Economic Modelling 61 (2017) 137–146

Contents lists available at ScienceDirect

Economic Modelling

journal homepage: www.elsevier.com/locate/econmod

A green winner's curse? Investor behavior in the market for eco-certified office buildings

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ARTICLE INFO

Keywords:
Green Building
Eco-certification premium
Real Estate auctions
Winner's curse

ABSTRACT

This paper contributes to the growing literature on the economics of green buildings: by merging auction theory and hedonic regression analysis we investigate the relationship between market concentration and price premiums in the American market for eco-certified real estate assets. Auction theory is used to model price formation where eco-investors may differ in their valuation of assets. Controlling for a large number of features, the empirical results provide evidence of a significant and positive relationship between investors' eco-certified market share and prices of eco-certified space. Contributing to the recent debate over the nature of the green premium, we find that eco-investors are creating clientele effects and that they may be subject to a green winner's curse.

1. Introduction

The increase in attention to "sustainable" or "green" building over the present decade has been remarkable. This reflects popular concern with environmental preservation, as well as changes in tastes among consumers and investors. In the real estate sector, a blend of mandatory government regulation and voluntary industry standards has emerged in response to pressure to reduce the negative environmental impact of the building stock. There has been growing interest among real estate investors, developers, occupiers, as well as regulators and policy makers, in the effects of environmental certification on the financial performance of real estate assets. This has motivated, within the growing body of research focused on sustainability issues, a novel research strand specifically focused on certification-related pricing issues.

In particular, a number of studies have found empirical evidence of financial benefits (see for example, Eichholtz et al. (2012) on US, Devine and Kok (2015) on US and Canada, Deng and Wu (2013) on Singapore, Chegut et al. (2014) on UK). Interestingly, the financial value of green buildings does not appear to be limited to operational costs: Eichholtz et al. (2013) and Reichardt (2014) find a premium for the sustainability certification that goes beyond reduced energy and operating expenses. Having said that, because green building certification allows for flexibility and does not entail specific technological requirements and because each type of green building or energy efficiency label is unique, some authors have referred to green certification as a "noisy" signal of building quality (see Fuerst and McAllister 2011b; Kok et al., 2012).

To date, there has been virtually no theoretical research on the nature and causes of such certification premium. In this paper we take a natural first step to address this gap by focusing on the role that the price formation mechanism can play on investors' behavior and on the resulting certification premium. We draw upon standard auction theory to develop a model of optimal bidding behavior for real estate assets; the model generates theoretical estimates of the price premium associated with a given market share. Second, using a database of more than 2700 commercial real estate transactions of Class A offices that took place between January 2007 and March 2012, we test the theoretical predictions of the model by employing hedonic regression analysis; in particular we examine whether eco-investors generally pay additional premiums for eco-certified assets.

Our paper contributes to three different strands of the literature. Firstly, the existing literature on real estate auctions is small, especially on the theoretical side (the usually cited models are those of Quan (1994), Adams et al. 1992, Mayer 1995); our paper contributes to this literature by developing a simple model that gives clean theoretical predictions on the relationship between investor's market share and paid price premium and that could be further applied to other auction-based markets. Secondly, the increasing attention to the environmental impact of commercial real estate has generated a developing body of

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http://dx.doi.org/10.1016/j.econmod.2016.11.007
Received 23 May 2016; Received in revised form 14 November 2016; Accepted 14 November 2016

empirical research that has focused on pricing and in particular on US commercial real estate assets; see, among others, Eichholtz et al. (2010, 2013), Wiley et al. (2010), Fuerst and McAllister (2011a, 2011b) and Miller et al. (2008). Following those contributions, we empirically investigate the eco-certification premium using the large Co-Star database,[1] but our novel contribution is to account for the investor's market share as an explanatory variable of the observed price premium. By doing this, we find that investors with a higher market share of eco-certifies assets tend to pay higher prices, other things equal, therefore we find evidence of a green winner's curse". Thirdly, in the market segmentation literature, there is a longstanding body of work suggesting that the size and nature of the investor base affects security prices. Most notably, explanations of the underperformance of Socially Responsible Investing (SRI) stocks have tended to focus on the impact of negative screening by SRI investors of 'sin' stocks: a decrease in the size of the investor base produces a neglect effect associated with exclusionary screening, lower demand for 'sin' securities, a negative effect on prices and a positive effect on returns. Nevertheless, the growing body of work on the performance of SRI securitized funds has found mixed results; see, among others, Bauer et al. (2005), Renneboog et al. (2008a, 2008b), Nollet et al. (2016) and Shen et al. (2016). In the same spirit of the last two cited papers, our work aims to better interpret the empirically observed non-linearity in the relationship between performance and SRI. Interestingly for the existing literature on Real Estate eco-certifications and on Real Estate Investment Trusts (REITs), we obtain the novel result that a "green winner's curse", rather than buyer type effects or a REIT premium, explains the observed price premium for Energy Star certified Class A offices.

Our findings can be broadly summarized as follows. A perhaps surprising finding is that, in the high quality market segment, eco-certified office space has become part of the mainstream and is no longer a niche product. Eco-certified office space has accounted for almost half of all Class A office space transacted since 2007. In addition, exploiting Co-Star data on investors' market shares, we find evidence for the existence of *eco-investors* (i.e. investors that are positively screening eco-certified office assets): a number of investors have only acquired eco-certified assets in the study period, while others have allocated the vast majority of the expenditure on Class A office to eco-certified offices. In line with previous hedonic studies, we find significant positive price premiums for some eco-certified office properties. However, this is only the case for space that is dual certified by LEED *and* Energy Star. When market share is included as a control in the hedonic estimations, there is no significant price premium for LEED or Energy Star certified stock. Our interpretation of this finding is that higher bids by eco-investors are a significant determinant of the observed price premium for eco-certified space. Our analysis indicates that obtaining a higher market share entails that the investor pays a higher purchase price for each percent of additional market share and that the magnitude of this premium is considerably higher for eco-certified assets acquired by investors with a high market share of eco-certified Class A offices, thereby indicating evidence of a winner curse for eco-investors.

The remainder of the paper is organized as follows. In the next section, we discuss related research on the price effects of screening and of eco-certification in commercial real estate markets. Drawing upon auction theory, the subsequent section outlines a theoretical model of optimal bidding behavior and expected price effects. Data description and empirical analysis follow, together with detailed discussion of the econometric modeling and results. Finally, conclusions are drawn.

[1] Our sample period 2007–2012 is larger than those of the cited papers and therefore we can draw comparisons with their results. It would be interesting to extend our sample period to more recent years, but access to more recent data was not available to us given our funding and the agreements with Co-Star.

2. Background and literature review

Typically, eco-certifications are awarded by a third party to products with a reduced environmental impact compared to a conventional product. In US commercial real estate markets, the two most common voluntary programs are LEED and Energy Star. The LEED Green Building Rating System, developed by the US Green Building Council, consists of a set of standards for the assessment of environmentally sustainable construction. A range of similar rating schemes have emerged in most advanced economies. Typically, the rating systems focus on six broad categories related to: sustainability of location, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality and innovation and design process. There are different levels of LEED accreditation based upon a scoring founded upon the six major categories listed above. In LEED 2009 for new construction and major renovations for commercial premises, buildings may qualify for four levels of certification: Certified, Silver, Gold and Platinum. The Energy Star program tends to be more commonly used for existing buildings and is an assessment of buildings' energy performance. Energy Star accreditation reflects relative energy efficiency and environmental performance since only buildings that are in the top quartile of energy efficiency are eligible for Energy Star accreditation. As our data will show, significant proportion of the buildings (and a larger proportion of space) is dual certified having an Energy Star certification in addition to LEED certification. Recent versions of LEED certification protocols require a minimum Energy Star rating, for example a rating of 65 for existing buildings applying for the LEED-EB label.

There is a growing body of evidence that occupiers of, and investors in, buildings with better environmental performance can obtain a range of benefits. Owners, developers and/or occupiers can benefit from subsidies, tax reliefs and reduced regulatory barriers that have been offered in many jurisdictions. In addition to the above, the other significant tangible benefit to occupiers is lower utility costs regarding energy and water use. More difficult to measure benefits tend to be associated with productivity improvements (lower staff turnover, absenteeism, higher outputs inter alia), reduced obsolescence, lower regulatory risks and reputational rewards. Kats (2003), Singh et al. (2010), and Turban and Greening (1997) are among those showing that enhanced performance can come from energy efficiency, water efficiency, higher-quality outputs, and improved employee productivity (and retention and recruiting). Green buildings may provide other benefits to their owners, including serving as a hedge against climate, regulatory, or other environmental risks. See, for example, Jackson (2010), Deng et al. (2012), Kahn and Kok (2014), Kahn et al. (2014).

Advantages for investors and developers tend to fall into similar categories. The green building literature has investigated geographical diffusion (see Fuerst, 2009; Choi, 2010; Kok et al., 2011, 2012), benefits for different types of occupiers (see Fuerst and McAllister, 2009; Eichholtz et al., 2009) and referred to building buyers, tenants, and employees (Singh et al. 2010) as well as the owning firm's customers and investors (Eichholtz et al., 2012; Chegut et al., 2014) as being stakeholders who might value the green building signal. Matisoff et al. (2016) provide a comprehensive review of literature on the economic motivations for green buildings and green building policies. They argue that the policies towards the certification of green building can be understood as an effort to better align the private costs of buildings with their social costs, where the certification process can verify difficult-to-observe improvements to building performance and its footprint, which might include energy efficiency, indoor air quality, or construction processes; see, among others, Kotchen (2006), Potoski and Prakash (2005), Fuerst et al. (2014), see also Brounen and Kok (2011) and Bond and Devine (2016a, 2016b) for related research on the role played by eco-certifications in the residential sector.

As already mentioned in the introduction, price premiums could potentially offset some of these benefits, but due to problems of data