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Expropriation risk and housing prices: Evidence from an emerging market

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ABSTRACT

This paper examines the microeconomic determinants of residential real estate prices in Caracas, Venezuela, using a private database containing 17,526 transactions from 2008 to 2009. The particular institutional characteristics of many countries in Latin America, and Venezuela in particular, where land invasions and expropriations (with only partial compensation) have been common threats to property owners, provide us with an opportunity to test the effects of these risks on housing prices using a unique database. The effect of these risks on property prices is negative and significant. To our knowledge, this is the first attempt to quantify these impacts in the Hedonic pricing literature applied to real estate. Size, the number of parking spaces, the age of the property, the incidence of crime, and the average income in the neighborhood are significant determinants of prices. Finally, this paper analyzes the microeconomic determinants of housing prices at the municipal level.

1. Introduction

This article examines the microeconomic determinants of the price (per square meter) of housing in Caracas, Venezuela. By doing so, it builds a framework of reference for investors who can use it to determine the price of a property based on its attributes; for owners, who may apply it to determine the value of their properties and the characteristics that drive their values; to developers, as they can estimate the optimal combination of attributes a property should have in order to maximize their benefits; to banks, who will have an objective methodology of valuation of assets that will serve as a guarantee for the delivery of a possible credit; and, finally, to policy makers, who can gauge, among other findings, the negative impact that invasions and expropriations may have on property prices. This is the first study of this type performed in Caracas, the largest real estate market in Venezuela and the fourth largest economy in Latin America. It is also the first article that measures the effect of expropriations and invasions on the prices of (neighboring) houses.

The authors analyze the microeconomic determinants of the price of housing in the metropolitan area of Caracas and the magnitude of their effects from 2008 to 2009. The article is divided into four sections. The first section develops a conceptual framework concerning the valuation of real estate assets using a Hedonic pricing model and provides the background, functional forms, and the most important conclusions found in the literature. The next section describes the main components of the data, as well as the descriptive statistical indicators. The authors present their adaptation of the model to the analysis of this particular data set and present the results for the metropolitan area of Caracas and for each of the five municipalities that comprise it in the third section. Finally, the main empirical results are highlighted and the conclusions are provided in the last section.

2. Literature review concerning the Hedonic pricing model

This section develops the framework for real asset valuation using a Hedonic pricing model, its background, the different functional forms this model may take, and some of its most important contributions.

2.1. The Hedonic pricing model

The idea behind Hedonic pricing is simple. If a property is made up of a series of attributes (which may be heterogeneous), then its market price must be an aggregate of the individual prices of all of them. The Hedonic pricing model is relatively straightforward as it is based on actual market prices and, if data are readily available, it can be relatively inexpensive to apply.

Unlike the majority of economic goods, buildings are characterized as being heterogeneous goods, something that makes them virtually unique and unrepeatable. However, what is known in the market is the composite price that contains no information regarding the marginal prices of the attributes that build it up. It is necessary to determine the implicit price (i.e., the Hedonic price) or contribution

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of each of these attributes within the total price due to their high heterogeneity and ease of differentiation.

Regression analysis based on the Hedonic pricing model has been used at length in the housing economics literature to analyze the relationship between the price of a unit of real estate and its attributes. A review of the use of the Hedonic model in real estate research can be found later in this section.

2.2. Microeconomic foundations of the Hedonic pricing model

Many authors place the origin of the Hedonic pricing methodology in the work carried out by Court (1939) for the determination of prices in the automotive market (Sirmans, Macpherson, & Zietz, 2005). Others place the origin of the Hedonic pricing methodology 17 years earlier, when Hass (1922) applied it to the calculation of the prices of cropland. Wallace (1926) continued this line of research in Iowa. Three years later, an application of the Hedonic pricing model was also found in a study of the quality of vegetables by Waught (1929). The common goal of these works is to analyze the price of a good by studying variations in the quality of the product, as represented by certain characteristics or attributes.

Subsequently, Houthakker (1952) and Tinbergen (1956) sought to build a theoretical formulation to justify the relationship between price and quality, which was eventually developed by Lancaster (1966) in his new approach to the consumer theory. This laid down the theoretical foundations supporting the Hedonic price model (i.e., that consumers derive their utility from the characteristics of a property and not from the properties themselves).

Later on, in 1974, Rosen (1974) provided the microeconomic foundation to the theory of Hedonic pricing and extended the research of Lancaster (1966) to real estate, which would become the paradigm of the Hedonic approach. This work closely follows the approach proposed by Rosen (1974). The Hedonic regression allows the estimation of a set of points in the intersection of the demand curves of different consumers, with different tastes, and supply functions of different firms with (probably) different production technologies. Rosen (1974) argues that the coefficients of the Hedonic regression can be interpreted as an approximation of the demand or supply (or neither). Indeed, if consumers are identical (in terms of income and tastes), but suppliers differ between them, the resulting Hedonic regression will look similar to a demand curve. Alternatively, if the suppliers are identical in terms of their cost structure and the consumers are different, the estimated parameters will be an approximation of the structure of the supply. However, if consumers and suppliers are heterogeneous (i.e., they have different distributions), the estimated coefficients of the Hedonic regressions should be interpreted as the equilibrium prices of those attributes.

2.3. Functional forms

Neither the model developed nor subsequent contributions to Rosen (1974) have established a criterion for selecting a functional form that provides better results. This problem, in essence, has become an empirical question. In order to assess the appropriateness of different functional forms, one would have to know the true marginal contribution of (consumer's willingness to pay for) attributes and to contrast that with the gradient of the particular Hedonic price function. The obvious difficulty in obtaining such data has led to the widespread use of goodness-of-fit. Traditionally, the most commonly used functional forms have been the linear, semi-logarithmic, and the double-logarithmic.

In 1964, Box and Cox provided a theoretical tool to determine the exact functional form from the following general expression:

$$P^{\alpha} = c + aX^{\alpha} + bY^{\alpha} + dZ \tag{1}$$

where α represents the coefficient of Box and Cox (1964) and whose determination provides the requested functional form. Eq. (1) adopts the linear form when α is one, and the logarithmic form when α is zero. Empirically, the hypothesis of a linear relationship has been ruled out, finding values of α close to zero leading to the conclusion that the functional form tends to be very approximate to the logarithmic form (Figueroa & Lever, 1992). This means that the impact of changes in the explanatory variables on the price tends to decline as the variable increases and vice versa.

From a theoretical standpoint, Cropper, Deck, and McConnell (1988), carrying a simulation where consumers bid for fixed housing stock, arrive at the conclusion that the Box and Cox (1964) transformation provides the most accurate estimates of marginal attribute prices when all attributes are observed (perfect information). When variables are not observable or are instead represented by a proxy, a simple linear Hedonic price function consistently outperforms the Box and Cox (1964) function, which provides biased estimators of hard-to-measure attributes. We have chosen a linear Hedonic price function as their interest lies in evaluating the impact on housing prices of a number of variables particular to the Venezuelan market and they are either not fully observable (expropriation and invasions risk) or do not belong to the realm of knowledge readily available to the average house buyer (homicide per 100,000 inhabitants, average income per family).

The functional form most recommended in the literature is the semi-logarithmic form as it fits particularly well to the data. Additionally, the coefficients can be interpreted as the percentage increase in the price of a good to a variation of a unit in the independent variable (Coulson, 2008; Halvorsen & Palmquist, 1980). For characteristics with binary measures, this interpretation is valid if the estimated coefficient has a small value.

2.4. Review of Hedonic applications in the housing market research

Every housing unit has a distinct price that is determined, in part, by the overall supply and demand conditions in the local housing market, but also by the different collection of attributes it embodies. Hedonic analysis does so by assuming that each attribute has its own market that is, in turn, governed by a supply and demand of its own. Therefore, each characteristic has a Hedonic price.

Numerous authors have used Hedonic applications to analyze the effects of observable attributes or macroeconomic variables on the housing market. Kim and Park (2005) study the determinants of housing prices in Seoul (South Korea) and its nearby cities, finding that the key determinants of changes in housing prices are the price index, changes in the money supply, construction area permitted, and the performance of the stock and bond markets. Wen, Jia, and Guo (2005) construct a Hedonic model of urban housing prices in the city of Hangzhou (China), dividing the characteristics of the property in three components: 1) structure, 2) neighborhood, and 3) location. Selim (2008) analyzes the determinants of the prices of homes in Turkey finding that access to water, number of rooms, size, and type of construction are the variables that most affect the price of houses. Nuñez, Ceular, and Millan (2007) confirm that the location, area, parking space, and age of a property are statistically significant determinants of the price of a house in the city of Córdoba, Spain. Finally, Keskin (2008) determines that the price of houses in Istanbul (Turkey) is determined by four types of characteristics: 1) ownership, 2) socio-economic environment, 3) quality of the neighborhood, and 4) geographic features. A number of authors have applied the Hedonic methodology to analyze the value of attributes within the housing markets of their respective country or city of location. Aguiló Safe (2002) examined the Balearic Islands (Spain), Chattopadhyay (1999) explored Chicago (U.S.), Meese and Wallace (2003) analyzed Paris (France), Figueroa and Lever (1992) examined Santiago (Chile), and Marquez (1992) used Guanare and Maracaibo (Venezuela). Additionally, Coulson (2008) presents a comprehensive