

Outlook

Inconsistent Effects of a Feature on Home Prices—Lang’s Two-Market Explanation

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Abstract

In his 2005 article “Valuing the Suburbs: Why Some ‘Improvements’ Lower Home Prices,” Robert E. Lang proposes an explanation of why improvements to a home may either add to or detract from its value. He suggests a dual housing market: “one for conventional low-density suburbs, and one for cities and denser suburbs” (8). The former values features implying a natural or less intense use, and the latter values features adding “intensity or utility to a property” (8).

This article reinterprets Lang’s explanation as an example of interaction (something having a different effect under one condition than it does under another) arising via summation followed by a nonlinear function of the result. An alternative explanation in terms of the fit between characteristics of a home and its location is also noted.

Keywords: Alterations; Markets; Prices

Introduction

According to Robert E. Lang (2005), improvements that would be expected to add value to a home sometimes surprisingly detract from it. To explain this phenomenon, he proposes a dual housing market: “one for conventional low-density suburbs, and one for cities and denser suburbs” (8).

The former values features that are natural or less intense, while the latter values features that “add intensity or utility” to the property (8). Consequently, an improvement paradoxically reduces a home’s value when it is a city-like improvement in a suburban area. Lang also links the negative price effects of some home improvements to the rules of homeowners associations.

His empirical evidence is based on a multiple regression analysis conducted by Sirmans and Macpherson (2003) with a largely suburban sample. His evidence came from negative effects on the price of suburban homes that were characterized by an intensive (i.e., urban) use or utilitarian features such as a home office, a sidewalk, or fencing, all associated with cities. As Lang points out:

What may be going on is a bias by purchasers of single-family detached houses against property characteristics that violate a suburban ethos....Uses that add intensity or utility to a property run counter to the suburban ethos....Yet not everyone has an anti-urban bias....The most likely answer is that dual housing markets exist: one for conventional low-density suburbs, and one for cities and denser suburbs....Some suburbanites show a preference for city living, including higher density housing....A distinct housing niche exists for cities and city-like suburbs....Suburban homes that have some urban elements may not be in high demand....Houses that have city features (even sidewalks) are neither fish nor fowl—they can be out-cited and out-countried....Doing urban development halfway may produce environments that please no one. (7–9)

Talen quoted Lang approvingly, concluding that “supporting diversity through design will need to involve serious consideration of the overall context of particular neighborhoods. It will require balancing design principles of place diversity with the appropriate, *corresponding* conditions” (2006, 245) (emphasis added to draw attention to an implied idea of inconsistency of effects). See also Kestens, Thériault, and Des Rosiers (2006), and the references cited therein, on differences between different locations or different types of purchaser in the value placed on the various features of a home. Surely it is not surprising that such heterogeneity exists, even if there is conceptual and technical difficulty involved in confirming it.

This article will look at Lang’s hypothesis from a new angle, relating it to what is termed interaction between independent variables (e.g., city versus suburban locality and presence versus absence of an urban feature) in their effect on a dependent variable (such as house price). No attempt is made

to question the finding or to examine the definitions of the variables or the method of analysis. The focus is on Lang's article and refining the findings, without discussion of the extensive literature on housing submarkets.

The meaning of interaction

In econometrics, statistics, and many other fields, interaction between two independent variables means that each has a different effect depending on what the other is. Suppose that the prices (the units are irrelevant, but might be thousands of dollars) of otherwise similar houses in four conditions are as shown in equation 1.¹

| | Factor B | | |
|----------|----------|---------|-----|
| | Absent | Present | |
| Factor A | | | |
| Present | 200 | 210 | |
| Absent | 220 | 200 | (1) |

Here, the presence of B increases the dependent variable by 10 (from 200 to 210) when A is present, but reduces it by 20 (from 220 to 200) when A is absent. This can be expressed the other way: The presence of A increases the dependent variable by 10 (from 200 to 210) when B is present, but reduces it by 20 (from 220 to 200) when B is absent. In the current context, A might refer to the urban-ness of the location and B to an urban feature of the home. The prices observed are those in equation 1, showing the interaction of factors A and B. Thus, the problem Lang is addressing is the reason interaction occurs.

Dual housing markets

Lang refers to his explanation as dual housing markets. In brief, here is what he says. Although houses have a lot of characteristics and so do locations, a useful simplification is to say that one dimension of relevance to buyers is how urban a house is (that is, the number of city-like features it has) and how urban a location is. More specifically, one of the things that can explain the price of a house is the total amount of urban-ness of that house in that place. The total equals the amount of urban-ness that the house has, plus the amount of urban-ness that the location has.

¹Equation 1 refers to prices observed for otherwise similar houses in four conditions.

Further, it so happens that there are two types of buyers. One likes a lot of urban-ness, and the more there is, the more this buyer will pay. The other dislikes urban-ness, and the more there is, the less this buyer will pay. For a house with low urban-ness in a suburban location, a seller can extract a high price. For a house with high urban-ness in a city location, a seller can also extract a high price. A house with low urban-ness in a city location or with high urban-ness in a suburban location will command only a low price.

This explanation has two parts: First, the city-like features of the house and the location are added together to give the total amount of urban-ness, with price being a U-shaped function of the sum. (U-shaped means simply that the function first decreases and then increases: It could be U-shaped, V-shaped, asymmetric, or irregular. The point is that it is high for low urban-ness, low for intermediate urban-ness, and high for high urban-ness.) Second, behind this, the reason for the U-shaped function is that some prospective buyers prefer as many city-like features as possible, whereas others prefer as few as possible.

To make the mechanism more explicit, here are the offers made by two different prospective buyers. As before, A refers to the urban-ness of the location and B to some urban feature of the home. One prospective buyer prefers urban features, and so the presence of A and B are both valued positively. The prices this buyer will offer for four versions of an otherwise similar house might be as shown in equation 2.²

| | | Factor B | |
|----------|---------|----------|---------|
| | | Absent | Present |
| Factor A | Present | 200 | 210 |
| | Absent | 190 | 200 |

(2)

Further, suppose another prospective buyer prefers a home with suburban-like features, so A and B are both valued negatively. The prices this buyer offers might be as shown in equation 3.

²Equation 2 refers to prices offered by a particular prospective buyer for otherwise similar houses in four conditions.

| Factor A | Factor B | | |
|----------|----------|---------|-----|
| | Absent | Present | |
| Present | 200 | 180 | |
| Absent | 220 | 200 | (3) |

Neither (2) nor (3) shows interaction.³ But the seller would naturally accept the higher bid. Under the four conditions, given offers of 200 and 200, 200 is the best price available; if 210 and 180 are offered, 210 is higher; if 190 and 220 are offered, 220 is higher; and given offers of 200 and 200, 200 is again the best price available. Houses with urban features in city areas are bought for high prices by Buyer 1, who values such features; houses with suburban features in suburban areas are bought for high prices by Buyer 2, who values these features. The other combinations go for lower prices to either type of buyer.

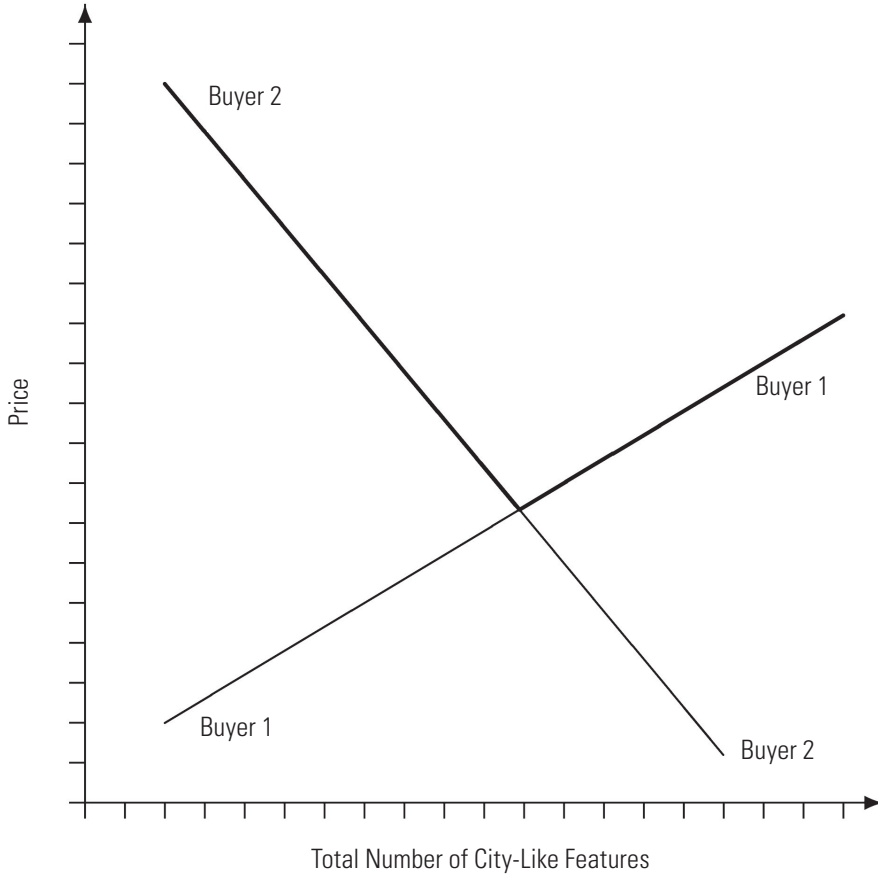
For Buyer 1, the one who prefers urban features, what a home is worth is an increasing function of city-like features. (It might be a steady increase, or alternatively it might be a sharp jump, with too few city-like features effectively being a deal-breaker. Future research could elaborate on this.) For Buyer 2, the one who prefers suburban features, the worth is a decreasing function of city-like features. The property is sold to the buyer who offers more, and the observed selling price is the greater of the two functions referred to. As city-like features increase, the price first falls but then rises once the increasing function has become greater—and thus the U-shaped dependence emerges.

Figure 1 illustrates two functions of the number of city-like features, one increasing and the other decreasing. (These might be straight lines as in the figure, but could be something else as well.) The greater of these first decreases, then increases. And the inclusion of more prospective buyers, provided the price they are prepared to pay in each case is either an increasing function or a decreasing function of the number of city-like features, will still lead to the same general shape (first falling, and then rising).

Thus two classes of prospective buyers (who operate in what Lang refers to as dual housing markets) will mean that price is (roughly) a U-shaped function of the number of city-like features, even though this is not so for each

³In the first row of equation 2, $210 - 200 = 10$. In the second row of equation 2, $200 - 190 = 10$, the same as in the first row. That is, there is no interaction. In the first row of equation 3, $180 - 200 = -20$. In the second row of equation 3, $200 - 220 = -20$, the same as in the first row. That is, there is again no interaction.

Figure 1. Dependence of Price on the Number of City-Like Features



Notes: For one prospective buyer, value increases. For a second prospective buyer, value decreases. The price available to the seller first decreases and then increases (heavy line).

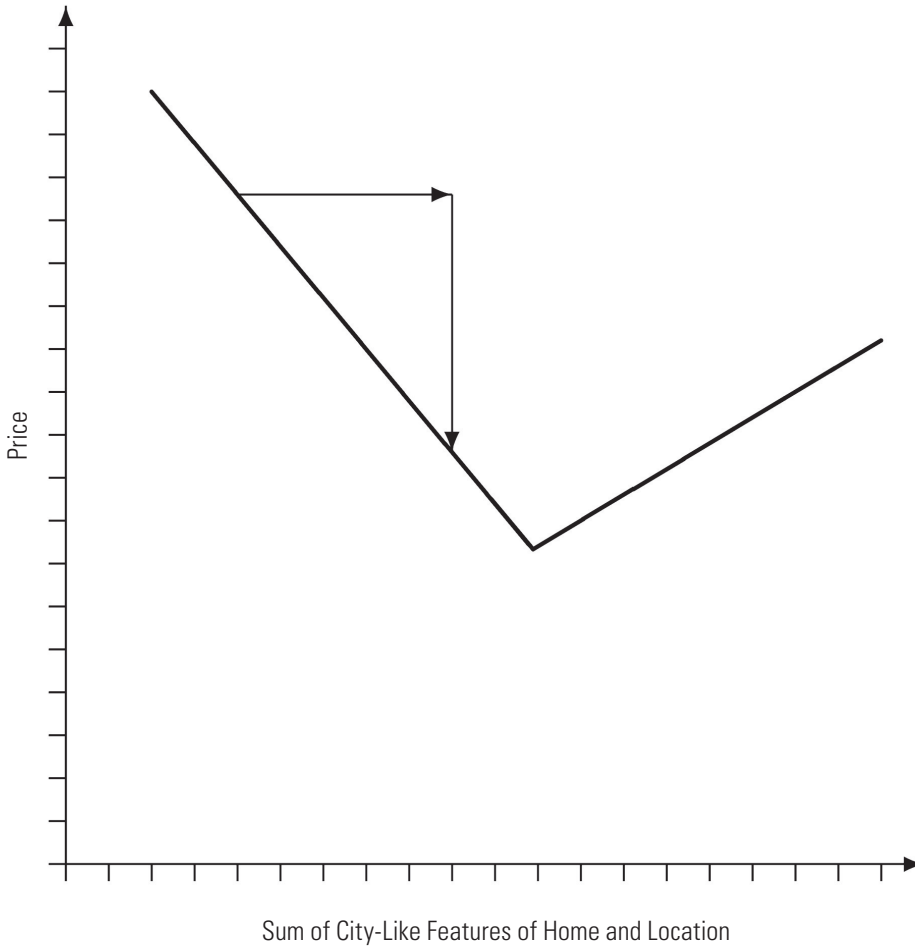
class separately. The city-like features can occur in two bundles involving home and locality, and interaction between them will be observed. To express it mathematically, let x_H and x_L be the number of city-like features of a house and its location, respectively. Lang's hypothesis is that price is a U-shaped function of the sum ($x_H + x_L$), and the surprising possibility of an increase in city-like features leading to a decrease in price is illustrated in figure 2. This is similar to the mechanism of interaction arising via a nonlinear function of a sum, described in general terms by Hutchinson (2006): Quantities associated with category i of factor A and category j of factor B add together to give a sum S_{ij} for that combination of categories, and the observed dependent variable Y_{ij} depends on S_{ij} nonlinearly. The special features of the present example are that sum S has a particular interpretation (the total urban-ness, from the addition of home features and locality features) and that there is a particular hypothesized process giving rise to the nonlinear function (the greater of an increasing function and a decreasing function). The latter could possibly be relevant in other circumstances where a seller accepts the highest offer and perhaps more widely where some process of selecting the greater of an increasing function and a decreasing function takes place.

Comments on Lang's hypothesis

To examine Lang's hypothesis further, and to attempt to generate alternatives to it, I propose a pair of conditions not yet discussed: both factor A and factor B being partially present. That is, there is a house with an intermediate number of city-like features in an area intermediate between city and suburb. According to the interpretation of Lang's hypothesis given in the previous section, this combination would be intermediate in total number of city-like features, and the price of such a house would be low.

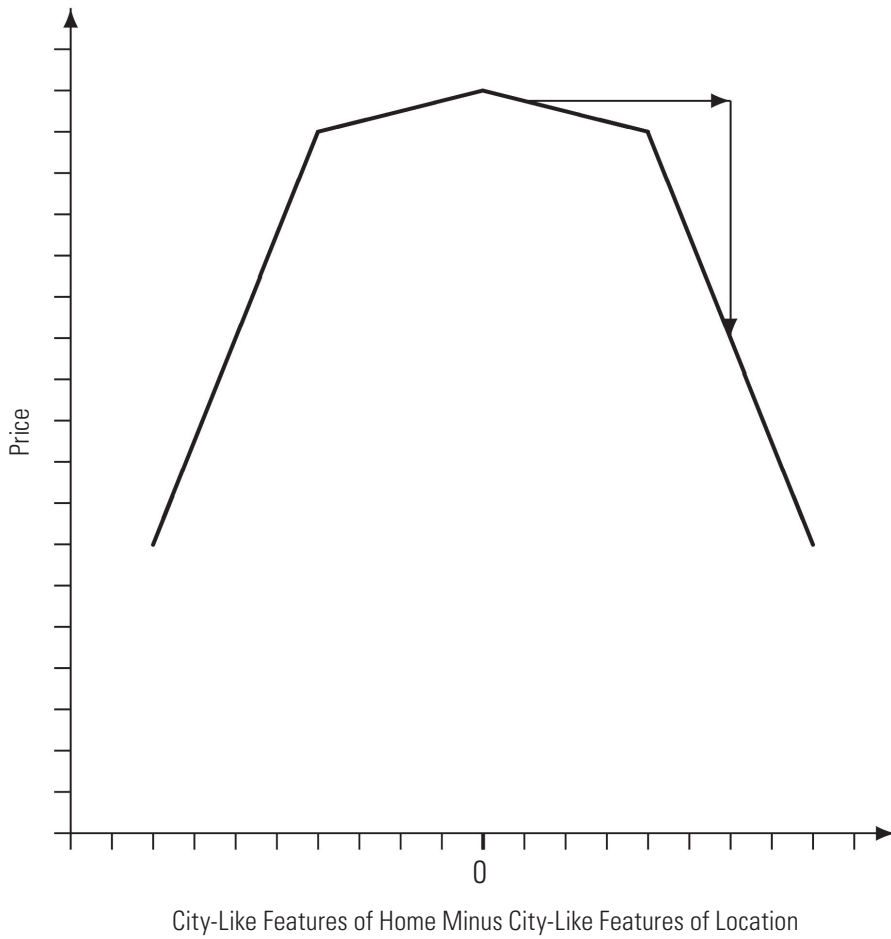
A different hypothesis posits that what matters is the fit between the features of a house and the environment in which it is located: City-like house features in the city and suburb-like house features in the suburbs are both good fits and lead to relatively high prices. If this is correct, an intermediate number of city-like features in an area intermediate between city and suburb would also be a good fit and would lead to a high price—a different prediction from Lang's. Under this hypothesis, the important quantity is the difference between the number of city-like features of a house and its location; the price is high when the difference is close to zero and lower when it is farther from zero. For a suburban house in a suburban area, figure 3 shows that an increase in city-like features leads to a decrease in price.

Figure 2. Lang's Hypothesis



Notes: What matters is the sum of city-like features of the house and its location (horizontal axis). As this increases, the price first decreases and then increases. (The function is shown as two straight lines only for convenience.) For suburban areas, this is small, and the left limb of the function is relevant: An increase in city-like features leads to a lower price.

Figure 3. Hypothesis of Fit: House Features and Location



Note: What matters is the difference between the city-like features of the house and its location (horizontal axis). As this gets farther from zero, whether positive or negative, the price decreases. (The function is shown as four straight lines only for convenience.) For a suburban house in a suburban area, the difference is small, and an increase in city-like features leads to a lower price.

I hope that I have correctly represented Lang's hypothesis and that the description just given is a refinement that demonstrates the greater potential of the idea Lang presented. In addition to the division in the market that he envisages, there could be divisions between such groups as those who want as much or as little public transportation as possible, those who want to live in a high-rise apartment with the best view and those who want to live as close to ground level as possible (close to mixed use with retail and entertainment), and those seeking proximity to as many or as few facilities targeted at a particular ethnic group as possible.

The policy recommendation that Lang makes is to avoid compromise: to choose between the conventional suburban and the New Urbanist design packages, but not to flounder half-way between. But if his hypothesis is mistaken and the reason that some improvements surprisingly reduce a home's value is instead a poor fit between the improved house and the environment in which it is located, this conclusion would not follow. Rather, where there is an area intermediate between city and suburb, what will command the highest price is a house with an intermediate number of city-like features.

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