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Public provision versus private provision of industrial land: a hedonic approach

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Abstract

This study examines the factors that explain the differences observed between the industrial land prices offered by the public sector and those offered by the private sector by means of estimating three hedonic pricing models. The results obtained show that location, defined as the distance to a highway, the distance to the city business district and the distance to the capital of the province, have an important impact on industrial land value. However, this impact is greater when private developers provide the land. Other variables considered, such as who is behind the provision of the industrial land, have an important impact on sale prices.

Keywords: Industrial land value; Public provision; Hedonic prices; Box and Cox transformation

Introduction

The provision of industrial land by public bodies can play an important role in the development of an economic territory, improving a previously unbalanced situation characterised by geographical differences. In fact, the public sector frequently tries to complement the private supply of industrial land, but the latter pursues different targets and, therefore, does not consider attractive some locations characterised, among other things, by a worse access to highways and small size of the towns where the industrial land is located. This fact, together with others, implies that the price charged by public and private developers is different for parcels of industrial land of similar size.

This paper employs the hedonic pricing model developed by Rosen (1974) to determine the impact of the different attributes of a parcel of industrial land, provided by both the public and private sectors, on industrial land prices in the Comunidad Valenciana region (Spain). This method relies on the proposition that an individual's utility for a specific good is based on the attributes that it possesses. Furthermore, this technique assumes that the price of the good can be decomposed into those different attributes and it is therefore possible to assign an implicit price to each attribute considered.

Many studies have applied this methodology previously. The majority of them have focused on the housing market, seeking to obtain the willingness to pay for negative externalities, such as traffic noise, air pollution and the proximity to open spaces, etc. (see, for example, Won Kim et al., 2003; Des Rosiers, 2002; Geoghegan, 2002; Boyle and Kiel, 2001; Din et al., 2001; Harrison et al., 2001; Wilhelmsson, 2000; Bolitzer and Netusil, 2000; Palmquist and Israngkura, 1999; Powe et al., 1995; Hughes and Sirmans, 1993; Palmquist, 1992). However, the number of studies that have attempted to decompose the price of industrial land—or industrial property—as a function of its different attributes is considerably lower. This line of research has mainly taken place in the United States. Contributions in this area include the seminal study carried out by Ambrose (1990) who examined the effects of physical and locational characteristics on industrial property prices. Similar research was carried out by Kowalski and Paraskevopoulos (1990, 1991) and Lockwood and Rutherford (1996). The former, analysed the impact of spatial variables and time-related variables on industrial

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land in Detroit (USA), while the latter used a different approach that dealt with estimation issues concerned with the econometric analysis of industrial prices. Another paper, written by Colwell and Munneke (1997), confirmed that land prices are concave in parcel size, which has profound implications for estimates of the rate at which land price declines with distance. More recently, Thompson and Tsolacos (2001) provided evidence that land values play an important role in the determination of industrial rents. Finally, another suggestive line of research deals with the effects of environmental pollution on industrial property sale prices, as in the research conducted by Jackson (2002). He found evidence that industrial properties with irremediable pollution transact at prices approximately 30% less than unpolluted properties.

The analysis of the industrial land market with the hedonic method is quite complicated in comparison to the typical case of the housing market. In particular, it is necessary to stress that it is difficult to obtain nation-wide land value series given that the value of industrial land is mainly a local market issue. Likewise, the lower number of transactions carried out along with the dispersion of the data which, due to coming from different sources (public and private), also makes the analysis more difficult.

The paper is structured as follows: the second section introduces the hedonic technique and the underlying assumptions. The next section presents the case of study, i.e. the industrial land market in the Comunidad Valenciana region. With this purpose we have obtained 343 observations of industrial property transactions carried out in different towns in the Comunidad Valenciana, provided by both the Public Administration as well as the private sector. The results obtained from the empirical analysis are presented in the fourth section. The purpose there is to identify what characteristics explain the observed differences between the price of industrial land of public and private provision. In particular, it is necessary to highlight that in this latter case the proximity to highways has a more marked effect on industrial land prices than in the case of the land provided by the public sector. The last section shows the main conclusions drawn from this analysis as well as the policy implications that derive from it.

The model

As Rosen (1974) formally demonstrated, the hedonic technique allows us to estimate the implicit price of the different attributes that compound a heterogeneous good. This method relies on the idea that the sets of characteristics that compound a composite good have an effect on their market prices. It is therefore assumed that the price of the composite good can be decomposed as a function of its different attributes, making it possible, therefore, to assign an implicit price to each attribute once the hedonic equation has been estimated.

The price of a parcel of industrial land can be considered a composite good, as its price depends on a set of different attributes, which can be divided into three main categories. In the first place, we have to consider structural attributes, such as the lot size, its usable space, highway exposure, whether or not the land (once bought) can be divided into smaller parcels, etc. Secondly, sale prices can also be affected by institutional characteristics, such as who provided the industrial land: public or private agencies. And thirdly, other factors related to its location, which can have a strong influence on sale prices, such as the distance or accessibility to a highway, the distance to the central business district, or the distance to the closest airport, etc.

If we assume that the industrial property market is in equilibrium and that the sale price of a parcel of industrial land can be represented by Eq. (1), where r_i is the price of the ith parcel, Z_1 is a vector of structural characteristics, Z_2 is a vector of institutional characteristics (who provided the industrial land) and Z_3 is a vector of location characteristics

$$r_i = r(Z_1, Z_2, Z_3). \tag{1}$$

Assuming now that there is perfect competition and that the firm that buys a single parcel of industrial land, maximises a profit function like the one that follows:

$$\pi = pX(L, z_{11} \ldots z_{1n}, z_{21} \ldots z_{2n}, z_{31} \ldots z_{3n}) - wL - r(z_{11} \ldots z_{1n}, \ldots z_{21} \ldots z_{2n}, z_{31} \ldots z_{3n}), \tag{2}$$

where pX are the revenues of the firm that are a function of the factors used (in this case, labour and industrial land for simplification purposes) and w and r are, respectively, the cost of labour and industrial land. Then, if the price of labour is normalised to one, the partial derivative of the hedonic price function with respect to a specific attribute (for example, z_{2i}) is equal to the marginal substitution rate between the considered attribute and labour as is shown in the equation

$$\frac{\partial X/\partial z_{2i}}{\partial X/\partial L} = \frac{\partial r}{\partial z_{2i}} \qquad i = 1, \ldots, n \tag{3}$$

therefore, the partial derivative of the hedonic price function with respect to z_{2i} is interpreted as the marginal price of this attribute, that is, all else being equal, the cost of having a marginal increase in that characteristic.

Case of study: the market of industrial land in the Comunidad Valenciana

In the Comunidad Valenciana three models for promoting industrial property can be said to exist, by considering whom the land is being sold by. This