



House price depreciation rates and level of maintenance

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Abstract

My objective in this paper is to estimate different depreciation rates of house prices depending on the level of maintenance of the property and the location of the property. I do this by supplementing transaction price data with owner information about level of maintenance. The result indicates that the level of maintenance has a substantial impact on the price level. Since maintenance offsets some of the physical deterioration of the property, the depreciation rate will be lowered by maintenance, *ceteris paribus*. To be able to estimate maintenance effects on depreciation rates, I isolated the interaction effect between the level of maintenance and the age of the property to allow for the fact that maintenance has an impact on the effective age of the property. In this study, I separate maintenance into indoor and outdoor maintenance levels (or absence of maintenance).

My results show that the depreciation rates are significantly different for a maintained property and for a property that is not maintained. The price difference between a 40-year-old property (built in 1960) and maintained both indoors and outdoors and a property of the same age that is not maintained is about 13% (–10% compared to –23% in total age effect). The absence of outdoor maintenance has more impact on price depreciation rates.

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1. Introduction

Analysis of depreciation rates and level of maintenance is important, among other things, since housing depreciation may bias the estimation of the consumer price index, real estate price indices, appraisals, and tax assessments. Increased knowledge of economic depreciation is also important for assessing public policies see e.g., [Malpezzi et al. \(1987\)](#) and [Smith \(2004\)](#).

Why does a property depreciate over time? Depreciation can be caused by three different reasons, namely, physical deterioration, functional and external obsolescence. Functional obsolescence is due to technological changes and layout designs. External obsolescence may result from changes in the neighborhood, such as changes in traffic volume. Both of these are difficult for the owner to have any impact on. On the other hand, the owner of the property can reduce physical deterioration by maintaining the property. Therefore, depreciation of the value of a property is to be expected as the property gets older and older, but good maintenance may decrease the depreciation rate. However, it is not possible to reduce the depreciation rate to zero as functional and external obsolescence is always present. [Clapp and Giaccotto \(1998\)](#) define depreciation as “the decline in value with respect to age because of increased maintenance costs and decreased usefulness.” However, there is also a vintage effect, that is, a price appreciation over time due to design and preferences, which may offset the negative effect of age over time. Thus, it is important not to mix the concepts of age depreciation effects and vintage effects. The vintage effect is defined as housing and neighborhood characteristics correlated with a certain construction year. [Asabere and Huffman \(1991\)](#) investigated the vintage effect by analyzing the price difference between properties inside a historically interesting area and properties outside the area. They concluded that there is such a difference and they estimated it to be around 25% of the value.

My main objective here is to estimate different house price depreciation rates depending on the level of maintenance of the house. My contributions presented in this study compared to earlier studies are: first, I measure the effect of both indoor and outdoor physical deterioration; second, I divide physical deterioration into the need for upgrading the kitchen and the laundry room, changing the electrical system and the drainage systems. Third, I analyze whether depreciation rates differ across different sub-markets within a housing market; and finally, I use spatial econometrics to take care of potential spatial autocorrelation.

The disposition of the paper is as follows: Section 2 includes a brief literature review and Section 3 presents the theory and methodology used in the study. Sections 4 and 5 present the data and the econometric analysis. Section 6 summarizes and concludes the paper.

2. A brief literature review and our contribution

The use of the age of a property as a proxy for its depreciation is usual in traditional hedonic pricing models including non-housing models such as analysis of VCR (e.g., [Silver, 2000](#)) and wine (e.g., [Angula et al., 2000](#); [Malpezzi et al. \(1987\)](#) present an extensive review of the housing literature on depreciation and housing prices. Their main objective was to estimate the rates of depreciation and how it varies across housing markets. The conclusion they drew from their literature review is that estimated depreciation rates vary

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