The Impact of Marketing Labels on Housing Prices: An Empirical Study on Hangzhou City

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Abstract. As urbanization continues to advance, real estate development is gradually shifting from an incremental market to a stock market, and consumers' requirements for the "comfort" and "functionality" of residential properties have increased significantly. In the face of increasingly fierce market competition, developers are paying more and more attention to real estate marketing issues, and marketing labels such as green, education, metro and garden have emerged. Taking Hangzhou as an example, this paper investigates the relationship between marketing labels and housing prices based on the marketing messages conveyed by real estate developers. The empirical results show that different marketing labels have different effects on housing price: the "official green marketing label-CGBL", "unofficial green marketing label", "rail transit marketing label" and "garden marketing label" all have a positive impact on the price of residential properties, with value-added rates of 13.6%, 5.2%, 1.6% and 1.4%; respectively. Compared with the marketing labels used by developers in advertising, the officially certified label information has a stronger impact on housing prices.

Keywords: housing price, marketing label, hedonic model, Hangzhou

1. Introduction

With the changing needs of consumers and the continuous segmentation of the residential market, people's housing choices are gradually changing from "survival" to "comfort". The marketing of many real estate companies has begun to change from a "product-centric" to a "consumer-centric" model. In today's increasingly homogeneous residential building features, concepts such as "green", "education", "rail transit" and "garden" have increased the selling points of residential buildings. Developers use marketing labels in their marketing activities to convey information about the features of residential products to homebuyers and strengthen their knowledge of residential product concepts, which helps sales and increases profits. As

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common product concepts and marketing labels in the housing market, green properties, educational properties, metro properties and garden properties are attracting more and more homebuyers.

Consumer theory began to develop in the 1950s. Sub-sequently, a large number of scholars studied consumer behavior and found that product information significantly affected consumers' purchase intention and behavior. A large number of scholars have studied the price premium of green housing and the capitalization effect of public goods (education resources, rail transport, parks), however, only few studies have quantitatively analysed the impact of marketing labels on housing prices from the perspective of real estate developers' marketing. The literature closely related to it mainly includes Zhang et al. (2016b), Chung (2015) and Kim et al. (2019). Among them, Zhang et al. (2016b) used the dummy variable "developer self advertising" to replace the variable "CGBL certification" in statistical analysis, and found that green advertising can generate a value-added rate of 2.8%; However, if the two variables enter the model together, the "developer self advertising" variable is not significant. The research shows that CGBL certification is more reliable and effective than the advertising information of real estate developers. Chung (2015) believes that the relationship between school choice and house price changes may be related to the adequacy and reliability of public access to relevant information. If parents do not understand the relevant school selection policies, the potential impact of school selection on house prices may be minimal. Kim et al. (2019) used the hedonic price method to measure the value of parks at different construction stages in the Busan metropolitan area of South Korea. It was found that all types of parks will have a significant positive impact on housing prices after completion, and the transmission of planning information has a value-added effect on the prices of houses near the planned park. This study collects data on housing prices and residential characteristics in Hangzhou, identifies green properties, educational properties, metro properties and garden properties according to the relevant marketing labels, and further analyses the effects of "green properties", "educational properties", "metro properties" and "park properties" through the hedonic price model. Based on the marketing labels conveyed by real estate developers, a distinction is made between special residential properties and ordinary properties, with a focus on the capitalization effect of marketing labels and the price premium of special properties.

2. Literature review

Based on the rising demand of home buyers and the innovation of real estate marketing, especially the popularity of concept marketing, developers will fully consider the "buying" and "selling" points of their products when developing residential properties, and will highlight one or more distinctive features of their products to consumers. Labelling is a common information vehicle used in the marketing process to differentiate a residential product with a particular feature from ordinary residential products, thereby affecting the decision-making of home buyers. This paper examines four types of marketing labels in the housing market to explore the impact of green marketing labels, education marketing labels, rail transit marketing labels and garden marketing labels on housing prices.

2.1 Green marketing label

Based on the environmental protection and sustainable development, real estate enterprises introduce the concept of green ecology into their marketing activities to meet consumers' demand for green houses, through a series of green marketing strategies to guide consumers to green consumption, and pursue the unification of economic, consumer and environmental interests to achieve sustainable social, economic and environmental development (Shu, 2004). Green labels and other green marketing messages can capitalize into the market value of green buildings, leading to a rental premium or selling price premium (Oyedokun, 2017). CGBL certification can add around 6.9% to the market value of a house, and compared to the incremental costs of the green house development, the premium capacity can generate some profit for real estate developers (Zhang et al., 2016).

2.2 Education marketing label

Educational resources play a positive role in shaping the cultural atmosphere of a neighbourhood, and the long-term inculcation of residents by a quality educational environment may have a spillover effect (Wang& Liu, 2010). The marketing of education as a complementary element of a residential property usually uses good educational resources as a key promotional label to attract buyers with a rigid demand or potential investors (Yu, 2015). As the quality and accessibility of educational facilities have been quantified, a large number of studies have shown that educational resources significantly affect housing prices, but little literature has examined the impact of the disclosure.

2.3 Rail transit marketing label

The impact of rail transit on housing prices is weakest for those in the planning period and strongest for those in the operation period (Hao& Shi, 2018). The marketing information of rail transit in the construction and operation phases can be judged and verified by home buyers based on the actual location of the metro stations, while the information of rail transit in the planning phase is mostly obtained only through government documents and developers' marketing propaganda. Conceptual marketing using proximity to the metro as a selling point can attract homebuyers, especially those who value the convenience of travel. However, other views have been put forward by scholars who argue that concept marketing featuring rail transit may not produce significant results.

2.4 Garden marketing label

As income levels rise and quality of life improves, residents increase demand for higher quality in their living environment and are willing to pay for a comfortable living environment. To meet residents' growing demand for gardens, real estate developers are using garden resources to reflect the comfortable and healthy lifestyle when they advocate in their residential products. Parks and landscaping have become an increasingly important selling point for real estate developers in residential development. Features and messages about the landscape in the advertisements easily attract homebuyers, indicating a preference for houses with a good view (Maruani & Cohen, 2013).

3. Data and models

3.1 Data and variables

This paper takes Hangzhou as an example, with the specific empirical study area including eight urban areas, namely Xihu District, Gongshu District, Shangcheng District, Xiaocheng District, Jianggan District, Binjiang District, Xiaoshan District and Yuhang District. This paper uses transaction data of 283 new residential communities in 2016, which were obtained from the Hangzhou government housing net, and the data sample is based on ordinary residential houses, excluding data information related to high-priced residential houses such as villas and town houses, so that housing prices are comparable. Data on residential community attributes were collected and obtained through Soufun.com (http://www. soufun.com). In this paper, the housing price used is the total price of a single residential unit. The data source is 49,809 new residential units in 356 districts, excluding samples with imperfect information and abnormal samples, and finally obtaining valid data for 36,981 residential transaction samples in 283 communities. The electronic map data was obtained by map distance measurement and latitude and longitude coordinates calculation.

Some scholars comprehensively studied the selection of housing characteristics variables, the construction of the hedonic price model, and the analysis of empirical results, and found that a large number of studies classified housing characteristics into three main categories: architectural characteristics, neighbourhood characteristics and location characteristics (Wen, 2005). With reference to the existing literature, this paper introduces marketing label variables based on the three dimensions of architecture, neighbourhood and location. The quantification of specific housing characteristics variables and their expected impact on housing prices are shown in Table 1.

Table 1: Description of residential characteristic variables.

Characteristic type	Variables	Variable definition	Expected sign
Dependent variable	Price	Total price of a housing (CNY/㎡)	/
Structure characteristic	Area	Housing sales area(㎡)	+
	Floor	The floor of the housing	?
	Decoration	1 if the decoration status is hardcover, and 0 otherwise	+
	Well-known developers	1 if the developer is in the "2017 China Top 100 Real Estate Enterprises List", and 0 otherwise	+
	Property fee	Housing district property management service level (CNY / ㎡· month)	+
	Volume rate	The volume ratio value stated in the developer's publicity	-
Neighbourhood characteristic	Living facilities	Banks, hospitals, food markets and supermarkets; each item is scored 1, and 4 points in total	+
	Education facilities	Kindergartens, primary schools, junior high schools and senior middle schools; each item is scored 1, and 4 points in total	+

Location characteristic	Close to quality primary schools	1 if there is a top 30 quality public primary school in Hangzhou within 1000m of the district and 0 otherwise	+
	Close to metro station	1 if there is a metro station 1000m away and 0 otherwise	+
	Close to the park	1 if there is a park within 1000m of the plot and 0 otherwise	+
	West Lake Distance	Straight-line distance from the community center to the coast of West Lake (km)	-
	Qianjiang New Center Distance	Straight-line distance from the community center to the new CBD of Qianjiang New Center (km)	-
Label characteristic	CGBL	1 if the project characteristic label is related to CGBL, and 0 otherwise	+
	Unofficial green label	1 if the project characteristic label is related to green, and 0 otherwise	+
	Education label	1 if the project characteristic label is related to education, and 0 otherwise	+
	Rail transit label	1 if the project characteristic label is related to rail transit, and 0 otherwise	+
	Garden label	1 if the project characteristic label is related to park, and 0 otherwise	+

3.2 Model specification

The hedonic price theory treats houses as heterogeneous goods with significant differences between the characteristics they contain, and houses are sold as a collection of intrinsic characteristics that influence consumer choice through a combination of product characteristics. The model represents the price of a house as a function of all characteristics.

There are four main functional forms of the hedonic price model, namely linear, logarithmic, log-linear and semi-logarithmic forms. In terms of the significance of the variables and the goodness of fit of the model, this paper chooses the logarithmic functional form for the fitting of the model, choosing the total price of a house as the dependent variable and 18 residential characteristics as the independent variables.

The model is shown as follows:

$$LnP = \alpha 0 + \alpha 1\ LnS + \alpha 2\ LnN + \alpha 3\ LnL + \alpha 4\ M + \varepsilon \quad (1)$$

In the formula, P is the total price of a house; S, N and L are building characteristics, neighbourhood characteristics and location characteristics, respectively, and M is marketing label characteristics; αi is the parameters to be estimated, $i = 0,1,2,3,4$; ε is the error term.

4. Results and discussion

The least squares (OLS) method was applied to estimate the model, excluding the effect of outliers (observations with absolute values of the standardized residuals greater than 3), and

the final regression results were obtained, as shown in Table 2. The ANOVA F-value of 17546.869 indicates that the equation works well overall, rejecting the hypothesis that all coefficients are zero and indicating that the logarithmic functions established for house price and housing characteristics can hold. The adjusted R^2 value of 0.896 indicates that the model can explain 89.6% of the variance in the dependent variable, indicating a good fit of model. The housing characteristics variables entering the model have a significant effect on house prices and have good explanatory power.

Table 2: Regression results of the hedonic price model.

Variables	Non-standardized coef.		Standard coef.	t-value	Sig.
	B	Standard error			
(Constant)	10.772***	0.025		429.258	0.000
ln Area	1.124***	0.005	0.400	230.494	0.000
ln Floor	0.011***	0.001	0.017	9.147	0.000
Decoration	0.183***	0.003	0.133	60.686	0.000
Well-known developers	0.043***	0.002	0.037	18.771	0.000
Property fee	0.032***	0.002	0.043	18.431	0.000
Volume rate	-0.012***	0.002	-0.010	-5.051	0.000
Living facilities	0.034***	0.001	0.065	30.362	0.000
Educational facilities	0.027***	0.001	0.040	20.406	0.000
Close to quality primary schools	0.022***	0.005	0.009	4.583	0.000
Close to metro station	0.112***	0.003	0.084	44.524	0.000
Close to the park	0.056***	0.003	0.037	19.792	0.000
ln West Lake Distance	-0.730***	0.004	-0.562	-193.127	0.000
ln Qianjiang New Center distance	-0.130***	0.003	-0.122	-39.024	0.000
CGBL	0.136***	0.011	0.021	12.402	0.000
Unofficial green label	0.052***	0.003	0.040	19.180	0.000
Education label	-0.040***	0.003	-0.028	-15.945	0.000
Rail transit label	0.014***	0.003	0.009	4.683	0.000
Garden label	0.016***	0.002	0.015	7.177	0.000
Adj-R^2	0.896				

Note: ***, **, and * represent the statistical significance at 1%, 5%, and 10% level, respectively.

4.1 Impact of traditional characteristic variables on house prices

As shown in Table 2, the traditional characteristics variables entering the model are all significant at the 1% level of significance, and the signs are consistent with the previous theoretical expectations. Among them, volume rate, West Lake distance and Qianjiang New Center distance have a negative effect on house prices, while the remaining structure characteristic: area, floor, decoration, well-known developer, and neighborhood characteristics of property fee, liv-

ing facilities, educational facilities, close to quality primary schools, close to metro stations and close to parks all have a positive impact on house prices.

In this model, the unstandardized regression coefficients correspond to the price elasticities or semi-elasticities of the housing characteristics. The regression coefficients for the continuous variables correspond to the price elasticity of the corresponding housing characteristics, i.e. the percentage change in the price of a house that would result from a 1% change in a variable, with other variables being constant. The price elasticity of housing size is 1.124, indicating that a 1% increase in housing size increases the total price of the house by 1.124%. The regression coefficient for floor level is 0.011, indicating a significant positive effect of floor level on the price of a house.

4.2 Impact of marketing labels on house prices

Based on the OLS regression results, the following conclusions can be drawn: the green marketing label, the rail transit marketing label and the garden marketing label have a significant positive impact on housing prices, while the education marketing label has a significant negative relationship with housing prices. This indicates that marketing labels significantly affect housing prices and that there are differences in the impact of different types of marketing labels on housing prices. Two green marketing labels, official green marketing label-CGBL and unofficial green label, have a higher value-added rate on housing prices than the remaining three marketing labels, at 13.6% and 5.2% respectively, indicating that green marketing by real estate companies has a stronger appeal to consumers, which also indicates that as environmental protection and sustainability concepts become more popular, the marketing label of green housing will attract consumers and thus higher premiums. The higher regression coefficient for official green marketing label-CGBL than that for unofficial green labels indicates that consumers perceive officially certified information to be more trustworthy and to have a stronger premium effect on housing prices than the information conveyed by developers' advertising using marketing labels. Marketing messages must be evidence-based, and conceptual hype can reduce buyers' willingness to pay. This compares to a premium of 1.4% and 1.6% for the rail transit marketing label and the garden marketing label respectively.

However, the results in Table 2 show that the negative relationship between education marketing labels and housing prices is not as expected. There are two possible reasons for this: (1) The message conveyed by education marketing labels is that educational resources are available in the vicinity of residential properties, but educational resources include kindergarten, primary school, middle school and high school, and parents are more concerned about primary and middle school education. At the same time, the idea that "children should not lose at the starting line" has made parents increasingly concerned about the quality of educational resources. Therefore, the limitations of the types of educational resources, the uncertainty of the quality of new educational resources and the poor quality of existing educational resources in the vicinity of residential buildings may lead to a great deal of uncertainty in the purchase of "educational real estate" or directly reduce residents' willingness to purchase; (2) Developers' use of the education concept for false marketing can lead to the discounting effect of the education marketing label. For example, Xie'an Zixian once attracted buyers with marketing advertisements of " Double Famous Schools" and "Key Famous School of West Lake Primary School + Wenxin Special Kindergarten", but later received a lot of negative comments due to fraudulent consumption inducement by the school district.

5. Conclusions

This paper quantitatively evaluates the influence of various marketing labels proposed by developers on housing prices by collecting data of housing prices and other characteristics in eight districts in Hangzhou. With establishing a hedonic price model, the results of the study show that: "official green marketing label-CGBL", "unofficial green marketing label", "rail transit marketing label" and "garden marketing label" all have a significant positive influence on housing price, with value-added rates of 13.6%, 5.2%, 1.6% and 1.4%; respectively, indicating that there are differences in the impact of different types of marketing labels on housing prices.

This paper finds that there are significant differences in the premium capacity of housing with different marketing labels, could providing better reference and suggestions for real estate developers and home buyers, as follows: For real estate developers, the starting point should be consumer demand, and it is necessary for developers to focus on the core value of residential products, focus the product concept in the design and development process, and through effective marketing measures communicating real and reliable information related to residential products to residents. For consumers, faced with diverse marketing messages, homebuyers need to be able to recognize the authenticity of these messages and make the right decision on home ownership, taking into account the actual situation of the price level, internal construction and surrounding facilities of the residential community.

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