibility and comprehensiveness of data on entities operating in a particular commodity market.

1 Introduction

Competitive environment is the most crucial market characteristic which determines conditions for its effective functioning. The object of the current
research is the housing investment market as an interdisciplinary system combining relations of the investment, construction and real estate markets; the subject of the research is competitive environment.

Currently, the emerging trends of economic instability determine topicality of researching market competitive environment as a necessary condition for the market’s sustainable development. During crisis and post-crisis periods, producers’ concentration in the markets significantly increases leading to occurrence of various structural deformations and transformation of competitive markets into oligopolistic and oligopolistic into monopolistic ones.

This explains an increased attention to the categories of “competition”, “competitive environment” and “market concentration” in scientific literature. Competitive environment is defined as the economic environment in which producers of goods and services compete for consumers, contractors and their market position. Such environment determines companies’ functioning conditions in the market and the essence of economic entities’ relations in questions of price formation, goods’ sales volume, and degree of market share competition.

The main indicator helping to assess current state of competitive environment and draw a conclusion about market’s competition type is the market concentration indicator. Market concentration characterizes quantity of market operating entities and their market shares, that is, depicts market structure in general.

Competition level and competitive environment assessment research is particularly relevant for markets with a predominantly high concentration of producers, for example the housing investment market. In this regard, development of theoretical provisions and methodological approaches to the assessment of competitive environment of the housing investment market characterized according to [1, 2] by structural deformations and complex subject-object relations along with relations with other markets is the most important aim of economic research.

2 Methodological approaches to the housing investment market competitive environment assessment

Assessment of market competitive environment is one of the most essential state economic policy tasks. Its solution allows analyzing market situation,
studying market supply segmentation, identifying possible market deformations. Competition development conditions’ assessment is a prerequisite requirement for a balanced state policy development in the sphere of market entities relations’ regulation.

As the aim of economic research, market competitive environment assessment appeared a long time ago; market relations’ development and market power growth of individual market participants necessitated the study of market situation and influence of individual producers on the markets. For the first time, market competition assessment was carried out in the USA for assessing the amalgamation and mergers of companies using the Concentration Index developed by the American economists A. Herfindahl and O. Hirshman [3] independently of each other.

The commodity market competition rate assessment, as revealed by bibliographic analysis of economic literature, is based on two conceptual approaches – the behavioral approach and the quantitative (or structural) approach (Fig. 1).

**Figure 1.** Classification of market competition rate assessment approaches.

Behavioral competitive environment assessment approach involves implementation of research in two main directions: enterprise’s market power assessment and its marketing strategy evaluation.
Market competitive environment assessment based on enterprise’s market power indicators’ specification is based on the assumption that the market competition rate depends on the ability of an enterprise to make a profit providing this enterprise has sufficient market power. The market power of an enterprise is reflected in its financial performance: a low rate of return indicates low market power and high competition, a high rate proves significant market power and low competition [4]. Enterprise’s market power indicators in commodity market are the Bain Index [5], the Lerner Index [6] and the Tobin’s Q Ratio [7]. To determine an enterprise’s market power indices the indicators of financial activity (the price of goods and production costs, return on capital and enterprise assets value) are used. Market power indicators do not allow quantifying competition rate, that is, do not answer the question on distribution of market shares by producers and degree of producers’ concentration in the market.

Competition level assessment according to the structural approach involves a quantitative measurement of the producers’ concentration degree in commodity market – a higher level of concentration determines a greater dependence of market participants on each other [8]. Competitive environment assessment is performed by calculating the producers’ market concentration figures which give a numerical assessment of competition rate. Concentration figures characterize either distribution of market shares by producer or unevenness of this distribution. The most popular methods of competitive environment assessment in the framework of the structural approach are the Concentration Ratio, the Herfindahl-Hirschman Index [3], the Lorenz Curve [9], the Gini Coefficient.

Competition level assessment in the housing investment market is based on the theory of markets and its two main subdivisions – the theory of industrial markets and the theory of competition (Fig. 2). The competitive environment research tools in the housing investments market can involve utilization of both behavioral and quantitative approach methods to assess competition rate.

As the structural approach allows obtaining a quantitative assessment of market concentration level, the given research focuses more on detailed analysis of producers’ market concentration assessment approaches.

Despite the variety of approaches used to assess market concentration, they are based on a single methodological principle – the use of quantitative indicators characterizing the share of the subject-producer in the total volume of the product market. In various researches to compare the size of an enterprise with the size of the market [8] various indicators are used: the production volume in monetary or physical units (most common) [10], sales revenue [11], organization profit [12], the number of employees. Moreover,
to describe the market share of organization, other indicators taking into account the industry specifics of the market entities are used (for example, loan market competitive environment assessment requires bank’s loan portfolio volume analysis) [13; 14].

![Methodological basis of competitive environment assessment](image)

**Research subject**: Competitive environment  
**Research object**: Housing investment market  
**Research aim**: Market competition rate assessment  

**Theoretical basis of the research**  
Theory of markets  
- Theory of industrial markets  
- Theory of competition  

**Research objectives**  
1. Identification of product and territorial boundaries of the market  
2. Analysis of market supply structure by producer  
3. Assessment of enterprise’s share in commodity market  
4. Assessment of enterprises’ concentration in commodity market  
5. Assessment of competitive environment in commodity market  

**Research tools**  
- Statistic analysis  
- Marketing analysis  
- Assessment of enterprise’s share in the total market  
- Method of assessing competitive environment in the housing investment market  

**Figure 2.** Housing investment market competitive environment research scheme based on the structural approach.
3 Housing investment market competitive environment research and assessment tools

Competitive environment research tools usually involve utilization of enterprise’s share in the total market volume assessment methods, based on two approaches – the index approach and the relative approach based on the use of inequality rate indicators (Table 1). The difference between the methods developed in the framework of these approaches is the use of various mathematical tools to build the dependence of the market concentration level on the indicators that characterize producers’ market shares.

Table 1. Market concentration assessment methods classification based on the market coverage comprehensiveness and utilized mathematical tools

| Methods of inequality rate assessment | Discrete methods | Cumulative methods |
|--------------------------------------|------------------|-------------------|
| Index methods                        | The Concentration Ratio, CR | Herfindahl-Hirschman Index, HHI |
|                                      |                   | The Rosenbluth Index, RI |
|                                      |                   | The Hall-Tideman Index, HTI |
|                                      |                   | The Comprehensive Industrial Concentration Index, CCI |
| Methods of inequality rate assessment | The Lind Index, L_n | The Entropy Measure, E |
|                                      |                   | The Lorenz Curve; |
|                                      |                   | The Gini Coefficient, G |
|                                      |                   | The Coefficient of Variation, c |

The index approach involves market competition assessment on the basis of specification of market concentration indices, calculated according to the parameters characterizing enterprises’ market shares, and the weighting
coefficients indicating the significance of certain entities’ influence on the market situation.

Relative methods, or methods using inequality indicators to assess market competition, make it possible to assess the heterogeneity of the distribution of enterprises’ shares in the market.

Competitive environment assessment methods in economic science are also divided into discrete and cumulative depending on the comprehensiveness of market producers’ coverage [8, 13].

Discrete concentration assessment methods allow evaluating the market impact of its largest participants – discrete concentration indices are calculated by market shares of the largest enterprises, excluding the market impact of its other participants. Discrete indicators of concentration first of all include the Concentration Ratio (CR) and the Lind Index, \( (L_n) \) (Table 1).

The methods using cumulative concentration indices imply assessment of the market impact of all of its participants – based on specification of market shares of the full range of producers operating in the market. Cumulative concentration indicators explain the entire distribution of market participants’ shares, assuming that structural changes in the distribution of all subjects as a whole affect the value of concentration indicators [13]. Cumulative concentration indices are the Herfindahl-Hirschman Index (HHI), the Rosenbluth Index (RI), the Hall-Tideman Index, \( (HTI) \), the Comprehensive Industrial Concentration Index (CCI), the Entropy Measure \( (E) \), the Lorentz Curve, the Gini Coefficient, and the Coefficient of variation.

In economic literature, there is also a classification of index methods for assessing market concentration depending on the applied “weighing scheme”, since the weight coefficients’ properties determine the concentration assessment sensitivity to changes in the market share distribution of groups of “outermost” market participants [13].

The Concentration Ratio (CR) is defined as the sum of the market shares of the largest market participants, calculated by the values of the indicator adopted to assess the level of competitive environment. Most often in economic literature and practice it is determined by the concentration level of three (CR3) [13; 10, 9], four (CR4) [13; 11], five (CR5) [13], six (CR6), eight (CR8) or ten (CR10) largest sellers. An obvious advantage of the Concentration index is its calculation simplicity, and a disadvantage is ignoring the market structure (the index does not take into account the “size” of the enterprise in the market [10]) and insufficient coverage of enterprises in the market. Thus, the Concentration index does not take into account the market structure, as it does not show the difference between a market dominated by one firm and markets which are roughly equally divided by four or more large enterprises – a market in which one firm controls 77 %
and the remaining 23 control 1%, will have the same four-enterprise concentration factor as the market in which five firms control 20% each. The lack of justification of the number of enterprises taken into account in the calculations [8] is also considered to be a disadvantage of assessing the level of competition with the help of the Concentration index.

The Herfindahl-Hirschman Index (HHI) is one of the most commonly used concentration measurement methods in economic research [8, 11, 13, 14, 15, 16, 17, 18]. It allows calculating the distribution of market shares between its participants which is the sum of the squares of market shares of all producers in the market. A higher value of the index indicates a stronger market concentration – the value of the indicator increases with a decrease in the number of enterprises and an increase in inequality between them [10]. The HHI takes on the lowest value $1/n$ when all enterprises in the market are of the same size, whereas in the case of a monopoly it possesses the highest value equal to 1. Utilization of the index as a weight-scales of enterprises’ market shares allows taking each participant’s market impact into account and adequately reflecting distribution of market power [13]. Major advantages of the Herfindahl-Hirschman Index utilization for the purposes of market competitive environment assessment are market coverage comprehensiveness and market structure consideration. As a drawback of the HHI, some studies [8] indicate that its concentration rate does not take into account enterprises’ rank by their market shares.

The Rosenbluth (RI) and Hall-Tideman Indices (HTI) are almost similar in structure, utilized indicators and calculation aim. Moreover, both of these indicators allow taking into account the rank of the enterprise in terms of its market share in order to assess market impact not only of the enterprises’ share distribution but also of their total number. According to Hall and Tideman, the inclusion of enterprise ranks into concentration assessment will make it possible to show the particular industry entry conditions impact on the competition level [13]. However, the Rosenbluth and Hall-Tideman Indices differ in the method of assigning ranks: the highest rank equal to 1, in the Rosenbluth Index calculations is allocated to the smallest enterprise while in the Hall-Tideman Index to the largest one. Thus, the Rosenbluth Index is more sensitive to market shares distribution alterations of small enterprises [13], whereas the Hall-Tideman Index – of large ones.

The Comprehensive Industrial Concentration Index (CCI) allows desensitizing some market concentration rates (The Rosenbluth Index, The Hall-Tideman Index, The Gini Coefficient) to shares distribution of small or, conversely, large enterprises. The CCI is the sum of the leading enterprise’s share and squares of other enterprise’s shares weighted by a multiplier reflecting the proportional size of the rest of the industry [13].
The Entropy Measure (E) involves weighing the market shares of enterprises by the base logarithm of these shares. The Entropy Measure characterizes the degree of deconcentration: the higher E value is, the greater economic uncertainty and the lower enterprises’ market concentration parameters are. The Entropy Measure is used not only to assess the level of market concentration, but also to compare different types of markets [8, 13].

The Lind Index, the Lorentz Curve and Coefficient, the Gini Coefficient and the Coefficient of variation are relative indicators of concentration which allow assessing the inequality of enterprises’ market shares distribution.

The Lind Index \( L_k \), similarly to the Concentration Index (CR), is calculated only for the \( k \) of largest enterprises and, therefore, does not take into account the situation on the “outskirts” of the market. However, unlike the Concentration Index, the Lind Index is focused on taking into account the differences in the market “core”. The Lind Index requires consecutive calculation of a whole system of indices \( L_1, L_2, ..., L_m \) on condition of preliminary ranking of enterprises’ market shares in descending order [19]. The Lind Index for two largest enterprises will be equal to half the ratio of their market shares:

\[
L_2 = \frac{s_1}{s_2} \times 100 \%
\]

where \( s_1 \) - share of the first largest company in the market; \( s_2 \) - share of the second largest company in the market.

The Lind Index for three enterprises will be calculated by the arithmetic average of two ratios: 1) the largest enterprise share to the arithmetic average of the second and third largest enterprises share ratio; 2) the arithmetic average of the two largest enterprises’ shares to the third largest enterprise’s share ratio. Therefore, the Lind Index will be equal to:

\[
L_3 = \frac{1}{2} \left[ \frac{s_1}{(s_2+s_3)/2} + \frac{(s_1+s_2)/2}{s_3} \right] \times 100 \%
\]

where \( s_1 \) – largest enterprise’s thirds of shares in the market.

The Lind Index allows determining how many enterprises occupy a dominant position in the market – the index is calculated in stages until the continuity of the function is disrupted (the downward trend of the index cannot be replaced by the trend of its increase). Violation of the function’s continuity suggests that the last enterprise added to the calculation has a significantly smaller market share than any of the previous ones [20].
The Lorenz Curve [21] characterizes enterprises’ shares distribution inequality in the market and represents the concentration curve of certain elements of statistical population by enterprise. The diagonal corresponds to the enterprises’ market shares equality, so the deviation degree of the Curve from this line is an indicator of a relative concentration of sellers. For a relative characterization of deviation from equality in enterprises’ market share distribution the Lorentz coefficient is calculated. It depends on the comparison of enterprises’ indicator values and their market share sizes.

The level of enterprises’ market share inequality is also calculated with the help of the Gini Coefficient \((G)\), which measures the deviation degree of the Lorentz curve from the diagonal. The Gini Coefficient is calculated as the ratio of the area of the lying above the bisector and bounded above by the Lorentz curve figure to the area of the triangle bounded above by the bisector, the ordinate axis and the straight line \(y=100\%\). The Gini Coefficient value can range from 0 (full equality of enterprises’ market indicators) to 1 (full inequality of enterprises’ indicators).

The Coefficient of variation \((c)\) is a degree of variation and measures the extent to which enterprises’ market shares deviate from their average values. In contrast to the variance, the coefficient of variation is insensitive to the enterprises’ proportional size increase [13].

In Russia the Rosenbluth, the Hall-Tideman, The Comprehensive Industrial Concentration Indices are rarely used to assess the level of competition in the market.

**Table 2.** Comparison of market concentration rates

| Name of concentration rate | Method according to comprehensiveness of market coverage | Method according to the type of weight-scales | Advantages | Disadvantages |
|----------------------------|------------------------------------------------------|---------------------------------------------|------------|--------------|
| The Concentration Ratio, \(CR\) | Discrete | Weights are not used, or shares of \(k\) enterprises have the same weight \(w_i = 1\), if \(i \leq k\) | – Simplicity of calculation | – Incomplete market coverage |
|                             |                                                      |                                             | – Does not take market structure into account |
| Index                          | Cumulative Weights | Notes                                                                 |
|-------------------------------|--------------------|----------------------------------------------------------------------|
| The Herfindahl-Hirschman Index, $HHI$ | Weights allow taking market structure into account – assessing the impact of each enterprise on the market, $w_i = x_i$. | - Lack of justification of the number of enterprises taken into account in the calculations - A relative simplicity of the calculation - Full market coverage. - Taking market structure into account |
| The Rosenbluth Index          | Weights take into account the impact of enterprises' total number on the market, $w_i = i$, where $i$ – enterprise’s sequence number. | - Full market coverage - Taking market structure into account - The impact of small enterprises on the market is overstated. - The impact of large enterprises on the market is overestimated. |
| The Hall-Tideman Index        | Weights allow taking market structure into account, the weight is calculated as the base logarithm | - Full market coverage - Taking market structure into account |
| The Entropy Measure           |                    |                                                                      |
of the enterprise’s market share \( w_i = \ln s_i \).  

| Method                      | Discrete/Lorenz Curve | Cumulative/Gini Coefficient |
|-----------------------------|-----------------------|----------------------------|
| Lind Index                  |                       |                            |
| Possibility to perform different market types comparisons | –                      |                            |
| Takes into account alterations in the enterprise concentration in the market “core” | –                      | Complexity of calculations; |
| Complexity of market coverage; |                       |                            |
| Does not take into account the impact of small enterprises on the market | –                      |                            |
| Full market coverage        | –                      | Complexity of calculations; |
| Studies uneven enterprise indicators distribution in the market | –                      | Underestimation of large enterprises importance |
| Complexity of calculations; | –                      |                            |
| Underestimation of large enterprises importance | –                      |                            |
4 Conclusion

Therefore, it can be concluded that despite the existence of a large number of different coefficients for calculating market concentration in order to assess the competitive environment, most of them are inapplicable in practice, due to the lack of most essential data. What is more, competitive environment assessment in many product markets is significantly complexified by the lack or inaccessibility of reliable data on prices, sales volumes, profits, numbers and other indicators of market entities. An important advantage of the housing investment market as an object of competitive environment research in comparison with other product markets is the fact that buildings and structures created through housing investments are subject to mandatory registration in the Unified State Register of Objects under Construction. This allows reliably determining each market entity share in total sales. However, complex subject-object relations in the housing investment market manifested in the fact that the same economic entity can at the same time play roles of a seller and a buyer, as well as be present in adjacent markets, seriously complicifies analysis and assessment of the competitive environment. Thus, in our opinion, it is necessary to improve existing approaches to assessing the competitive environment of the market and to calculating the market concentration rate. Moreover, these market features should be taken into account when developing the state housing policy, setting strategic goals and justifying housing indicators and while choosing forms and tools to influence the market in order to regulate the competitive environment.

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