

NATIONAL ASSOCIATION OF

REALTORS®

National Center for Real Estate Research

The Composition of Hedonic Pricing Models: A Review of the Literature

G. Stacy Sirmans
David A. Macpherson
Florida State University

December 2003



NATIONAL ASSOCIATION
OF REALTORS®

The Voice For Real Estate®

**THE COMPOSITION OF HEDONIC PRICING MODELS:
A REVIEW OF THE LITERATURE**

by

**G. Stacy Sirmans, PhD
Kenneth G. Bacheller Professor of Real Estate
Department of Insurance, Real Estate and Business Law
College of Business
Florida State University
Tallahassee, Florida 32306-1110
(850) 644-8214 (Phone)
(850) 644-4077 (Fax)
ssirman@garnet.acns.fsu.edu**

and

**David A. Macpherson, PhD
Abba Lerner Professor of Economics
Department of Economics
Florida State University
Tallahassee, FL 32306-2180
(850) 644-3586 Phone
(850) 644-4535 Fax
dmacpher@mailier.fsu.edu**

A Research Project

Sponsored

by

The NATIONAL ASSOCIATION OF REALTORS®

December 2003

EXECUTIVE SUMMARY

THE COMPOSITION OF HEDONIC PRICING MODELS:

A REVIEW OF THE LITERATURE

G. Stacy Sirmans and David A. Macpherson
Florida State University

A house is made up of many characteristics, all of which may affect its value. A house has been compared to a bundle of groceries in that the bundles come in different sizes and may contain different items. Unlike groceries however, the price of individual housing characteristics cannot be directly observed. Hedonic regression analysis is typically used to estimate the marginal contribution of individual characteristics to the total value of the property. Understanding the marginal effect of individual characteristics can be valuable to a number of market participants including homebuyers, real estate agents, developers, and real estate appraisers.

This study provides a review of recent studies that have used hedonic modeling to estimate house prices. The paper is made up of several discussions: the early history of hedonic modeling, the relationship between selling prices and time on the market, and recent studies using hedonic modeling. Even though Court (1939) is often viewed as the father of hedonic modeling, earlier hedonic studies that examined the value of farmland date back to Haas (1922) and Wallace (1926). Later studies developed the microeconomic foundation for estimating the value of utility-generating characteristics (Lancaster, 1966) and for nonlinear hedonic pricing (Rosen, 1974).

Selling price and time on the market tend to be interactive, thus specifying models for these variables in a simultaneous framework is often difficult. Time on the market is generally negative when estimated in a selling price equation. This implies that a longer selling time results

in a lower selling price. When selling price is included in a time on the market equation, the results are less clear. Some models show that houses with higher selling prices sell faster while other studies show that houses with higher selling prices have longer selling times. Listing price is generally thought to be a major factor in time on the market and studies show that a higher listing price results in a longer time on the market, that housing liquidity depends on market participants' search effort that is partially determined by listing price, and that it is expensive to overprice a house initially.

Using the recent literature, the characteristics that are most frequently included in hedonic pricing models are identified. These include lot size, square feet, age, the number of stories, the number of bathrooms, the number of rooms, the number of bedrooms, fireplace, central air conditioning, basement, garage, deck, pool, brick exterior, distance to CBD, time on the market, and a time trend. These variables generally have the expected sign although in some instances they are not significant. Due to the large number of variables, categories are created and the top characteristics from each category are identified. The categories and characteristics are: **structural features**: lot size, square feet, age, number of bathrooms, and number of bedrooms; **internal features**: full baths, half baths, fireplace, air conditioning, hardwood floors, and basement; **external features**: garage spaces, deck, pool, porch, carport, and garage; **natural environmental features**: lake view, lake front, ocean view, and good view; **neighborhood and location**: location, crime, distance, golf course, and trees; **public services**: school district, percent of school district minority, public sewer; **marketing, occupancy, and selling factors**: assessor's quality, assessed condition, vacant, owner-occupied, time on the market, and time trend; and **financing**: FHA financing, VA financing, foreclosure, favorable financing, and property taxes. Most of the characteristics have a positive effect on selling price. Those

characteristics that have had a negative effect on price include age, crime, percent of school district minority, and if a property is vacant.

Following are some other interesting variables that are seen to affect selling price. Those that have a **positive effect** include a slanted versus flat roof, a sprinkler system, a garden bath, a separate shower stall, a double oven, and a gated community. Other characteristics that have a **negative effect** on selling price include not having attic space, living in an earthquake zone, proximity to a hog farm, proximity to a landfill, proximity to high voltage lines, corporate owned properties, and properties that require flood insurance.

The study compares estimated coefficients across geographical regions for selected characteristics. Some major conclusions are:

- the effect of square footage on selling price does not have a great deal of variation across regions. The greatest effect was in the Southwest and the lowest average effect was in the Midwest;
- the effect of lot size was generally consistent across regions;
- age was consistently negative and the effect on price seems to be consistent across regions;
- for studies primarily from the Northeast and Southwest, each additional bathroom increased selling price in the 10 to 12 percent range;
- for studies limited to the Northeast and Southwest, the effect of bedrooms on price was greater in the Northeast than in the Southwest;
- a fireplace had a positive effect on selling price in the six to 12 percent range and was generally consistent across regions, except for the West;

- central air conditioning was consistently important in all regions with the greatest price effect in the Southwest;
- a basement added significant value to selling price in most studies in the 12 to 16 percent range;
- a swimming pool was a consistently significant characteristic with the effect on price being the greatest in the Southwest and Southeast;
- the value of a garage was consistent across regions in the six to 12 percent range; and
- perceived school quality consistently had a significant effect on selling price.

The NATIONAL ASSOCIATION OF REALTORS® National Center for Real Estate Research supports original, high quality research which contributes to a greater understanding of the real estate industry, the real estate business, housing and homeownership.

Topics of primary interest include, but are not limited to:

- Real estate brokerage
- Real estate brokerage business models
- Real estate markets
- Housing policy
- Housing markets
- Real estate wealth effect
- New economy / technology
- Cost and impact of regulation
- Land use controls
- Multifamily
- Retail
- Office
- Industrial
- Commercial property finance

For further information, contact Paul C. Bishop, Director, National Center for Real Estate Research, NATIONAL ASSOCIATION OF REALTORS® at 202-383-1246 or via e-mail at pbishop@realtors.org



NATIONAL ASSOCIATION
OF REALTORS®

The Voice For Real Estate®





NATIONAL ASSOCIATION
OF REALTORS®

The Voice For Real Estate®

