



Analysis

The role of public information in increasing homebuyers' willingness-to-pay for green housing: Evidence from Beijing



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ABSTRACT

To explain the weak demand for green housing in Chinese cities, researchers point to the lack of reliable and accurate information to convince owners to invest, yet there is little concrete evidence that such information would in fact promote homebuyers' investment in green housing. We implement an information experiment in Beijing. We select two pairs of residential complexes – each pair has two complexes located in the same housing submarket, and one is green while the other is not. We ask the respondents' willingness to buy a new green housing unit, and, if yes, the price premium they are willing to pay. Then we show them an information card that documents that green apartments outperform their non-green counterparts in terms of several indoor environmental indicators, and then ask them the same two questions. We find that dwellers living in green complexes present a significantly higher initial willingness-to-pay for greenness, but this difference narrows significantly after our information treatment, as the non-green-complex dwellers' willingness-to-pay for greenness increases dramatically. This inspiring result suggests that Chinese urban households will be encouraged to purchase green housing if they are provided more reliable and concrete information.

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1. Introduction

The excessive energy consumption and greenhouse gas emissions in the building sector leads to many environmental impacts in the life cycle of every building. Promoting green buildings is thought to be an ideal solution to mitigating these environmental impacts. The Chinese government has prioritized addressing such environment and energy problems, recognizing that energy consumption and environmental impacts resulting from construction, operation and demolition of buildings are particularly severe in China. For instance, in Beijing, where the situation of building energy efficiency is relatively better in present China, the residential buildings are estimated to consume 1.5–2.0 times as much energy for winter heating as residential buildings in similar cold climates in Western Europe or North America and still provide far less comfort (Zhu and Lin, 2004). The energy consumption of building sector may further increase as urban households see their incomes rise and subsequently demand higher living standards. The Chinese State Government issued the Green Building Action Plan on January 1, 2013, setting the goal that by 2015, 20% of all new buildings should be green. However, the market has shown very weak response to such policies. By the end of 2013, the floor space of new residential

buildings certified by the Chinese Green Building Label system only accounted for about 0.8% of the gross floor space under construction that year.

While the promotion of green housing depends on the supply-side, the main driving force is from the demand-side – whether and how much urban households are willing to pay for green housing. If this willingness-to-pay (WTP) exceeds the incremental costs of building such green housing, developers will be incentivized to supply this green product in the market. To date, limited empirical evidence has demonstrated Chinese urban households' preference for green housing. In fact, based on a conjoint survey conducted in Nanjing, Hu et al. (2014) find that in China only the rich are willing to pay a price premium for green apartments. Zheng et al. (2012) investigate homebuyers' revealed preference for “green” housing based on the transaction prices and rents of residential complexes in Beijing between 2003 and 2008, and find that the self-advertised “green” residential complexes could sell for a price premium at the presale stage but subsequently resell or rent for a price discount due to false advertising or overselling the benefits of their “green” housing. They then argue that Beijing urbanites' demand for green housing is rising, but the lack of reliable information regarding the complex's true “greenness” (defined to include energy savings and improvements in living comfort) has substantially hindered development of the green housing market. It is true that no official certification system for green buildings was available in China until recently. Even after the launch of the official “Chinese Green Building

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Label (CGBL)” system in 2008, public knowledge of this official certification system has not been widespread (Zhou, 2015). Our survey reveals that around 90% of respondents know very little or nothing about the certification system. The dominant information source about green buildings is still from developers' advertisements.

Research has been conducted in other countries regarding the role of information provision in stimulating energy-efficiency investment. There is a widespread perception that better information can alleviate underinvestment in energy efficiency (Hausman, 1979; Achtnicht, 2011; Davis and Metcalf, 2014; Allcott and Taubinsky, forthcoming). Information plays a more crucial role in the real estate market than the markets of products whose attributes are perfectly observable prior to purchase, as buildings are a typical experience good – it is difficult to directly observe a full bundle of a building's quality attributes in advance (Nelson, 1970; Shapiro, 1983). Furthermore, the problems of information asymmetry and adverse selection are more serious in the green building sector than ordinary buildings (Heinzle et al., 2013), because the attributes of green buildings, consisting mainly of living comfort and energy efficiency (Kahn and Kok, 2014; Zuo and Zhao, 2014; Zhou, 2015), are revealed gradually over time as one physically lives in a building (Zheng et al., 2012). Most users lack specialized knowledge or sufficient information to evaluate a building's energy efficiency; in particular, such “energy literacy” has been found to be especially low in the residential sector (Brounen et al., 2013). In addition to this, some recent studies also suggest that consumers' low awareness of residential buildings' energy efficiency may be rational as the energy costs are too small (or lack of flexibility) to justify the effort (Brounen et al., 2013; Davis and Metcalf, 2014; Allcott and Taubinsky, forthcoming). Moreover, the environmental externalities may be another reason for households' inattention to green building's benefit of energy efficiency. Our paper will not explore all these factors in details, but mainly focuses on the role of information about green buildings' superior performance in terms of living comfort. Specifically, we investigate the added value achieved by providing more useful information and its impact on increasing potential homebuyers' willingness-to-pay for green housing units.

To achieve our research goal, we implemented an experiment in Beijing, China's capital. We select two pairs of residential complexes, and each pair consists of a green complex and a non-green complex located in the same housing submarket (a small geographic area). Therefore, the location and building quality of the two complexes within the pair are similar except for the “greenness” attribute. The two green complexes are developed by the same developer – MOMA,¹ which is widely acknowledged as one of the most famous “green” developers in China. This developer adopted the same green technologies in the two complexes we select. However, one of the two green complexes is officially certified while the other one is not.² Our partner, Department of Building Science at Tsinghua University, conducted a field test of indoor environmental quality (temperature, relative humidity, background noise, and luminance under natural lighting) in December 2014, and designed an information card based on the test results, which demonstrated that green apartments perform much better than their non-green counterparts in terms of the four indoor environmental indicators above. We use this information card to conduct a before–after information-provision survey in the two complex pairs. Before showing this information card to the respondents, we ask about their willingness to buy a new green housing unit, and, if they answer yes, the price premium they are willing to pay. Then we ask the same two questions after showing them the information card. The

design of our experiment ensures that the WTP change is solely due to the information treatment.

The results from our experiment show that those who live in green complexes either have a higher preference for green buildings, or have more pre-experiment knowledge about green buildings (the official green certification system), or both. We do find that those green housing dwellers have a higher initial WTP for greenness (329 RMB/m², compared to 225 RMB/m² for non-green housing dwellers), even after controlling for household attributes. But their incremental WTP compared with non-green housing dwellers becomes much smaller after our information treatment since the net gain from such information is marginal for them (the after-information treatment WTP is 317 RMB/m² and 285 RMB/m² for green and non-green housing dwellers, respectively). Furthermore, the comparison of the certified and non-certified green complexes (both developed by MOMA) reveals that there is little difference in these dwellers' WTP for greenness, either before or after our information treatment. Therefore the developer's “spillover” strategy is effective: it builds its “green” image by certifying some of its projects, and then enjoys the spillover effect to other projects under the brand name. Altogether, our experiment results highlight the important role of public information in promoting green housing development, and suggest that in addition to the green building certification, more concrete information is needed to improve dwellers' preference for green housing.

The remainder of this paper is organized as follows. We briefly introduce the institutional background of information dissemination regarding green buildings in China in Section 2. We present how we design our experiment and the basic findings from the experiment in Section 3. In Section 4, econometric models are estimated to better understand the before–after information-treatment WTP change and how such change varies between the dwellers in green and non-green residential complexes after controlling for location and other physical attributes. Section 5 concludes.

2. Information Sources of Green Housing in China

There are three common information sources about green buildings: knowledge cumulated by living in green buildings; non-official information from developers (mostly self-advertisements); and official information from the government (always in the form of green building certifications). Here we introduce the institutional context of the last two information sources in China.

As “greenness” is quite a new concept for most Chinese households and no official certification existed until recently, the primary information source has been developers' self-advertisements. Some real estate developers differentiate their housing products from others by actively advertising the green technologies used in their buildings, such as solar systems, ground source heat pump systems, appliances for natural ventilation and Low-E insulation windows (Zhang et al., 2011), and use words such as “green (*lv-se*)”, “energy-saving (*jie-neng*)” or “environmentally friendly (*huan-bao*)” in their advertisements (Zheng et al., 2012). Sometimes this becomes the developer's key selling point to attract those homebuyers who prefer to buy houses with superior energy efficiency performance or higher living comfort. The presale arrangement in China's real estate market, which allows developers to sell units when they are still under construction, exacerbates the asymmetry information problem for “greenness” – developers may have an incentive to oversell their “greenness” or even cheat on this, while homebuyers can only learn about the true “greenness” (energy efficiency and living comfort) of their units by living in them for a relatively long period of time. This uncertainty in the presale process may reduce homebuyers' incentive to invest in green buildings.

It is widely believed that reliable market signals, such as green building certifications provided by third parties like governments or independent institutions, are a relatively low-cost way to overcome the information problems in the green real estate market, and thus

¹ This developer's website: <http://www.modernland.hk/en-us/index.php?m=page&a=index&id=210>.

² Since this developer is regarded as a “green” developer by the public, people tend to believe that all residential complexes built by it are green, and thus this developer wants to enjoy this spillover effect and save the certification cost.

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