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Introduction

This study of the St. Louis, Missouri, housing market is one of several complementary econometric analyses of urban housing markets carried out at the National Bureau of Economic Research. Although these studies emphasize different questions and rely on different bodies of empirical data, they share a common core of theory and method. Collectively they test a series of hypotheses that provide the basis for a much enriched theory of residential location, of urban spatial structure, and of housing markets.[1]

The theoretical and empirical analyses presented in these NBER studies differ from earlier investigations of urban housing markets in several important respects. First, they assert that the demand for housing and the behavior of urban housing markets are better understood if "housing" is viewed as bundles of heterogeneous housing attributes rather than as a single-valued commodity, housing services. Second, they acknowledge that many of the attributes of these housing bundles are not produced by competitive firms, that households usually must make all-or-nothing choices among discrete bundles, which will seldom include the precise collection of attributes that they prefer, and that their ability to modify these bundles to match their preferences more closely is limited. Finally, the analyses recognize major market imperfections, which must be incorporated in any realistic theory of urban housing markets. The most important of these imperfections, analyzed in detail in this book, is housing-market segregation.

[1]The NBER Urban Simulation Model, another component of the NBER Urban Studies program, is a computer representation derived from this alternative theoretical framework and provides a way of synthesizing the findings of these econometric studies. See Gregory K. Ingram, John F. Kain, and J. Royce Ginn, *The Detroit Prototype of the NBER Urban Simulation Model* (New York: National Bureau of Economic Research, 1972). The third major component of the NBER Urban Studies program is made up of several empirical studies of the determinants of intrametropolitan industry location. See Raymond Struyk and Franklin James, *Intrametropolitan Industrial Location: Tests of Three Hypotheses* (New York: National Bureau of Economic Research, 1974), and Robert Leone, *Location of Manufacturing Activity in the New York Metropolitan Area* (New York: National Bureau of Economic Research, forthcoming).

It may seem peculiar to some readers that existing economic theories give so little attention to these features of urban housing markets. Moreover, some of the issues we give so much emphasis to in subsequent chapters may even seem obvious to persons knowledgeable about housing. However, it should be recognized that existing "economic" theories of urban housing markets typically assume that housing is a homogeneous good that can be represented simply by the household's total outlay for housing; that these theories consider only those aspects of the housing bundles that are produced by competitive firms; and that they ignore the existence or implications of racial discrimination. Although few proponents of these theories would defend these simplifying assumptions as empirically correct, many argue that nothing is lost from their use for most purposes. Moreover, many economists continue to draw strong conclusions from theories that rely on these assumptions, even when it has not been demonstrated that the assumptions are as benign as they suggest. In addition, many practical men accept what we perceive to be seriously incorrect theories, without recognizing the nature or the extent of the implicit simplifying assumptions.

Traditional theories of the housing market accommodate the assumption of a single homogeneous good by considering only a long-run equilibrium solution, where all housing inputs, except accessibility to the center, are variable. The obvious empirical difficulty in applying this long-run equilibrium assumption to housing markets arises from the extreme durability of the stock of residential capital and from the high cost of either relocating particular units or making major physical changes in units at a given location. The useful lives of both individual structures and entire neighborhoods span decades or, in some instances, centuries.

In addition, many important attributes of the bundle of housing services are not produced by individual property owners. These include such diverse factors as police and fire protection, street cleaning, trash and garbage collection, public and parochial schools, neighborhood amenity and prestige, and the traits of persons residing in the surrounding neighborhood. All of these housing attributes have at least some of the characteristics of public goods, in that their provision requires some kind of collective action—either directly, as in the case of public services provided by local governments, or indirectly, through the aggregation of private decisions, as in the case of the socioeconomic character of neighborhoods.

The durability of the physical stock and the cost of transforming it at particular locations, plus the nonmarket provision of several attributes of housing services, create an important heterogeneity on the supply side of the market. This heterogeneity is enhanced by the behavior of con-

sumers, whose behavior clearly demonstrates that the heterogeneity of the housing supply matters to them. If a theory of the housing market is to be relevant and useful, it must deal explicitly with those aspects of housing-stock heterogeneity that influence the behavior of consumers and housing suppliers. Effective public intervention in the housing market similarly requires a clear understanding of the nature and implications of this heterogeneity.

Traditional theories of the housing market either entirely ignore racial discrimination or assume that it has no important effects on the welfare of black households, or on the functioning of urban housing markets. Insofar as theoretical and empirical studies of the housing market have considered discrimination at all, they have asked only whether such discrimination causes blacks to pay more for the homogeneous good, housing. Viewing housing as a bundle of housing attributes puts the probable effects of housing-market discrimination in a considerably different light. It suggests that if price discrimination exists, its form is more complex than is suggested by most earlier studies, and that it varies in magnitude among housing attributes and among bundles of different composition.

Even this more sophisticated view of price discrimination may fail to capture the effects of racial discrimination on the behavior of housing markets. It is obvious that more than higher prices deters blacks from seeking housing outside the ghetto, particularly if many kinds of housing appear to be cheaper outside. Prohibitive search costs, discriminatory treatment by sellers, intended and unintended discrimination by various agents and market institutions, and simple fear all appear to play a large role.

This suggests that a more fruitful approach may be to investigate discontinuities in the supply of certain attributes available to black households. Because of the importance of stocks, the nonmarket production of various attributes, and the particular geographic distribution of others, many bundles of housing services may be altogether unavailable to black households. That is, the price black households must pay for these bundles or the information, search, and psychic costs they must be prepared to incur to acquire them may be so high that such bundles are practically never consumed by black households. Presumably, it would be possible to impute a monetary cost for these unobserved transactions, but empirical studies of price discrimination would still fail to detect them.

This study offers little empirical evidence on the effect of workplace location on housing consumption patterns. However, the differences in housing costs resulting from differences in workplace location figure prominently in the revised theory of urban spatial structure presented in

the first half of this book. Fortunately, other NBER studies—specifically, those by Dresch (Detroit), by Straszheim (San Francisco), by Quigley (Pittsburgh), and by Brown and Kain (San Francisco)—provide conclusive evidence that workplace-specific variations in housing costs (housing expenditures plus transportation costs) have an important effect on the demand for housing attributes.[2] This evidence is summarized in Chapter 2.

One distinguishing characteristic of NBER econometric studies of the housing market is their use of large samples of home-interview data. None of these large samples, which vary in size from twelve-hundred to forty-thousand households, was collected by the NBER. Rather, in all cases, the data were obtained originally for other purposes by other groups. As a consequence, all of the data sources, though of great value, are far from perfect for our analyses.

The surveys invariably lack critical information, but the gaps differ somewhat among them. As a result, the research design and hypotheses considered in each analysis are dictated to a substantial degree by the strengths and weaknesses of the particular data sources. Of these several NBER studies, none was more strongly influenced by the nature of the available data than the research on the St. Louis housing market presented in this book. Yet we, the authors, had a greater opportunity to influence the structure, content, and coverage of the underlying survey instruments than is true of any of the other NBER analyses.

The analyses we present here are based on a sample of roughly twelve-hundred St. Louis households interviewed in 1967 as part of the St. Louis Community Renewal Program (CRP).[3] Both of us were consultants to the St. Louis CRP and, therefore, were able to influence the design and content of the sample to a certain extent. Nonetheless, differences in the purpose for which the original survey was intended, budget limitations, and various program constraints on survey design combined to produce a far different survey than would have emerged if the data had been collected with econometric research on the housing market as its principal objective.

Still, the St. Louis survey is well suited to the investigation of a number of important aspects of housing-market behavior. A major

[2]Ingram, Kain, and Ginn, *Detroit Prototype;* John M. Quigley, "Residential Location: Multiple Workplaces and a Heterogeneous Housing Stock" (Ph.D. diss., Harvard University, 1972); Gregory K. Ingram, "A Simulation Model of a Metropolitan Housing Market" (Ph.D. diss., Harvard University, 1971); Mahlon R. Straszheim, *An Econometric Analysis of the Urban Housing Market* (New York: National Bureau of Economic Research, 1975).

[3]Alan M. Voorhees and Associates, Inc., *Technical Report on a Residential Blight Analysis for St. Louis, Mo.* (prepared for the St. Louis City Plan Commission, March 1969).

feature of the analyses that we put forward is a detailed consideration of the effects of racial discrimination on metropolitan housing markets, and on the behavior and welfare of black households. This emphasis has been made possible by a heavy oversampling of minority households. Blacks constituted an estimated 16 percent of all households in the St. Louis metropolitan area in 1970. They constitute 34 percent of the 1967 sample of St. Louis households used for these analyses. The relatively large sample of black households, 266 black renters and 72 black owners, permits extensive analyses of the effects of housing market discrimination on the behavior of blacks in the housing market.

The sample's greatest weakness for housing-market analyses is a serious underrepresentation of suburban households. To some extent, the undersampling of high-income suburban residents was an inevitable consequence of the decision to obtain a large sample of minority and low-income households. However, the exact weight of suburban and central-city households in the final sample was dictated not by research considerations, but by regulations which prohibited the expenditure of CRP funds to collect data on households located outside the city. The valuable but all-too-small sample of suburban properties used in this analysis was funded from other sources.[4]

The second important feature of the St. Louis sample, which strongly influences the form of the analyses presented here, is the unprecedented attempt to quantify the relevant attributes of sample dwelling units and of the broader residential environment. Most samples used to analyze urban housing markets provide only a limited description of the bundle of residential services consumed by urban households. Many surveys contain extremely detailed descriptions of households and virtually no information on the dwelling units which they occupy. All too often, when detailed descriptions of the housing stock are obtained as part of housing-market studies, no—or only minimal—information is obtained on the characteristics of occupants. The most common failing, however, is a tendency to limit the description of housing to the characteristics of the interior of an individual dwelling unit, altogether ignoring the wider residential environment. Yet this wider residential environment may be at least as important as the characteristics of individual dwelling units to housing consumers and a fortiori to those who would understand the structure and behavior of urban housing markets.

By contrast, the surveys used to analyze the St. Louis housing

[4]It is unfortunate that the regulations governing central-city CRP programs should require study agencies to disregard the competitive links between city and suburb, but it appears that this is the case. No meaningful or effective program for improving conditions within the central city can be developed without determining the relation of the central-city housing supply to households located outside the city.

market for this volume are probably the most comprehensive ever available for empirical analyses. In addition to the fairly detailed information on individual households and dwelling units obtained from a more or less conventional home-interview survey, the study draws on two complementary surveys of dwelling-unit exteriors and neighborhood environments carried out by teams of building inspectors. The analysis also incorporates a great deal of published and unpublished data describing the characteristics of the neighborhood and the quality of services provided.

In spite of these efforts, the sample surveys which we employ remain less than fully satisfactory. For example, no data could be obtained on the quality of neighborhood schools and crime levels for suburban properties. The lack of these important indexes and the small size of suburban samples seriously hamper efforts to evaluate the role of neighborhood amenities and services in the housing market. Similarly, the unavailability of information on home financing and household wealth and assets inhibits our analyses at important points.

Data were collected on the critical area of maintenance and renovation expenditures by homeowners as part of the home interview, but subsequent analyses indicate that they are too poor in quality to be of much value. In addition, several aspects of households and individual dwelling units are less creatively described than we now believe possible. In short, although the data we analyzed are of unprecedented richness and depth, they are not fully adequate to the important and difficult tasks of modeling the choices of housing consumers and the structure and behavior of urban housing markets. Because of these data limitations, the major contribution of this book may lie in providing a theoretical and empirical basis, as well as a set of hypotheses, for further investigation with larger and more representative samples of data. We hope that subsequent efforts, better financed and more oriented to the collection of housing-market information, will benefit from our often unsuccessful attempts to define, measure, and model the important characteristics of urban housing markets.

Large samples of individual household data are being used increasingly in economics and in the other social sciences, a reflection of the rapidly declining costs of computation and data processing as well as the growing availability of large data sets. However, their application to housing-market analysis has so far been limited.

The potential for this kind of analysis has been greatly expanded with the release of the 1970 census one-in-one-hundred samples for individual metropolitan areas. Of particular interest for housing-market research are those samples which contain the characteristics of individual households and dwelling units. Our study and the companion NBER

econometric studies of urban housing markets should provide useful guidelines for exploiting these data sources, as well as a detailed set of hypotheses for testing with this avalanche of data.

PLAN OF THE ANALYSIS

This book deals with a wide range of issues. However, as noted previously, two threads run throughout the analyses: (1) the need to view housing services as bundles of housing attributes rather than as a homogeneous good, and (2) the study of distortions caused by racial discrimination. A third, the effect of workplace location on the behavior of housing consumers, and the effect of the spatial arrangement of employment in the aggregate, lurks behind the analysis; but because of the characteristics of the sample, it is not treated in the empirical analyses.

These features of the analyses combine to produce rather sharp and important departures from the traditional analyses of urban housing markets and of urban spatial structure. Therefore, in Chapter 2, we begin to identify the elements of a revised theory of residential location, urban spatial structure, and urban housing markets. Chapter 3 extends the analytical discussion in Chapter 2 to include consideration of the effects of housing-market discrimination on urban housing markets. The chapter considers the extent and causes of housing market segregation in American cities and seeks to provide an explanation of both peripheral expansion of central-city ghettos and the effect of discrimination on housing prices both inside and outside the ghetto.

Chapter 4 provides a brief description of the St. Louis, Missouri, Standard Metropolitan Statistical Area (SMSA) and its major geographic subdivisions and depicts the surveys used in collecting data for the study and the rather complex sample design used to obtain the home interview survey, the core data source used in the analysis.

Chapters 5 through 10 contain the substantive findings of our research. Household decisions to move and to rent or purchase housing are considered in Chapter 5, using the St. Louis sample. One important finding of these analyses is that black households are less often homeowners and black movers are less often home buyers than are white households of similar income, size, composition, and labor-force attachment.

Chapter 6 considers the broader implications of an impairment in the opportunity for blacks to own their homes and presents a further analysis of home ownership, using aggregate census data from eighteen large metropolitan areas.

Chapter 7 presents a conventional analysis of the demand for housing services, which employs the common practice of using monthly contract rent or the value of owner-occupied units to measure the quantity of housing consumed by each household. Chapters 8, 9, and 10 provide a more extensive treatment of the nature of housing services and of household demand for housing services.

In Chapter 8, we present several equations that express the rent or value of individual properties as a function of the characteristics, or attributes, of each property; including both the broader aspects of the residential environment and the characteristics of the individual dwelling unit. These rent and value equations can be interpreted as hedonic price indexes in which the individual parameters are the market values or unit prices of the underlying dimensions of housing services.

Since we anticipated that housing-market discrimination would cause the structure of attribute prices for ghetto and nonghetto properties to differ, we estimated separate equations for these properties. These separate equations confirm the notion that the structure of attribute prices are very different inside and outside the ghetto, that ghetto housing is more expensive, and that the black disadvantage is even larger when the differences in the ghetto and nonghetto housing markets are recognized.

In Chapter 9, we further consider the implications of viewing housing as a collection of attributes by estimating demand equations for the large number of individual housing attributes used previously to describe the bundle of housing services. These attribute demand equations provide a much more detailed picture of the way in which housing market discrimination modifies black housing consumption.

Since we suspect that the demands for housing attributes may be interdependent, we make some modest efforts to deal with this interdependence. These efforts, presented in Chapter 10, involve estimation of demand functions for four attribute bundles: dwelling quality, dwelling-unit size, parcel area, and neighborhood quality, using a method of joint estimation first used by Arnold Zellner. Although these equations provide a convenient summary of those results, they give little indication of the kinds of interdependence that Zellner's treatment is designed to handle. The final chapter summarizes our principal findings.