

# Real estate confidence index based on Web GIS and SPSS WebAPP

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## Abstract

Real estate confidence index, as an efficient and effective information-oriented measure, is being studied and applied to the China's real estate market. It not only assists government with the macro control of real estate market, but also guides investment and consumption. In order to assure the accuracy and real time of the RECI, more factors should be considered and an efficient system based on IT is needed. This paper presents a set of real estate confidence indices via considering synthetically efficient demand and supply, latent demand and latent supply on the basis of domestic and overseas research status and establishes relevant mathematical models at all levels. Then a Web GIS and SPSS WebAPP-based indices-issued system model is constructed. The relevant key techniques are analyzed, and the functions of the model are discussed. Otherwise, according to current conditions, the application of the system is conceived. © 2006 Published by Elsevier Ltd and IPMA.

*Keywords:* Real estate market; Information-oriented; Real estate confidence index; Web GIS

## 1. Introduction

Real estate confidence index (RECI) can reflect and measure the running status, booming degree and equilibrium degree of the real estate market (REM). It is one of important means of macro control of the REM and is also the main component of information-oriented warning systems for the REM [1,2]. RECI is a widely studied research topic. For example, Research Centre for Real Estate at Texas A&M University in US has been compiling Texas RECI (TRECI) since the second quarter of 1999 [3]. The Hong Kong Polytechnic University has also compiled their real estate index (BRE Index) [4].

However, these existing indices are regularly issued and mainly applied through Internet or Intranet. Difficulties have been experienced in the process of data collection, compiling and releasing of indices. For example, data collection is often not in time, which results in index issued late. If the original data used for compiling the indices

are not released, users will only know about the indices and cannot verify them. In addition, data collected in previous studies were primarily based on questionnaires. RECI developed upon these data reflects mainly latent demand of residential property, without taking into account other important factors such as current effective demand and supply (D&S), and latent supply [3,4]. RECI should be a set of indices involving the confidence of consumers and the confidence of investors and governments in the REM, which reflect synthetically the current status and development trend of the REM. Thus the effective D&S index and the latent supply index should be implicated in RECI, as well as the latent demand index.

In this study, a new RECI system is developed by integrating data of latent supply, current effective demand and supply, as well as latent demand. At the same time, through the use of Web GIS and SPSS WebAPP technologies, data collection and analysis, the dissemination of indices are effectively conducted using these online technologies. The subsequent sections of this paper described how the RECI is developed and used to support decision making processes in the real estate market. Specifically, the second section presents how the RECI system is established

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based on efficient D&S, latent demand and latent supply, and main models for confidence indices are constructed, including a composite index model, monomial index models and other models. Weighting coefficients of monomial indices and sub-indices are also determined. In Section 3, the key techniques constructing RECI-release systems are analyzed. Section 4 presents the model of RECI-release systems based on Web GIS and SPSS WebAPP (W-S) and describes the functions of the system. An application of the system is discussed in Section 5. Finally, Section 6 concludes the study.

**2. Establishment of real estate confidence index system**

*2.1. Architecture of the RECI*

Based on the consideration of demand and supply of real property, the RECI system is established as shown in Table 1, where PP denotes Purchasing power; HOCPI denotes Homeowner considering purchase; HOCPII denotes Homeowner and conditional purchaser; NHOCPPI denotes Non-homeowner considering purchase; NHOCPPII denotes Non-homeowner and conditional purchaser; FH-RH market denotes First-hand residential housing market; SH-RH market denotes Second-hand residential housing market; Comm-building denotes Commercial building.

The first level is the composite index level, which reflects synthetically the developmental status and trend of REM of a certain region. The second one is the monomial index level, involving efficient D&S index, latent

Table 1  
The framework of the real estate confidence indices system

Composite index level	Monomial index level	Sub-index level	Basic index level
Composite index	Efficient D&S index	Price index	FH-RH market price index SH-RH market price index Comm-building price index Office building price index
		Population index PP index Market index	Land development index Building area index Sales index
	Latent demand index	HOCPI index HOCPII index NHOCPPI index NHOCPPII index	
	Latent supply index	Land inventory index Land increment index Capacity rate index	

demand index, and latent supply index, which image respectively the status of REM from different viewpoints. The third one is the sub-index level, which constructs all sub-indices imaging efficient D&S, latent demand, and latent supply. And the fourth one is the basic index level, which further analyzes above sub-indices and provides these indices usually attracting experts and the masses. The RECI can guide developers' investment and consumers' consumption, and assist government with the macro control of REM, which assures the healthy development of a REM.

*2.2. Models of the basic indices*

(1) *The model of the housing price index:* Because housing price is influenced by many non-market factors, for example view, location, storey, etc, the market price should be adjusted before constructing price index to make it comparable. Then weighted average method and ratio method are to be utilized to found the models of price index for the FH-and-SH residential housing market. The modeling process in detail is as follows.

First, based upon Hedonic model [5–8], the price for the FH-and-SH residential housing market is adjusted according to flat model and characteristics, as follows

$$P = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m + \gamma_1 D_1 + \gamma_2 D_2 + \dots + \gamma_n D_n + u \tag{1}$$

where  $P$  denotes post-adjusted price;  $\alpha$  denotes asked price;  $X_1, X_2, \dots, X_m$  are the attributes of a sample point, such as storey, area, and decoration;  $\beta_1, \beta_2, \dots, \beta_m$  are respectively the correction coefficients of each of the attributes;  $D_1, D_2, \dots, D_n$  are dummy variables;  $\gamma_1, \gamma_2, \dots, \gamma_m$  are respectively the coefficients of each of the dummy variables; and  $u$  denotes chance error variable.

Then, construct the housing average price model of a district, and construct the housing price index model of a district.

$$I_{hp} = \frac{P^t}{P^0} \times 1000 \tag{2}$$

where  $I_{hp}$  denotes the housing price index of the district;  $P^0$  denotes the housing average price of the district in comparing date;  $P^t$  denotes the housing average price of the district in report date.

(2) *The models of the price indices of commercial and office building:* The difference between the price index model of commercial building and the one of office building is mainly the calculation of average price. After respectively figuring out the average price, the same method may be used for constructing index models concerned.

First, according to the asked price, this kind of building is divided into four grades, viz. high, middle-high, middle, and low; and then the frequency of each of the four grades is counted in order to determine the sampling proportion of each grade.

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