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GREGORY K.  
INGRAM,  
Editor

# Residential Location and Urban Housing Markets

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**Residential Location  
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## Introduction

Gregory K. Ingram

Before the 1960s most studies of housing by economists emphasized the macroeconomic aspects of housing markets, such as the role of residential construction in the business cycle and the aggregate value of residential real estate. In addition, economists interested in financial markets became involved in the analysis of housing markets through their studies of real estate mortgage markets. Both approaches are evident in early NBER publications.<sup>1</sup> Although work on the macroeconomic side of housing markets has continued, in the early 1960s many economists began to study microeconomic and spatial aspects of housing markets in urban areas, including topics such as the household's choice of residential location and type of dwelling unit; the structure of housing prices within urban areas; the behavior of housing producers; and the provision of public services by local governments. This volume focuses upon this relatively new area of the economics of residential location and urban housing markets.

Although analyses carried out over the last fifteen years have taught us a great deal about how urban housing markets work, the problems in this field abound. At the risk of oversimplification, I have categorized the major problems in the economics of residential location and urban housing markets into those of theory, measurement, and policy analysis. The studies in this volume each address one or more of these categories, and they have been grouped roughly according to their major emphasis.

## PROBLEMS OF THEORY

The theoretical underpinnings of residential location within urban areas were developed in the early 1960s with the work of Alonso, Wingo, and others.<sup>2</sup> These theories of residential location are essentially adaptations of a model proposed by von Thunen to explain the pattern of agricultural land uses surrounding a market town. The simplest residential location theories assume that economic activity in an urban area occurs at a single center and that travel costs are similar in all directions; the theories produce equilibrium household locations and distributions of lot size that are radially symmetric about the single center.

It has become apparent, however, that many of the simplifying assumptions of these theories do not agree with reality, and we have had mixed success in modifying these underlying theories to incorporate more realistic assumptions. First, it is obvious that the monocentric assumption does not apply to modern metropolitan areas where workplaces and other centers of activity are not concentrated in the central business district or even in the central city. In Boston, for example, roughly a third of the metropolitan area's total 1970 employment was in the city of Boston, and less than a fifth in the central business district. Multiple centers or continuous distributions of employment and other activities more closely approximate reality than does the monocentric representation.

A second problem with the simple residential-location theories is that they ignore the existence of long-lived capital stocks. Households participating in the housing market are concerned with characteristics of residential structures beyond simply location and lot size; they value such qualities as structure type, number of bedrooms and bathrooms, unit layout and size, and the unit's state of repair. Furthermore, residential structures are durable, heterogeneous, and often difficult to modify; so structure characteristics may change slowly. If structure durability has a significant impact on market outcomes or prolongs the time of adjustment to equilibrium, residential-location theories must incorporate stock adjustment on the supply side of the housing market.

A third problem for residential location theories might be termed locational interdependence; that is, a household's location decision may depend directly or indirectly upon the location choices of other classes of households. Examples of interdependencies include racial discrimination, the public goods or externalities that may be produced by the agglomeration of household-location choices, and possibly the service levels (such as education or safety) produced by

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local governments. Interdependencies in location can easily produce multiple solutions to location problems or make static equilibrium solutions unattainable. Relatively few theories of residential location have incorporated interdependencies or even an endogenous local public sector.

In addition to multiple activity centers, durable stocks, and locational interdependencies, other complications might be introduced into theories of residential location and housing markets. Examples of potentially important considerations include tenure choice, the role of housing as an investment as opposed to a consumption good, zoning requirements, and income tax regulations.

#### PROBLEMS OF MEASUREMENT

Although lack of suitable data for housing market studies continues to handicap some empirical work, many specialized data sources are available for housing market research. Moreover, the content and form of decennial census data has steadily improved, and housing analysts have become more adept in its use. When suitable data are available, two major choices must be made in order to measure housing: measures can be made of either stocks of housing capital or flows of housing services; and the stocks or flows can be assumed to be either homogeneous or heterogeneous.

For example, stocks can be measured as homogeneous housing capital, and the procedure used to report housing starts measures housing stocks simply in terms of numbers of dwelling units. This is a crude measurement technique because new dwelling units embody different amounts of housing capital. In this case, data are also available on the value of new residential construction, but these suffer many of the classic problems of aggregation. Many housing market analysts attempt to measure flows of homogeneous housing services in terms of a quantity index of housing services, but developing an overall quantity index has proven difficult because of the same aggregation problems.

More recently, much attention has been devoted to measures that assume that the stocks or flows are heterogeneous, i.e., a dwelling unit is defined as a bundle of attributes obtained in a single purchase. Numerous studies based on this approach have used hedonic indexes to value housing attributes. Even with this approach, however, the housing attributes dealing with quality have not been well measured. Indeed, our lack of success in quantifying attributes such as dwelling unit quality, neighborhood quality, and the quality of local public services is probably the major problem facing empirical work on

urban housing markets at this time. Finally, the hedonic index approach often incorporates so many attributes (twenty to thirty are typical) that subsequent analysis such as the estimation of demand equations can be unwieldy.

### PROBLEMS OF POLICY ANALYSIS

In many respects, the quality of policy analysis in economics is directly related to the appropriateness of the theory at hand and the accuracy of the available data and parameter estimates. It is apparent from the preceding paragraphs, therefore, that our ability to analyze policies in urban housing markets is limited. As our observations of housing market activity lead us to extend theories and to develop more disaggregated techniques of measurement, we are confronted by an awkward choice between two alternatives for policy analysis. The first approach, termed the "grand simplification," employs representations of residential location and housing markets based on the monocentric model of long-run equilibrium. These representations are relatively transparent, understandable, and easy to check for errors; yet they almost certainly exclude many aspects of housing markets that may have important consequences for policy evaluation. The second approach, termed the "grand incorporation," employs representations of housing markets with more realistic assumptions and produces complex, numerically solved, computer-based models that are not easily intelligible. These representations, ironically because they include more complexities, are often difficult to believe when used for policy analysis because they are so difficult to understand and to check for errors.

### SUMMARY OF STUDIES

The studies presented in this volume focus on many of the difficulties just outlined. They have been grouped into four parts, with the first three parts corresponding roughly to the problem areas of theory (Chapters 1-3), measurement (Chapters 4-6), and policy analysis (Chapters 7-8).

In Part I, which concerns the theoretical aspects of residential location and housing choice, Richard Muth discusses empirical work motivated by his vintage model of housing services, which incorporates aspects of housing stock durability. Using census data to relate age of dwelling units, distance from the central business district, and income of resident households, the author finds that household income increases with distance from the CBD, and that age of

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dwelling units does not appear to be an important determinant of household location by income level. He reports comparable results for 1950, 1960, and 1970 census data, although the strength of the association between household income and distance from the CBD has tended to increase over this period. These results lead Muth to suggest that dwelling unit age may not be a good indicator of dwelling unit quality, and that filtering models based on dwelling unit age may be invalid.

In Chapter 2 Mahlon Straszheim outlines what might be described as a model of decision making in the local public sector. Noting that households jointly purchase a location, a level of local public services, and a housing unit, he believes it may be possible to predict household preferences for public services within a local jurisdiction, given data on the jurisdiction's housing stock and household preferences for dwelling units. Straszheim lays the theoretical groundwork for this approach using the change-of-variable technique. His goal is to integrate decisions about the supply of local public services into a model of the housing market.

Chapter 3 by Katherine Bradbury and others, reports preliminary empirical estimates of a household-location model based on Boston data. One of the major components of a spatially disaggregated regional growth model being developed at MIT, this model allows for the durability of housing stocks and includes structure conversion or rehabilitation as well as new construction in its supply-side activities. Furthermore, the model treats housing as a bundle of attributes that are valued differently by different classes of households. This is perhaps the first simultaneous equation model of a housing market that has incorporated durability and heterogeneity as characteristics of housing stocks.

Ann Schnare and Raymond J. Struyk (Chapter 4), investigate the extent to which and the reasons why blacks pay more than whites for housing in urban areas. The authors first measure price differentials paid by blacks at two different times, 1960 and 1970, and in two different cities, Boston and Pittsburgh. They then analyze data on changes in the population of blacks and whites in these two cities, contending that the decrease in price differentials blacks experienced from 1960 to 1970 is due primarily to the rapid loosening of the urban housing market and the increased availability of units.

Chapter 5, by William Apgar, describes a technique for using Census Bureau data more efficiently to estimate linear regression equations. He demonstrates that the two-way cross tabulations of data found in the fourth and later counts of the 1970 Census can be used to estimate ordinary least squares regression coefficients. Al-

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though this technique can be used in any application involving Census data, Apgar illustrates it with several housing market examples. He also suggests a number of revisions in Census Bureau practices that would make Census data more useful without compromising the confidentiality of individual questionnaire responses.

Chapter 6, by Werner Hirsch and Stephen Margolis, describes an attempt to estimate the impact that a variety of habitability laws may have on the cost of housing occupied by low-income households. After describing a theoretical model, the authors report parameter estimates based on an interstate sample of households compiled by the University of Michigan Income Dynamics Panel Study. They find that rent receivership, the most severe form of habitability law, may increase rents paid by low-income households by as much as 16 percent.

The third section, involving policy analysis, includes two studies that use models to simulate the response of the housing market to particular policy interventions. Chapter 7, by Frank de Leeuw and Raymond J. Struyk, briefly describes the Urban Institute housing model and its use in examining several housing policies. Although the Urban Institute model is dimensionally small—it typically includes five or six zones and thirty to forty households—it incorporates several important housing market characteristics such as the durability of existing units and neighborhood effects. Using two representative sets of parameters for the model, the authors examine the impacts of housing allowances and new-construction subsidies on the structure of prices in urban housing markets. They find that housing allowances may increase the housing prices paid by recipient households, and that construction subsidies produce benefits for households living in existing units as well as for those who buy new housing.

In Chapter 8, Gregory K. Ingram and Yitzhak Oron present a housing market model that focuses on the production of dwelling quality by owners of existing units. In this model, a housing supplier produces quality by combining a dwelling unit's capital with operating inputs, and he alters the unit's stock of capital by incremental investment or disinvestment. After calibrating production functions for the model, the authors explore two issues: First, using just the supply model, they determine the likely magnitude and duration of rent increases for housing units if the demand for dwelling quality is increased by a housing allowance or similar program. They find that a typical housing allowance program is likely to increase rents in the short run by less than 10 percent and that this increase is likely to dissipate in less than six years. Second, when the supply model is

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combined with a demand model, the market-clearing simulations suggest housing allowances will increase the average level of housing quality, but that some households may substitute other housing attributes for quality.

During the past few meetings of the Conference on Income and Wealth, it has been customary to have a session composed of student papers selected by a review committee. The first selection included here (Chapter 9) is a study by Susan Nelson of Princeton which sets forth a theoretical model that relates reduced labor market opportunities for blacks to their spatial segregation in the housing market. The author uses a search model over space in the labor market to determine how housing market segregation could produce higher unemployment rates or lower wage rates for blacks. Nelson's study is virtually the first theoretical analysis of this topic, which is the subject of controversy in the empirical literature.

The other paper (Chapter 10), by Marcy Avrin of Stanford, is an empirical study of the effect that zoning and zoning changes have had on residential property values in San Francisco since the city's zoning regulations were changed in 1960. By compiling data on property sales Avrin is able to investigate the effect of zoning regulations over time (before and after the change) as well as at one point in time (across zoning districts). The author's empirical findings support the conclusion that zoning restrictions increase the value of all residential property but that increases vary by allowed density levels.

The studies presented in this volume cover many topics and convey a sense of the range of issues in the economics of residential location and urban housing markets. At the same time, the studies do not cover all topics in this field, nor do they integrate neatly as a progress report or survey. Taken together, however, they reflect the approaches and subjects that housing market analysts are focusing on now, and they are a good sampling of current work in the field.

## NOTES TO INTRODUCTION

1. For example, see David L. Wickens, *Residential Real Estate* (1941) and the six volumes in the NBER series, *Studies in Urban Mortgage Financing*, published in the early 1950s.

2. For example, see William Alonso, *Location and Land Use* (Cambridge, Mass.: Harvard University Press, 1964); Lowden Wingo, Jr., *Transportation and Urban Land* (Washington, D.C.: Resources for the Future, 1961); John F. Kain, "The Journey-to-Work as a Determinant of Residential Location," *Papers and Proceedings of the Regional Science Association*, IX (1962); Edwin S. Mills, "An Aggregative Model of Resource Allocation in a Metropolitan Area," *American*

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*Economic Review* (May 1967); and Richard Muth, *Cities and Housing* (Chicago: University of Chicago Press, 1969).



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