



# Green label signals in an emerging real estate market. A case study of Sao Paulo, Brazil

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## ABSTRACT

This article investigates how real estate stakeholders price information conveyed by voluntary environmental certification schemes in Sao Paulo, the largest metropolitan area of Latin America. In addition to low incidence of green buildings, the city and many local urban agglomerations in Brazil exhibit weak environmental performance due to limited capacity to enforce existing regulation. Therefore, we exploit the role of internationally accredited third-party environmental audit schemes. In addition to comparing labelled and non-labelled properties in a hedonic framework, we also examine pricing discrepancies related with the intention to certify (registration), but no achievement of actual certification in a timely manner. Our results systematically indicate that labelled office properties in Sao Paulo yield a larger green premium than their peers from developed countries. Findings also suggest that applicants who do not obtain the label upon delivery do not receive any green premiums and may be subject to discounts, depending on specification, beyond that of other non-green office buildings. These findings provide further evidence of the relevance of market diffusion and economic governance linked to the implicit pricing of environmental labels.

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## 1. Introduction

The environmental social governance (ESG) and financial benefits of real estate eco-certifications, such as Leadership in Energy and Environmental Design (LEED), encompasses a wide and growing body of literature. Recent research suggests uniformity of major drivers for green buildings across countries and regions (Darko et al., 2017). However, Qin et al. (2016) identify unique risk factors to China, applicable more broadly to developing countries, such as government bureaucracy and unclear goals for green buildings.

Much of the initial green building literature (e.g. Fuerst and McAllister, 2011a; Eichholtz et al., 2010) identified premiums in developed economies; however, increased market diffusion and

adoption yielded changing premium levels and underlying mechanics in those markets (Robinson et al., 2017; Reichardt et al., 2012). The diffusion literature also references different stages of evolution and developing economies are in an earlier phase of this cycle (Sanderford et al., 2017; Kok et al., 2011). This paper advances the literature in two areas – an empirical analysis the impact of voluntary certifications on the largest urban agglomeration in Latin America and the economic impact between registration for and achievement of an eco-certification.

Labelling schemes in developing economies, like Brazil, represent an important group as these countries hold some of the world's largest metropolitan areas and experience rapid growth in both economic development and greenhouse gas emissions. Some research identifying qualitative motivations for environmental certifications exists. In addition to above, Singh et al. (2015) identify competitive landscape and corporate image as key drivers for adoption of ecologically sound management techniques using an Indian sample. In contrast, Ma and Cheng (2017) employ algorithms to identify which Chinese submarkets could be prominent

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candidates to receive green properties based on economic, demographic and geographical features.

Our sample explores more quantitative aspects of measurable financial benefit for voluntary certification in Sao Paulo (Brazil). The city is the world's 5th largest urban agglomeration with 20.8 million inhabitants (United Nations, 2014a). Sao Paulo's office market was the 12th most expensive in terms of net lease prices worldwide in 2014 and contain 11.5 million sqm of gross leasable area – GLA, almost five times more than Rio de Janeiro, the second city in Brazil (Colliers International, 2014). Given some level of eco-label maturity in the real estate markets of developed countries, investigation of a leading Latin American city may yield new and meaningful insights. For example, inflated premiums could be found through the introduction effect caused by the relative scarcity of labelled properties and the lag between supply and demand for green buildings (Fuerst and Van de Wetering, 2015).

The process of LEED certification for new construction (LEED-NC) involves first registering the intent to certify a new project and then earning certification through a post-construction inspection. During the construction cycle, common practice for most large office buildings establish a reasonable level of pre-leasing which can vary from a small percentage to 100% pre-leased, depending on market conditions. Almost the entirety of the sustainable real estate literature focuses on certified buildings or buildings that have achieved the requirements set forth in the voluntary sustainable standards (Eichholtz et al., 2010).<sup>1</sup> The unique data set used in this paper permits us to address an important gap in the literature, that is to investigate the market consequences, if any, of not delivering an eco-certification after registration. LEED is the prevailing certification scheme in Brazil and representative of other major eco-certifications. While critical evaluations of the LEED certification system have identified a number of areas that require improvements, LEED remains one of the prevailing global standards for environmentally friendly construction and building management. For example, Gou and Xie (2017) argue that many rating systems focus more on a mix of sustainability rhetoric and fixed engineering solutions that are put in place during construction or retrofitting, rather than a continuous benchmarking and measurement process which ensures that tangible reductions in energy consumption and resource use are delivered.

The market may interpret delays or lack of final certification for a registered building as a signal of ineffective management<sup>2</sup>; alternatively, an observed difference in rent may be the realized value of the label in otherwise comparable buildings. Finally, the possibility of contractual reductions as penalties for non-achievement of eco-certification also exists. Of course, some combination of these factors along with unobservable lease level impacts may combine for a discount.<sup>3</sup> Sedlacek and Maier (2012) highlight the role of Green Building Councils (GBCs) in reducing informational problems in real estate markets by creating a label that signals the true quality of a property (not only environmental). Certifying institutions can therefore be viewed as a complementary mechanism of economic governance to developers, occupants and investors. Although the results focus on the importance of GBCs in Brazil, they could perhaps be extended as many of the comparable country's information on building quality or are simply unable to enforce existing regulation. In this context, third-party auditing

schemes from accredited and internationally recognized institutions could provide industry stakeholders an additional assurance above and beyond that of local environmental standards.

This paper explores two research questions. **Does Sao Paulo, Brazil, exhibit greater eco-certification premiums than currently found in developed economies? Does a discount exist for proposed buildings that register for an eco-certification but do not earn the label upon completion in this market?**

The article is structured as follows. The next section provides some background to the research questions. The third section presents the research hypotheses. In the fourth section, we describe the empirical model, the data, the sample and the working method employed. The empirical baseline results and robustness tests are discussed in the fifth section. The final section presents the conclusion.

## 2. Theory

As described above, an eco-label primarily functions as a signaling device between various stakeholders in the real estate market. However, to obtain the label, a developer or building owner must make efforts to fulfill the requirements of the labeling scheme. Investments to meet these requirements may, in turn, lead to additional economic benefits such as lower energy costs or higher worker productivity in the labelled building. Hence, every developer first needs to decide to which level of building sustainability, if any, they would like to aspire. This decision and the profit maximization strategy ensuing from it can be written in Cobb-Douglas form as follows:

$$E(\pi_n) = \alpha \sum_{n=1}^N (g_n^\beta + x_n^\gamma) \quad (1)$$

where  $E(\pi_n)$  is the expected developer's net operating income (NOI) on a building project  $n$  which comprises a level of greenness ( $g$ ) along with all other characteristics of the building ( $x$ ). Next, the developer decides on a budget allocation that distributes the available funds to sustainable building features and other characteristics with weights  $\beta$  and  $\gamma$ , respectively, to maximize its expected NOI.<sup>4</sup> The developer's investments are profitable under the condition:

$$E(\pi_n) : p \leq \sum_{n=1}^N (g_n^\beta + x_n^\gamma) \quad (2)$$

The chosen level of sustainability enters the developer's building specification comprising of a number of general property characteristics such as location, building specification, planning, occupation, *inter alia*. Some of these factors are correlated with sustainable features (Alencar et al., 2017). For example, a LEED Platinum certified office building is likely to be in a prime location and to be larger, better maintained and better managed than properties without the label or with a lower level of the label. Matisoff et al. (2014) use firm production functions to show that higher sustainability or energy efficiency ( $g$ ) not only entails lower energy consumption and other tangible impacts which affect the balance sheet but also creates a competitive advantage for a firm as it is able to signal its greenness to consumers and clients. This signaling effect is particularly important for business relations with

<sup>1</sup> Standards such as Building Research Establishment Environmental Assessment Method (BREEAM), Energy Star, LEED, among others.

<sup>2</sup> Non-achievement of a label may suggest failure to qualify or may also be the case that certain applicants do not necessarily pursue the label after registration. Those two scenarios are not observably different.

<sup>3</sup> While unobservable to the authors, reductions in face rent as a consequence for lack of final certification are possible clauses in pre-leases.

<sup>4</sup> According to the income capitalization method, in which the value of a building is equal to the present value of expected NOI (RICS, 2008), the developer can maximize property value by increasing its cash flow stream.

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