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The Application and Research of a New Combinatorial Analysis and Forecasting Method in Real Estate Area based on Grey System Theory and Multivariate Linear Regression

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Abstract

By analyzing the main factors influencing the real estate market demand and mechanism, the paper has established a real estate demand-analyzing model founded on the base of the gray theory to demonstrate the factors influencing the real estate market of China and finally finds which factor is the most important or less important. The trend of real estate demand in the three years is forecasted by combining least square method and regression method.

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Keywords: Real Estate Demand, Grey Theory, Multivariate Linear Regression

1. Introduction

Real estate is a medium and long-term investment industry which has a long return period. To strengthen control, the state council's publication of the property market regulation do work on the issue of notice" Relating to do a real estate market control work on the issue of notice" (the instruments of eight ")," clear the control objectives, wider and more severely limit for policy ", a series of policies in January 26, 2011.^[1]

The foreign scholars of the study has two aspects of viewpoints: one is using the microscopic data, due to the facilities and data collection, the other is detailed in-depth research, considered the different colors^[2], age, time, the relative housing, family sizes^[3]. These rich studies and research methods of our demand for real estate have provided a lot of useful experiences.

In China, Bo Gao, Bin Wang^[4] selected the price factors, people factors and the residents' income factors to the study of regional differences of demand elasticity of real estate. Huili Liu^[5] chose the housing sales price, one-year bank loans rate, the real per capita disposable income of residents in Jiangsu province factors influencing analysis; Bin Zhang^[6] selected the population and property sales price, the per capita disposable income, inflation, loans, the domestic economy standards to the estate needs research.

This paper takes the property market as a grey system, uses gray theory to quantizing analysis of market factors influencing and uses multiple linear regression way to the next few years estate forecast of our country so that to provide more effective analysis and forecasting methods for our real estate industry and healthy and orderly development of positive significance for the formulation of policies.

2. Analysis of the factors influencing real estate market

Population factors^[7]. Real estate price factors. Per capita disposable income factors. The domestic

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economy development level factors. Other factors.

Above all, this paper summarizes four items of the total population of our country, commercial residential buildings average selling prices, the per capita disposable income, per capita GDP on our estate needs influencing factors analysis, and choose the most relatively important factors to predict

3. Grey associated analytical method

The basic ideas of grey associated analysis^[8] is the similarity of the geometry of the sequenced curve, the more similar they are the more association they have.

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Procedure of grey associated analysis:

(1)Data collected to determine the purpose of appraisal target system , the sequences of data in the following matrix:

$$(X'_1, X'_2, \dots, X'_n) = \begin{pmatrix} x'_1(1) & x'_2(1) & \dots & x'_n(1) \\ x'_1(2) & x'_2(2) & \dots & x'_n(2) \\ \vdots & \vdots & \ddots & \vdots \\ x'_1(m) & x'_2(m) & \dots & x'_n(m) \end{pmatrix}$$

Inside m is the number of index.

$$X'_i = (x'_i(1), x'_i(2), \dots, x'_i(m))^T, \quad i = 1, 2, \dots, n$$

(2)Determine the reference data list, reference data list should be an ideal comparative standard and it can also be selected with some reference values under evaluation purposes:

$$X'_0 = (x'_0(1), x'_0(2), \dots, x'_0(m)) \cdot$$

(3) Dimensionless of the target data, a sequence of data after dimensionless can be in the following matrix:

$$(X_0, X_1, \dots, X_n) = \begin{pmatrix} x_0(1) & x_1(1) & \dots & x_n(1) \\ x_0(2) & x_1(2) & \dots & x_n(2) \\ \vdots & \vdots & \ddots & \vdots \\ x_0(m) & x_1(m) & \dots & x_n(m) \end{pmatrix}$$

(4)Count each indicator and evaluate the object reference corresponding with a sequence of bad elements in the absolute value: $|x_0(k) - x_i(k)| (k = 1, \dots, m, i = 1, \dots, n)$.

(5)Determine the $\max_{i=1}^n \max_{k=1}^m |x_0(k) - x_i(k)|$ and $\min_{i=1}^n \min_{k=1}^m |x_0(k) - x_i(k)|$.

(6)Calculating the associational modulus. We can use as follow:

$$\zeta_{0i}(k) = \frac{\min_i \min_k |X_0(k) - X_i(k)| + \rho \max_i \max_k |X_0(k) - X_i(k)|}{|X_0(k) - X_i(k)| + \rho \max_i \max_k |X_0(k) - X_i(k)|} \quad k = 1, \dots, m$$

We call ρ separate index, it ranging from (0, 1). Usually we select 0.5 on it.

(7) Calculate the associational level with. $r_{0i} = \frac{1}{m} \sum_{k=1}^m \zeta_{0i}(k)$

(8) Comprehensive evaluation.

4. The analysis of last nine years’ real estate market demand influencing factors in China

We used the real estate market influence factors from 2001 to 2009 based on a gray associated analytical.

Table1 .reference sequence and comparison sequences

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