A HOUSING SUBMARKET APPROACH TO NEIGHBORHOOD REVITALIZATION PLANNING: THEORETICAL CONSIDERATIONS AND EMPIRICAL JUSTIFICATIONS

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ABSTRACT

(Under the direction of Roberto G. Quercia)

Many urban revitalization programs focus policy resources on spatially defined target neighborhoods. The impacts of these programs can include direct effects in the neighborhood chosen for intervention and spillover effects in other neighborhoods. These unintended and sometimes unpredicted effects may be positive or negative. This dissertation argues that without analyzing the urban spatial structure as a set of inter-related housing submarkets, planners will not be able to adequately predict and evaluate the effects of revitalization policy. In doing so, the research investigates the theorized nature of neighborhoods, discussing this socio-cultural geography in light of the theorized nature of the housing market in space. The empirical investigation, a case study of Philadelphia, defines spatial housing submarkets as distinct market segments based on housing quality. These submarkets are compared with first the housing market implied by the theories of Alonso-Mills-Muth and Tiebout, and second with the defined policy neighborhoods. The city and metropolitan area of Philadelphia are found to be highly heterogeneous in housing types, with no uniform pattern predicted by theory. Additionally, policy target neighborhoods are often comprised of different submarkets, leading to confusion in policy targeting. This research suggests that urban planners should consider the geography of housing submarkets in developing revitalization policies in order to choose appropriate geographic targets and to predict the spatial extent of market responses.
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To my parents, thank you for your high expectations; I hope I have met them all.
# TABLE OF CONTENTS

List of Tables .................................................................................................................. ix

List of Figures .................................................................................................................. x

CHAPTER

1 Introduction ....................................................................................................................... 1
   1.1 Neighborhood Revitalization Planning Can Backfire ............................................. 1
   1.2 Housing Submarket Theory as a Framework for Revitalization ......................... 4
   1.3 Implications of the Research .................................................................................. 5
   1.4 Contributions of the Research ............................................................................. 8
   1.5 Organization of the Study .................................................................................... 9

2 Neighborhood Planning .................................................................................................. 11
   2.1 Planners Define the Neighborhood as the Locus of Revitalization Efforts .......... 11
      2.1.1 Why the neighborhood as a unit of revitalization? ...................................... 12
   2.2 Theoretical Definitions of Neighborhood Undergird Planning Efforts .............. 13
      2.2.1 Neighborhood as social space .................................................................... 14
      2.2.2 Neighborhood in a system of systems ......................................................... 15
      2.2.3 Boundary setting as a practical matter driven by theory .............................. 16
   2.3 Neighborhood May Not be Adequate for Understanding Policy Effects in the Housing Market ........................................................................................................ 18
   2.4 Conclusion ............................................................................................................ 20

3 Analyzing the Urban Housing Market: The Submarket Theoretic Approach .......... 22
   3.1 Introduction ........................................................................................................... 22
3.2 Evolution of Housing Market Theory ........................................ 23
3.3 Modeling a Fragmented Housing Market: The Current Approach ...... 24
  3.3.1 Submarkets as market segments ........................................ 25
  3.3.2 Submarkets and market equilibrium .................................... 26
3.4 Defining Market Fragmentation: Conceptualizing Submarkets .......... 27
  3.4.1 Dimensions of housing quality segment the housing market ...... 28
  3.4.2 Defining submarkets through hedonic prices ......................... 29
3.5 Investigating the Spatial Nature of Submarkets ............................ 31
  3.5.1 Determinant approaches to spatial submarket definition .......... 32
  3.5.2 Agnostic approaches to spatial submarket definition .............. 34
3.6 Relationship of Submarket to Neighborhood ................................ 35
3.7 Operationalizing Housing Market Segmentation ........................... 36

4 Research Design: Data and Methods ......................................... 38
  4.1 Research design .............................................................. 38
    4.1.1 Defining submarkets ................................................... 39
  4.2 The Case Study: Philadelphia .............................................. 43
    4.2.1 Philadelphia’s housing market ....................................... 44
    4.2.2 Philadelphia’s Neighborhood Transformation Initiative .......... 46
  4.3 Statistical Methods ........................................................ 48
    4.3.1 Defining spatially based housing quality level submarkets ...... 48
    4.3.2 Confirmatory factor analysis defines dimensions of housing quality 49
    4.3.3 Cluster analysis groups similar areas ................................ 50
    4.3.4 Hedonic price regression confirms spatial submarkets .......... 51
  4.4 Examining Submarket Spatial Distribution ................................ 53
  4.5 Comparing Submarkets to Predefined Planning Areas .................. 54
  4.6 Data ................................................................................. 56
    4.6.1 Data sources for the City of Philadelphia ........................... 56
    4.6.2 Data sources for metropolitan Philadelphia ......................... 57
5 Housing submarkets are described ............................................. 59

5.1 Defining Submarkets for the City of Philadelphia ................. 59
   5.1.1 Dimensions of Housing Quality ........................................... 59
   5.1.2 Creating variables ............................................................ 66
   5.1.3 Cluster analysis finds six submarkets in the city ............. 67

5.2 Defining Submarkets at the Metropolitan Level .................... 72
   5.2.1 Metropolitan housing quality ............................................. 72
   5.2.2 Six submarkets at the metropolitan level ......................... 75

5.3 Regression on Individual Unit Sales Price Confirms Submarket Definition for City .......................................................... 78

5.4 Conclusions ........................................................................ 82

6 Housing Submarkets as Urban Spatial Structure .................... 83

6.1 The Distribution of Submarkets Compared to Theory ............ 84
   6.1.1 The spatial distribution of submarkets in the city of Philadelphia ............................................. 84
   6.1.2 The distribution of submarkets in the metropolitan area ... 88
   6.1.3 Comparing city and metropolitan submarket structure .... 90

6.2 The Distribution of Submarkets Compared to Policy Boundaries ... 93
   6.2.1 Housing submarkets and Philadelphia’s Planning Analysis Sections .................................................... 93
   6.2.2 Submarkets and traditionally defined neighborhoods ... 95
   6.2.3 Submarkets and political jurisdictions ......................... 99

6.3 Conclusions ........................................................................ 101

7 Contributions and Policy Implications .................................. 102

7.1 Summary of the Research ..................................................... 102

7.2 Theoretical contributions ..................................................... 104

7.3 Implications for neighborhood planning ............................ 106
   7.3.1 Implications for City Policy .................................................. 108
   7.3.2 Implications for Regional Policy ........................................... 112
LIST OF TABLES

5.1 Confirmatory Factor Analysis of Housing Quality Dimensions for City of Philadelphia .................................................. 61
5.2 Housing Submarkets: Describing clusters ................................................. 68
5.3 Confirmatory Factor Analysis of Housing Quality Dimensions for Metropolitan Philadelphia .................................................. 73
5.4 Hedonic Regression on Individual Unit Sales Price, 2000 .......................... 80
6.1 Submarket Composition of City Planning Analysis Sections (Proportion of block groups in each submarket) .................................................. 94
6.2 Eta squared statistics for City of Philadelphia (Proportion of variance in variable explained by segmenting market) ................. 95
6.3 Eta squared statistics for Metropolitan Philadelphia (Proportion of variance in variable explained by segmenting market) ............ 100
A.1 City of Philadelphia: Variable definitions ................................................... 118
A.2 Variable Means, City of Philadelphia (Census Block Groups) .................... 120
A.3 Metropolitan Philadelphia: Variable definitions ........................................ 121
A.4 Variable Means, Metropolitan Philadelphia (Census Tracts) ..................... 122
B.1 Hedonic Regression on Individual Unit Sales Price, 2000 (Submarket interaction model) .................................................. 125
LIST OF FIGURES

6.1 Philadelphia housing submarkets .................................................. 87
6.2 Housing Submarket Local Indicators of Spatial Autocorrelation .......... 89
6.3 Philadelphia regional housing submarkets and counties ..................... 91
6.4 Philadelphia regional housing submarkets and minor civil divisions ....... 92
6.5 Philadelphia Housing Submarkets and Planning Analysis Sections .......... 96
6.6 Philadelphia Housing Submarkets and Neighborhoods ...................... 98
7.1 Temple University Neighborhood Submarkets .................................... 110
CHAPTER 1

Introduction

1.1 Neighborhood Revitalization Planning Can Backfire

Planners have long considered the neighborhood to be the building block of urban revitalization strategies. Most federal and local programs require planners to define target areas for stabilization and renewal activities, with the assumption that neighborhoods are the best scale for community development. The list of programs following this basic strategy is lengthy, and the amounts disbursed to localities over the last forty years are staggering. A truncated list includes the 1966 Model Cities program of the Great Society, which allocated $1.2 billion for its first three years (in 1966 dollars); the Community Development Block Grant, first authorized in 1974, currently disbursing $4 billion annually; the complementary (albeit shortlived) UDAG funded up to $675 million per year during the 1970s. Despite this long history of revitalization programs, with a steadily increasing commitment to the neighborhood as the focus of efforts, urban blight has continued to be a problem for America’s cities. Traditional urban revitalization planning, with its focus on the neighborhood as a policy target, has often failed to meet expectations.

When planners attempt to intervene at the neighborhood level to improve condi-
tions, they have often been met with unexpected results or with spillover effects, some of which are detrimental to the neighborhood itself and to the city as a whole. Grigsby et al (1984:5) wrote in the mid-1980s of the “lengthy record of failure” of neighborhood revitalization efforts, citing a history of the practice dating back to the 1930s. The potential problems are myriad, including population displacement, further abandonment, or a simple lack of positive results. Redevelopment can induce rapid gentrification and displacement (Kennedy and Leonard 2001, in Cowan and Rohe 2003:11). This in-migration of higher income households to minority neighborhoods during revitalization may create intense social and political conflict (Varady and Raffel 1995, in Cowan and Rohe 2003:11). Stegman warns that displaced low-income minority populations can be “squeezed” by programs that maintain or increase housing prices in high quality neighborhoods while demolishing low cost housing, limiting their housing options at both ends of the spectrum (Stegman 1979:496). In contrast, redevelopment plans sometimes fail to create desired effects in adjacent areas, as during the urban renewal era—Teaford (2000) reports that “tenants did not flock to the new structures, and renewal schemes often failed to generate much private development on adjoining tracts” (Teaford 2000:449-50). For example, plans to build homes for middle-class blacks in Buffalo stalled when families refused to purchase units nearby to a slum; the land was left vacant, further blighting the area (Teaford 2000:448-9). More recently, while the intensive efforts at the redevelopment of blighted public housing through HOPE VI have resulted in some positive spillover effects in surrounding neighborhoods—for example, Zielenbach reports reduced crime and raised property values near HOPE VI sites (2003:625)—the relocation of project residents has sometimes created problems for their new neighborhoods, which must deal with an influx of subsidized households (Smith 2002:41). Even supporters of CDBG funding acknowledge that significant improvements in neighborhood indicators are only observed in areas with high spending levels per poor resident, funding levels reached by few cities (Galster et al 2005). The impacts of urban revitalization programs can include direct effects
in the neighborhood chosen for public intervention and spillover effects in other neighbor-
hoods. Some of these effects have been positive, as when HOPE VI projects create
improved neighborhood conditions; others are negative, as observed during the urban
renewal era of large population displacement. I argue that some of these consequences,
at times unintended and unpredicted, are due to planners’ use of the neighborhood as
the focus of intervention, without additional analysis of the urban housing market. Plann-
ers target neighborhoods, rather than defining a geographic scale that is most relevant
to the desired policy outcomes, and without analyzing the neighborhood as part of an
interconnected urban system that extends beyond the jurisdictional boundaries of a city.
Neighborhood is an important focus of revitalization, as it is an important construct for
understanding social and organizational relationships and for mapping networks among
key actors. The neighborhood allows planners to consider the neighborhood as it fits
into a system of institutional and political relations and to develop policies within that
rubric. However, the traditional practice of neighborhood-based revitalization is without
a framework that explains how neighborhoods are linked together in the urban housing
market, and what the housing consequences of revitalization efforts may be.

While the traditionally defined neighborhood serves many important social, politi-
cal, and programmatic functions, it may not be the best geographic scale for considering
how inner-city stabilization and revitalization strategies induce changes in the supply
and quality of housing. Galster writes that neighborhoods defined by social boundaries
may be an “inappropriate scale when one is attempting to analyze investment or mobility
behaviors which lead to changes in the physical condition or demographic composition
of a given area” (Galster 1986:244). In particular, neighborhoods may not be the ap-
propriate scale at which to analyze the city and metro-wide housing market responses to
policy interventions. In order to plan for housing market impacts of an urban community
revitalization strategy, planners need to identify the geographic scale of housing market
responses in order to identify possible results based on an established theoretical frame-
work. I suggest this framework is the spatially defined housing submarket, which can be used as an additional tool in revitalization planning. The geography of the urban housing market is an important consideration when planning urban revitalization programs that will affect housing.

1.2 Housing Submarket Theory as a Framework for Revitalization

Planners spend considerable effort on developing policies targeted to places; in contrast, economists examine particular segments of the housing market, or submarkets, defined on the basis of consumer behavior. The submarket approach suggests that consumers make choices among submarkets, which are groupings of housing units that are substitutes in the market, rather than among planner-defined neighborhoods. This submarket approach considers not singular neighborhoods, but a system of interconnected market segments. In the seminal *Maze of Urban Housing Markets*, Rothenberg et al. (1991) find that “units in adjacent quality submarkets are likely to be more closely related—and therefore more similarly affected by market events—than units in different nonadjacent submarkets.” This theoretical framework offers a method for assessment of the impact of planning interventions that is based on household preferences for housing and explicitly addresses the interconnections among areas of the metropolis that can confound the reactions to policy.

Making the submarket approach practical for planning urban revitalization policy requires an understanding of housing submarkets as places in the city that are linked together through supply and demand forces in the overall housing market. Because of the dominance of neighborhood and location factors is defining housing quality, it makes sense to conceive of submarkets as spatial realities, not abstracted market spaces. Research by Maclennan (1996) and Bourassa et al (1999, 2000, 2002) clearly demonstrates
that housing submarkets are real, mappable places, among which consumers make choices based on their preferences, income, and other demand-side factors. Housing submarket areas can be defined by using numerous dimensions of housing and neighborhood quality to segment the housing market in space.

The spatial distribution of submarkets in the urban area is as yet a topic of debate. Because of the clustering of land uses, housing types, and locational quality factors, submarkets will tend to be, to some degree at least, contiguous areas (Grigsby 1975, in Megbolugbe et al 1996). Some research into the nature of submarkets is based on the theoretical structures of Alonso (1964), Mills (1969), and Muth (1969) or of Tiebout (1956), which assume housing quality to be homogeneous within distance to the urban center or within political jurisdictions, respectively. This research imposes a spatial structure onto the urban housing market, yet no discussion has occurred about the accuracy of these theorized structures in depicting the urban housing market. Megbolugbe et al (1996) suggest that neighborhoods are suitable substitutes for submarkets in analysis, since they are most likely homogenous in terms of housing quality. Neighborhoods, insofar as they are comprised of a single demographic group, may constitute areas of particular demand that matches with a unique supply—in other words, a submarket. Grigsby et al (1987), however, suggest that while neighborhoods and submarkets are closely related, with neighborhoods changing along with submarket adjustments, it is not likely that neighborhood boundaries and housing submarket boundaries are coterminous. Features important for the assessment of housing quality levels likely extend beyond neighborhood boundaries, meaning neighborhoods underbound submarkets.

1.3 Implications of the Research

These debates suggest two issues to be subjected to empirical testing: First, does the urban housing market follow theorized spatial structures when we map submarket
segmentation? Do submarkets follow the concentric zone price gradient of the Alonso-Mills-Muth model, with housing quality constant at a given distance from the central business district, or do submarkets fit into the Tieboutian structure of distinction by political jurisdictions? Second, does an urban structure divided into neighborhoods provide an adequate depiction of housing submarkets? Is neighborhood a unique and homogeneous unit that captures the attributes of housing important for market segmentation, and therefore for depicting policy effects, or is it inadequate for that purpose?

Submarket theory suggests that housing markets can be segmented based on different aspects of housing quality in areas, rather than as groups of units. The size and shape of these areas, however, has yet to be discussed fully. This open question is the first addressed in the current research: what is the spatial distribution of housing submarkets in the urban area? Are submarkets largely contiguous, or fragmented in space? When submarkets are defined without imposing the Alonso-Mills-Muth or Tieboutian structure, do they approximate either concentric zones or sorted jurisdictions? These theories assume a certain level of homogeneity within large areas, not unlike the assumption that neighborhoods are homogenous. I hypothesize that empirically defined housing submarkets show more spatial variation than allowed under the Alonso-Mills-Muth or Tieboutian assumptions. This finding would suggest that the urban housing market cannot be accurately analyzed in terms of these theoretical models, and that more complex constructions are needed for defining submarkets.

By examining housing submarket areas, rather than just traditionally defined neighborhoods, as the objects of revitalization attention, planners would have a better basis for predicting the housing market ramifications of their policy interventions. The submarket approach gives a theoretical basis for observing how households assess the quality of an area, and for defining which areas of the city are connected in terms of housing market outcomes. This knowledge would improve revitalization planning by making planners more aware of the interconnectedness of the market areas in which they intervene and
giving a framework for predicting the results of major policies. For example, planning for the absorption of displaced residents into similar submarket areas could decrease the negative effects of large-scale demolition or gentrification. This research will provide methods and analysis for planners to improve policy targeting by employing housing market analysis in their work. Therefore, the second major research question is: do the neighborhood definitions employed in revitalization planning correspond with divisions of the housing market into submarkets? Planning agencies define neighborhoods based on social and political boundaries rather than on an analysis of housing market types. I hypothesize that the neighborhoods defined by planners do not correspond well with housing submarket areas. Neighborhood-based planning is usually confined within a political jurisdiction; I hypothesize that submarkets link exists throughout the metro area and should be taken into account when identifying the intended and unintended consequences of planning interventions.

The present research addresses these questions empirically with data from the metropolitan area of Philadelphia, Pennsylvania. Philadelphia is a particularly relevant location because it is a city with large-scale revitalization needs that is currently pursuing a triage strategy in its Neighborhood Transformation Initiative. Detailed data on housing and neighborhood conditions are available from various sources, including the Philadelphia Board of Revision of Taxes, the Philadelphia Department of Licensing and Inspections, the 2000 Census, and the Philadelphia Indicators Project, which includes public health data and Home Mortgage Disclosure Act data. The research proceeds by first using statistical techniques for market segmentation to define housing submarket areas. Housing submarket spatial structure is described in terms of clustering and variation in housing quality levels. Finally, submarket areas are compared to the administrative areas and neighborhoods defined by Philadelphia’s planners to determine how well the three geographic scales overlap.
1.4 Contributions of the Research

First, the present research has methodological contributions in empirically segmenting the housing market. The confirmatory factor analytic techniques for defining the dimensions of housing quality that define submarkets are an improvement over the existing literature, and the multi-step approach to confirming their relevance can be seen as a contribution to methodology that builds upon the work of Bourassa et al (1999, 2000, 2002). This research capitalizes upon a superior set of indicators of housing quality from several sources to define housing quality levels more fully than previous research. Additionally, the segmentation of the market on the basis of race and ethnicity is a more accurate representation of a racially segmented market than is the current research, which tends to consider race/ethnicity as a direct measure of quality.

Second, this work is the first to explicitly discuss and quantify the spatial distribution of submarkets, even among works that define spatially based submarkets. Much of the extant work makes assumptions about submarket spatial distribution based on either concentric zone price gradients or Tieboutian municipal sorting patterns. This work is the first to discuss the variations in distribution of submarkets in light of these assumed spatial structures. It is the first to examine the spatial clustering and variation in areas, showing that significant quality differences occur within an overall clustered pattern of submarkets.

Finally, this research brings a concept of housing submarkets from the economics literature to an applied setting, assessing its relationship to neighborhood planning practice and its potential for creating revitalization policies that are more sensitive to the housing market. Focusing on specific areas in revitalization planning is meant to maximize the use of limited community development resources through place-based targeting. This research examines the differences in spatial structure as defined through two different theoretical approaches and uses the disaggregated submarket areas to quantify
housing heterogeneity (entropy) within the socio-cultural structure. It is the first work to compare a housing based spatial structure with the socio-cultural structure of neighborhoods, contributing to the planning literature on neighborhoods and revitalization planning. The measurement of neighborhood submarket types contributes to neighborhood planning and community development practice by giving planners insight about the appropriateness of current neighborhood definitions for examining the housing market. Submarkets created from small areal units do not overlap well with the neighborhoods defined by planning agencies. This indicates that neighborhoods are not sufficient tools for understanding all of the potential impacts of revitalization policies. Planners should add a consideration of submarkets in order to understand housing market effects of their programs.

Some planning issues, such as transportation or watershed management, occur at a regional level, as planners recognize the interconnectedness of these networks across political boundaries. Revitalization planners, on the other hand, typically work within their own city, focused on the neighborhood unit without cooperation from other places in the region. While revitalization planning typically occurs within one jurisdiction, metropolitan level analysis is important for understanding the structure of the housing market. A need for a more strategic approach to comprehensive neighborhood revitalization is suggested by the finding that neighborhoods and other metropolitan level boundaries are not appropriate representations of the structure of the metropolitan housing market.

1.5 Organization of the Study

The remainder of this study is divided into 6 chapters. The second chapter, Traditional Neighborhood Revitalization Strategies, reviews the literature on planning within the framework of neighborhoods and suggests that neighborhood may not be sufficient for understanding the housing market impacts of revitalization policy. In the third chapter,
Analyzing the Urban Housing Market: The Submarket Theoretic Approach, I discuss the conceptualization of the submarket approach and review the literature describing the segmentation of the housing market into quality-defined submarkets. This chapter discusses the theoretical frameworks of urban spatial structure that inform submarket research, and concludes by further discussing the connection between neighborhoods and submarkets. The fourth chapter describes the research design and methods used for this research as well as the data available for this study. In this chapter, I describe the housing market of Philadelphia and its current revitalization planning program, the Neighborhood Transformation Initiative. In the fifth chapter, Philadelphia’s Submarkets Defined, I discuss the results of applying these methods to segment the housing market in the city of Philadelphia. The sixth chapter, Submarkets in Space, first discusses the spatial distribution of submarkets in light of economic theory and then compares the submarkets with planner-defined administrative areas and neighborhoods targeted by current policy to examine whether policy boundaries match with housing market boundaries. Finally, chapter seven summarizes the main contributions of the research and provides recommendations for policy and future research.
CHAPTER 2

Neighborhood Planning

2.1 Planners Define the Neighborhood as the Locus of Revitalization Efforts

The traditional approach to urban revitalization planning involves the use of neighborhood as a geographic scale for policy-making attention. Major federal programs such as Urban renewal, Community Action, Model Cities, and the Community Development Block Grant program have all included neighborhood definition and targeting as a component of the strategy for urban revitalization. More generally, Gregory’s survey of 47 adopted comprehensive plans revealed that 93% included neighborhood boundary delineation (1996:11). Chaskin (1998b) reports that foundation-led revitalization programs also rely on a neighborhood focus.

Planners use the rubric of neighborhood because neighborhoods are widely viewed as the building blocks of a city, the appropriate scale at which to target policy. Different conceptualizations of neighborhood as a social and geographic space have been employed by planners in policy analysis and evaluation. This chapter discusses the theoretical and practical approaches to neighborhood, describing the use of the neighborhood construct in revitalization planning. The chapter concludes by suggesting that neighborhood-based
planning allows for the analysis of social and political ramifications of policy, but may not be the appropriate rubric for analysis of housing market ramifications of policy. Neighborhood planning tools could be complemented by the addition of an approach to analyzing policy outcomes in terms of responses in the housing market.

2.1.1 Why the neighborhood as a unit of revitalization?

Planners have long recognized the importance of the neighborhood to both people and cities. The neighborhood can have substantial impacts on individual and family life, particularly health, criminal victimization, and the educational and employment opportunities that provide self-sufficiency (see Ellen and Turner 1997 for a thorough review of the research). An individual’s physical and social environment provides a context for personal development, as it “creates, maintains, deepens, and sometimes modifies values and attitudes” (Rothenberg et al. 1987:251). The neighborhood setting impacts personal development through several dimensions, including physical quality, demography, social and cultural factors, and opportunity structure. These elements of the neighborhood affect decision making about education, child-bearing, and employment, affecting socioeconomic advancement (Brooks-Gunn, Duncan, and Aber 1997, Galster and Killen 1995). Taken in the aggregate, failing to address these neighborhood effects can cost cities millions of dollars in health care, policing and court systems, remedial education, and income supports, among other programs (Quercia and Bates 2001). Across a metropolitan area, neighborhoods vary widely in terms of demographics, income levels, environmental and physical quality, and available services. Metropolitan areas with extreme differences in income between city and suburban residents do not perform as well economically as those with more equal distribution (Rusk 1995). These differences are of interest to planners and policy makers who would like to create equity in publicly provided services, to maintain property values, and to reduce the problems associated with negative neighborhood externalities. Because neighborhood is so important to individual socioeconomic attain-
ment and to area-wide economic and social conditions, neighborhood-based policies are a key component of urban revitalization.

Planners also employ neighborhood-based strategies for practical reasons of program implementation. The neighborhood focus allows the planner to address particular needs and particular outcomes while working at a manageable scale, rather than with the entire city population. Neighborhood-based programs allow for programs that can target specific populations, both for service provision and for planning process reasons. Rohe and Gates (1985:41) list community organizing goals as a key reason for the neighborhood focus in 1960s programs like Community Action program and Model cities. Chaskin, surveying 25 foundations implementing neighborhood programs, finds that 76% report that public participation and responsiveness to community needs is a main reason for choosing a neighborhood focus (Chaskin 1998b:13). Neighborhood-based programming can take advantage of pre-existing organizations for organizing resident input and for offering decentralized locations for service provision (Rohe and Gates 1985: 41).

2.2 Theoretical Definitions of Neighborhood Undergird Planning Efforts

Planners’ use of the neighborhood rubric in revitalization planning is driven by the theoretical construct of neighborhood (see Rohe and Gates 1985, Chaskin 1997 for extensive reviews of the evolution of the neighborhood construct in the theoretical literature). Planners use neighborhood as conceptualized as a social space, a space of interaction, and as part of a political economy system. These theorized functions of neighborhood lead planners to tools for revitalization programming which capitalize on an understanding of the social and political aspects of urban spatial structure.
2.2.1 Neighborhood as social space

Neighborhood may be viewed primarily as a social unit. The ecological view of neighborhoods, first discussed by Park et al. (1925) of the Chicago school of sociologists, views the city as an analog of the natural world. Different social groups compete over territory, migrating when another group succeeds them in an area. Land use and industrial locations drive the movements of populations in search of jobs and housing. Neighborhoods are viewed as “natural areas” that are homogenous in population and can be characterized by their cultural identity. The social interactive model of neighborhoods emphasized not only shared identity, but shared public spaces and networking among residents (Schoenberg 1979, in Galster 2001:2111). The neighborhood is an area within which populations are homogenous and social relationships, such as friendship and kinship networks, exist (Downs 1981:15). Residents in the neighborhood share an identity based within commonly named boundaries (Galster 2001:2111).

As described by Firey (1944), the cultural symbol of the neighborhood, the sentiment attached to the neighborhood, is of paramount importance for understanding the behavior of residents in response to the changing conditions described by neighborhood ecologists. Residents with strong attachment to place will resist population succession and may stymie the forces of urban decline. Temkin and Rohe (1998) write that in areas with a strong “sociocultural milieu,” residents are more likely to engage in collective action to resist downward succession (Temkin and Rohe 1998:69). Planners have employed this social interactive neighborhood in considering neighborhood programming. Revitalization planning may focus on developing greater networks among residents, increasing neighborhood attachment in order to engage residents in the revitalization process. Neighborhood planning practice may use the level of social networks and interaction among residents as a criterion for judging a neighborhood’s potential for revitalization. Temkin and Rohe (1996) suggest targeting neighborhood enrichment policies based on the “potential for offering a healthy social environment for their residents over a significant period of time.”
Neighborhoods without certain social capital indicators should be slotted for voluntary deconcentration. Similarly, Chaskin (1998) promotes targeting neighborhoods that have strengths such as strong organizations and institutions, recognized leaders, and social cohesion (20). The social interactive unit of neighborhood is primarily concerned with relationships within the neighborhood area as resources for community development programming; other approaches to neighborhood place more emphasis on relationships with actors external to the neighborhood.

2.2.2 Neighborhood in a system of systems

Theorists have also viewed the neighborhood as a unit interacting in a system of organizations, political units, and economic actors. This functional view of neighborhoods describes "systems of systems" in which residents act both alone and as members of the community, and the neighborhood unit acts in relation to larger organizational units, such as city government (Chaskin 1998b:12). Relationships are not just interpersonal, but interorganizational (McKnight 1987, in Chaskin 1998b:529). Suttles (1972) defines four levels of neighborhood, each with particular functions and actors operating to create and maintain the environment. The block face, the space over which children play unattended, is an area of intense social networks and control over public space. The second level, the defended neighborhood, is characterized by a sense of identity defined in contrast with other areas. The community of limited liability is the third neighborhood space, and could be the local government district, in which participation in daily affairs is voluntary and may be sporadic. Finally, the expanded community of limited liability is a larger unit, such as the sector of the city (Galster 2001:2114). This description, confirmed in surveys by Birch et al (1974), depicts a nested system from neighborhood to city level, with different types of participation and interaction at each level.

This view of neighborhood as a unit in the political economy lends itself to an approach to revitalization planning that emphasizes the connections among neighborhoods,
organizations and institutions, and powerful economic and political actors. Jacobs sug-
gests neighborhood can be used to organize residents for broader political and social
change, beyond the borders of their own communities, writing that neighborhoods are
“intimately tied—not isolated and self-contained—to the broader structure of the city”
(Jacobs 1961:114, in Chaskin 1998b). In this approach to revitalization, planners con-
sider two types of connections: horizontal links among social actors in the neighborhood,
and vertical links to institutions and actors outside the neighborhood (Warren 1978, in
Chaskin 1998:12). McKnight finds explicating these vertical linkages essential to un-
derstanding neighborhood conditions, as external forces play a large role in setting the
context for neighborhood revitalization (McKnight 1996, in Chaskin 1998b: 529). Kret-
zman and McKnight’s tools for community capacity building include the use of vertical
network-based assets for leveraging resources from outside the neighborhood. They pro-
vide guidelines for planners’ mapping assets based on their location and source of control,
whether in or outside of the neighborhood. Residents must connect with external insti-
tutions, such as social service providers, foundations, and local government, in order to
utilize the assets these groups control (Kretzman and McKnight 1996). Rohe and Gates
(1985) write that these making connections with these institutions and their assets is a
key component of neighborhood revitalization: “The vertical linkages between individ-
uals and organizations in the local community and extra-community systems are also
essential for maximizing the resources and power acquired by a community” (Rohe and
Gates 1985:64). Moreover, recognizing the neighborhood as part of a larger political
system can help to integrate residents into public life, as planners help to increase their
participation in neighborhood, city, and regional issues (Rohe and Gates 1985:64).

2.2.3 Boundary setting as a practical matter driven by theory

In order to plan for neighborhoods, planners must first designate boundaries. How-
ever, the spatial character of the neighborhood is not unambiguous—as in Suttles’ (1972)
nested neighborhood construction. The division of urban space into neighborhoods may
depend on the attributes of interest to the policy-maker (Galster 2001:2113). In some
instances, the need for program administration and data collection may mean that bound-
daries are established in an ad hoc manner, with precise spatial definitions valued over
resident perception (Galster 1986:245). However, boundary-setting does follow from neigh-
borhood theories to attempt to incorporate areas that are homogeneous, physically and
demographically. In general, the neighborhood boundary "separate[s] dissimilar land
uses and populations, and include[s] similar ones" in a small, contiguous area of the city
(Grigsby et al 1987:7).

Chaskin, in his survey of neighborhood revitalization oriented foundations, finds that
organizations choose boundaries that relate to existing, recognized neighborhood names.
These organizations want to incorporate the target demographic group in the neigh-
borhood, along with recognizing relationships among residents, community leaders, and
other organizations working in the area (Chaskin 1998b:18). This approach to boundary
setting is related to the social interactive notion of neighborhood as a space of social
networks. This theory is also employed in resident-driven approaches to neighborhood
boundary setting. Connerly describes neighborhood mapping as a process of confirm-
ing with residents and local organizations their perceived boundaries (Connerly 1996,
3). This participatory method is meant to build upon existing social-spatial networks
among residents, city officials, service providers, and real estate actors (Chaskin 1998:3).
Gregory (1996) and Chaskin (1998b) both find that neighborhood boundaries drawn by
different government administrative bodies and local service providers are rarely coter-
minous. As in Suttles (1972), different actors are concerned with different dimensions of
place—as a symbol for a distinct demographic group, an activity space, a social network,
a programmatic or service area, or a political unit—and therefore draw overlapping and
nested boundaries that need to be aggregated into a singular neighborhood (Chaskin
1998:3).
2.3 Neighborhood May Not be Adequate for Understanding Policy Effects in the Housing Market

The theories underpinning neighborhood planning are mainly concerned with social and political relationships and resources. Material quality of life is an essential component of revitalization planning, and may be addressed through the current use of theory, but considering the impacts on the quality and supply of housing may require additional analysis. It is important to investigate whether social constructions of neighborhood boundaries and planning are, as argued by Grigsby et al (1987:12), largely “meaningless with respect to many components of a neighborhood stabilization strategy.”

Neighborhood definitions based on social groupings or historical names are useful for some purposes, but may not allow planners to predict some effects of policies. In particular, they may not be meaningful geographic units for analyzing housing market reactions to policy interventions. Galster writes that neighborhoods defined by social boundaries may “be the inappropriate scale when one is attempting to analyze investment or mobility behaviors which lead to changes in the physical condition or demographic composition of a given area” (Galster 1986:244). Separate neighborhoods with cultural dissimilarity may share larger environmental factors important for housing value, social relationships may not relate to property investment (particularly for non-resident owners), and real estate market actors, basing their decisions on investment potential rather than sentiment, may have a different judgment of the neighborhood’s quality than residents do. When socially defined neighborhoods do not align with the behavior of consumers in the housing market, policy-making is complicated. If the neighborhood has, as Galster argues, “little or no perceptual or behavioral significance” with respect to resident choices of housing, investment, and mobility, then the neighborhood geography does not offer a tool for assessing the potential housing impacts of revitalization policy (Galster 1986:245).

Because neighborhoods are considered generally homogenous in terms of population
and land uses, it may be that the neighborhood does capture an area of housing quality that can be useful in understanding consumer choices. However, the division of urban space into neighborhoods does not capture housing market dynamics fully because the concept of neighborhood does not include a systematic theory about the inter-relatedness of neighborhood material conditions. Neighborhood planners consider social and political relationships with respect to potential for change: interactions of actors are mainly focused on leveraging resources, political connections, and social network/capital building, not on property investment or household mobility decisions.

Even when planners discuss the use of housing-related measures of revitalization potential and outcomes, they are often related to a single neighborhood, not a system of neighborhoods related to each other in the housing market. Several authors offer criteria for neighborhood revitalization based on housing trends. Starr (1976) concludes that investment should be reserved for healthy areas; planners should manage the out-migration of populations from those areas where “the private market has ceased to function” because they are no longer attractive. Goetze and Coulton (1980) expand on this concept by creating a detailed typology of neighborhoods based on housing conditions and market perception, with neighborhoods falling into one of 12 possible categories, each of which is associated with different types of policy intervention to achieve neighborhood stability. Policy choices are based on the cost of maintenance and rehab of existing housing and on the incentive to improve the neighborhood given the level of market demand (186). These neighborhood planning strategies are based on assessing the individual target neighborhood as a singular unit, with its quality measured in relation to other areas, but its market-based connections to those areas left unexplored. Grigsby et al (1987) point out that the policy of ranking neighborhoods based on housing quality and providing revitalization funding only to some is not, in fact, a strategy for stabilizing neighborhoods within a dynamic, interconnected urban area (Grigsby et al 1987:64). It cannot assess if non-contiguous areas are deemed equivalent in terms of housing-related decisions and
should be analyzed together for impacts of policy. It does not suggest a theory of how similar areas may respond to policy, or of how spillover effects are transmitted across similar areas, even if they are in different neighborhoods. While the neighborhood concept offers a way to analyze the relationship of the neighborhood in the political system, it does not address the ways that areas are related to one another in the housing market.

2.4 Conclusion

Neighborhood planning relies on theories of urban space that gives planners tools for understanding the social and political ramifications of revitalization policies. However, planning interventions also alter the housing market. As explained succinctly by Grigsby et al (1987):

“Changes in social and economic variables cause households[,] acting directly or through a system of market intermediaries[,] to make different decisions regarding level of maintenance, upgrading, conversion, whether to move, new construction, boarding-up, and demolition, producing changes in dwelling and neighborhood characteristics.” (Grigsby et al 1987:33)

Neighborhood conditions change, but the construct of neighborhood itself as used in planning does not directly reflect the housing related decision-making and behavior that causes those changes.

Neighborhood-based planning allows planners to consider social and political ramifications of their programs. However, it may not provide a geographic scale at which to consider housing market ramifications of revitalization policies. In order to improve policy targeting, we need an additional analysis that takes into account connections within the housing market across space. In order to also consider housing outcomes of revitalization interventions, policy-makers should employ a theory of housing as a segmented market in a geographic space, which would allow them map areas related to household
assessment of housing. Using the housing submarket approach, (defined in Rapkin et al. 1953, Grigsby 1963, and others) as an additional tool in neighborhood revitalization planning would allow planners to address the possible response of consumers to changes made to the quality, cost, and location of housing for their needs. The next chapter describes this submarket theoretic approach to analyzing the housing market.
CHAPTER 3

Analyzing the Urban Housing Market: The Submarket Theoretic Approach

3.1 Introduction

Housing economics has developed a framework for the analysis of urban places in terms of household decision-making about where to locate. I suggest that this theoretical framework offers an tool for revitalization planning that is well suited to analyzing place-based policies and their potential repercussions in the housing market. In order to implement effective planning interventions in the urban landscape, planners must employ an accurate representation of the complexities of the urban housing market. This chapter describes the theoretical economic framework of the housing market, explaining the concept of the submarket as an analytic tool and describing the empirical research on the effects of policy on submarkets. I also discuss the most recent literature on operationalizing the definition of housing submarkets, which serves as the foundation for the empirical approach of this investigation into whether current revitalization practice
is reflective of the workings of the housing market. This new set of studies offers a set of methods for considering the submarket as a geographic reality, which makes the concept more relevant for policy-makers than the abstract approaches of theoretical studies.

### 3.2 Evolution of Housing Market Theory

The submarket theoretic approach to analyzing housing markets is at an advanced stage in the evolution of the economic theory of housing markets. The first theorists of urban housing markets considered a simple model of a monocentric city, with identical consumers and a perfectly malleable housing stock (Alonso 1964, Muth 1969, Mills 1972). In this model, housing units are conceived as offering abstract units of housing services, measured by price (Olsen 1969). These models focus mainly on the tradeoffs households make between the amount of residential space, increasing with distance from the urban core, and accessibility, or transportation costs. Analysts model the effects on city size and population in response to changes in income or transportation costs. These models can also incorporate the existence of a durable housing stock with replacements of lost units (Wheaton 1982) and depreciation of housing units (Muth 1976, Brueckner 1980).

With researchers citing inadequacies in the representation of the housing stock, a new approach to housing economics has emerged, one that treats a housing unit not as an amount of housing services, but as a combination of attributes. The housing unit is represented by a vector of the unit’s structural, land, and neighborhood characteristics (Kain and Quigley 1975). These attributes are treated as distinct commodities, each with its own revealed price. The hedonic index method of decomposing house prices for individual attributes follows from this conceptualization. As explicated by Rosen (1974), the hedonic model equates the offer function of supply with the bid function of households (demand) in a market-clearing equation. The attributes of housing are separated as elements of the household utility function, with their value revealed as a
marginal price. Economists have come to a consensus that housing is multi-dimensionally heterogeneous (Rothenberg et al 1991:15). However, the complexity of this approach to housing makes it difficult to generate the clean results of the housing services approach, which allows researchers to estimate the effects of changes to supply and demand fairly easily. The next step in the evolution of housing economics is the submarket theoretic approach, which views the housing market as fragmented.

### 3.3 Modeling a Fragmented Housing Market: The Current Approach

The conceptual framework of housing economics has developed substantially in order to capture the complexities of housing as a good. Rather than a single, well-integrated market of homogenous products with a unitary and instantaneous equilibrium solution, the housing market is fragmented. Market fragmentation arises from market imperfections and product heterogeneity. Unlike most consumer products, housing is durable—it lasts a long time and most of the existing stock is old—and fixed in space—it cannot be transported to the consumer, but must be consumed in place. It may be difficult for households to find complete information about available housing units, particularly if they are located at some distance away, and the cost of changing housing consumption—of moving—is high. These importance distinctions from the typically modeled product market lead to persistent price differences in different parts of the market (Watkins 1998:4, Rothenberg et al 1987:17). On the demand side, households differ in terms of composition, preferences for housing and environmental attributes, socioeconomic status, and life cycle. Each type of household has different needs and desires in terms of housing units and locations. Suppliers of housing produce a wide variety of products in different locations in response to this broad spectrum of preferences and incomes among housing consumers. Replication of housing and neighborhood types may be impossible, leading to
their offering similar but not exactly interchangeable housing products (Maclellnan and Tu 1996). Because of these market conditions, the housing market is in permanent disequilibrium, when considered as a whole (Whitehead and Odling-Smee 1975, in Watkins 1998:17). Price differences in different parts of the market are persistent and not simply temporary adjustments to a unitary equilibrium housing price.

3.3.1 Submarkets as market segments

Each type of housing and neighborhood combination is, in effect, in its own submarket, with its own equilibrium price level. The housing market is therefore best considered as a series of linked submarkets. These complexities must be modeled appropriately by examining the segmentation of the overall housing market into submarkets, or groupings of units of similar quality. Those dwelling units that are close substitutes for consumers comprise submarkets. The seminal work by Grigsby (1963) introduced the concept of housing submarkets, consisting of units that may have different attributes but are evaluated by consumers as being of equivalent quality. Grigsby quotes Rapkin et al (1953:10) describing this distinction between attributes and assessment: “Housing and dwelling units are notoriously unstandardised [sic] commodities, differentiated by location within the housing market area, by size, orientation, layout, materials and age of construction, mechanical equipment, price or rental class, and other features the question is whether the units compete with one another as alternatives for demanders of housing space.” The differentiation of housing quality occurs on the basis of several dimensions: unit structural characteristics and quality, location in the urban area, and neighborhood characteristics. These submarkets can be arrayed in a hierarchy of commodity quality that reveals their substitutability. Units within a submarket are considered substitutes, and are less substitutable with units from a significantly different quality submarket.

This concept of submarkets as the subset of units with similar assessed quality can be understood quite simply by considering the housing search process. A household does not
examine every sale listing available without regard to the features of the home; rather, it sets conditions for a range of attributes that will satisfy its needs and preferences and searches only among the units meeting those criteria. For example, a family may be in the market for a 3 bedroom house with either a garage or a basement, located within walking distance of an elementary school, and views properties meeting these desires only. When the family grows or has increased income, we may say they are trading up to a bigger property or better neighborhood—in other words, they are moving to another submarket of greater housing quality.

3.3.2 Submarkets and market equilibrium

To describe the movement towards equilibrium price and quantity in the housing market, supply and demand must be described in terms of submarkets. Submarkets move toward internal and external equilibrium—they adjust both within the submarket and with other submarkets to create market equilibrium (Maclennan and Tu 1996). Rothenberg et al. find that “units in adjacent quality submarkets are likely to be more closely related—and therefore more similarly affected by market events—than units in different nonadjacent submarkets” (1991: 32). The empirical work by Rothenberg et al. estimates aggregate demand and supply conditions for different submarkets, including cross-elasticities across submarkets. Finding positive price elasticities for closely related submarkets, their conclusion is that substitution does occur between segments of the housing market, with the highest elasticities found for the highest and lowest qualities of housing. In their words, “occurrences in one submarket are transmitted to others through altered behavior of households” with the “strength of transmission non-uniform across submarkets” (1991: 424).

In policy terms, when planners change the quality and supply of housing, they are in fact making changes that resonate throughout all levels of the housing market. That the estimated strength of the transmission is high among the lowest quality submarkets
would be of great importance to revitalization planning, which often targets areas made up of precisely these housing submarkets and therefore would have great impacts. Policies resonate throughout submarkets, which are connected through the relationships of supply and demand. Consider the effects of a policy of demolishing dilapidated housing. Decreasing the supply of low quality housing while demand for it stays constant creates pressures on prices at the low end of the market; these higher prices induce downward conversions of properties by owners seeking to minimize maintenance costs while capturing the now relatively higher prices for low quality housing. Some areas of moderate quality housing will decline in quality, an effect likely not sought by planners. If planners choose a policy of subsidizing rehabilitation for low quality housing, rather than demolition, the interplay of supply and demand changes has a different result. Rothenberg et al (1991:312-14) describe an adjustment process during which the upgrading of low quality units increases the supply of medium quality units, decreasing medium quality rental prices. Some renters can move up from the low quality submarket, decreasing demand in the submarket and lowering prices that rose when low quality supply decreased due to upgrading. The final result may be a long run increase in medium quality units, with a concomitant decrease in rents, and additional downgrading from the high and medium quality submarkets may also result.

3.4 Defining Market Fragmentation: Conceptualizing Submarkets

The most abstract definition of housing submarkets is based on substitutability among housing units. Therefore, markets are divided into collections of individual units, which may be located anywhere throughout the market area, whether adjacent or not. The empirical work by Rothenberg et al (1991) takes neighborhood characteristics into account, but does not impose contiguity constraints on the market segmentation. In prac-
tical terms, however, researchers recognize that substitutable units tends to be clustered, because of the non-uniform distribution of housing and site characteristics and the importance of location for housing quality (Megbolugbe et al 1996:1781). Current approaches to the empirical definition of submarkets tend to consider the spatial ramifications of market fragmentation explicitly, examining the submarket as a spatial phenomena as well as an artifact of supply and demand conditions. This body of research includes some work that imposes particular theorized frameworks of urban spatial structure, and other approaches that allow the spatial distribution of submarkets to be empirically determined.

3.4.1 Dimensions of housing quality segment the housing market

There are two major components of housing quality that divide the market into submarkets: unit characteristics and neighborhood characteristics. In order to carefully define housing quality, it is important to capture as many characteristics of the multidimensional housing unit as possible. Maclennan and Tu (1996) find the age, size, and structure (detached, semi-detached, or apartment) of the unit to be key dividing points. Rothenberg et al (1991) employ housing condition measures related to available facilities and structural soundness for market segmentation. Bourassa et al (2002) find that a variety of attributes contribute to submarket division, including space, dwelling age, condition, and building materials, views, and characteristics of the yard space.

It is also important to consider neighborhood attributes as an aspect of housing quality differentiation when defining submarkets. Neighborhood quality is also an important component of consumers’ preferences for housing units. Researchers find that housing prices are affected by neighborhood attributes such as racial composition, income distribution, employment conditions, homeownership rates, and vacancy rates (Kiel and
Kain and Quigley (1970) and Argeuea and Hsiao (2000) use factor analysis to construct multiple dimensions of housing quality that include neighborhood variables, finding that these measures account for a significant component of house value.  

Following this extensive literature, defining submarkets should include considering the substitutability of neighborhood characteristics, as well as unit characteristics. Bourassa et al (2002) describe housing submarkets by measuring neighborhood quality in terms of access to the CBD and other points of interest, homeownership rates, population and unit density, and some socioeconomic characteristics. They conclude that including socioeconomic characteristics of neighborhoods when stratifying the housing market improves their accuracy in predicting house prices within a submarket.

3.4.2 Defining submarkets through hedonic prices

Hedonic price modeling can be used to verify the identification of submarkets through housing attribute pricing. Because housing is a complex product with many characteristics that are traded together in a bundle, hedonic models are used to decompose the effects of each attribute. To do this, the attributes of housing are regressed on price. The resulting coefficients are marginal or implicit prices for each attribute (Rosen 1974).

1Zabel examines racial composition, neighborhood education levels, and vacancies. Wachter and Megbolugbe (1997) proxy neighborhood quality with a variable for central city versus suburban location and with the AHS neighborhood satisfaction variable. Somerville and Holmes (2001) quantify the neighborhood with the proportion of housing that is affordable and the proportion of the population that has low income. These studies all find neighborhood variables to be important for housing prices.

2Kain and Quigley’s 1970 article on estimating the importance of housing quality is seminal in this approach. They create factors to represent various aspects of neighborhood physical quality and also examine neighborhood education levels, schools, and crime. They find that environmental factors are in fact significant determinants of house prices, particularly environmental factors and neighborhood education levels. Arguea and Hsiao (2000) update this approach to use prespecified dimensions of neighborhood quality rather than allowing a statistical program to choose the factor array. Arguea and Hsiao find that the quality indicators from AHS-junk, crime, noise, litter, education levels, and racial composition-are significantly related in a factor structure that in turn significantly predicts house prices.
Typically, characteristics of the unit and neighborhood are entered into the regression equation as direct determinants of housing value. Generally the findings are consistent in terms of direction of influence, and they are consistent with expectations of how characteristics or quality contribute to value. However, the size of effects is not at all consistent across studies (Mills 2000). This inconsistency can be explained by the fragmentation of the housing market into submarkets, not often well accounted for in hedonic studies. Straszheim (1975) suggests that debates over house prices arise due to the failure to properly define submarkets, including the overbounding of submarkets, which leads to unreliable measures of attribute marginal prices (in Palm 1978:211).

The submarket is a break point for hedonic prices (Hancock and Maclennan 1989, Maclennan and Tu 1996). Because of different supply and demand pressures from sub-market to sub-market, marginal prices—the price consumers are willing to pay for an attribute—differ. Watkins states that the persistent and significant variation in attribute prices is a necessary condition for submarkets (Watkins 1998:6). It is not enough to observe identifiable subgroups of products or consumers; in order to define a submarket there must also exist “significant variations in price after standardizing for product complexity” (Kotler 1972, in Watkins 1998:6).

As parameters change across different areas it is possible to detect how affects the marginal price of features of both housing and neighborhoods. For example, a two-car garage is not worth the same amount in the central city as it is in the suburbs. Similarly, the importance of being near public transit is expected to be greater in lower income or central city neighborhoods than in higher income/suburban locations. Hedonic regression can be used, then, to determine the structure of submarkets in a metropolitan area. Points at which marginal prices differ significantly are the boundaries of the submarket, where the same housing unit commands a significantly different price. Several studies

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3Can (1992) and Can and Megbolugbe (1997) find that parameters of marginal price drift; they account for spatial heterogeneity, or possible parameter drift, by weighting neighborhoods based on quality variables. Hedonic prices are allowed to drift based on spatial location and the unit’s neighborhood. The
have used this technique to confirm the existence and importance of submarkets in local housing markets. Schnare and Struyk (1977) find differing hedonic prices across quality-segmented groups of units; Goodman (1981) also confirmed that marginal prices are not stable across submarkets. The approach of Rothenberg et al (1987) is somewhat more simplified in that the hedonic index is merely stratified into deciles, dividing the market by standardized prices. That approach does not capture the key feature of price differentiation, however, merely of price differences.

3.5 Investigating the Spatial Nature of Submarkets

Some empirical investigations of housing submarkets have conceived of submarkets as a collection of units, often space and place-less. However, the housing market is not just an abstract collection of units in a nebulous market space. Units are located in a real geography and have spatial relationships with one another. Market segmentation, then, must explicitly address space and location as characteristics of submarkets in order to analyze submarkets in a meaningful way for policy making. Considering the spatial component in this analysis is important because planners make policy interventions that apply to certain places-in particular, enacting programs to revitalize neighborhoods-not just to certain units of housing, or uniformly to the entire city. Several authors have investigated the spatial submarket hypothesis, concluding that submarkets are, in fact, best defined as spatial areas rather than as individual housing units. Their works can be characterized broadly as either determinant or agnostic with respect to spatial relationships, depending on what geographic constraints are placed on the analysis. Determinant approaches may follow theorized notions of urban spatial structure, predominantly the concentric zone model (the Alonso-Mills type of housing market) or the Tieboutian sort-studies by Can model instability in hedonic prices as a phenomenon of spatial error in estimation; I view this as a phenomenon of market fragmentation that can be accounted for by modeling spatially based submarkets.
ing theory of competing jurisdictions. Agnostic approaches are more exploratory, allowing the submarket’s spatial distribution to be statistically determined.

3.5.1 Determinant approaches to spatial submarket definition

Those authors working in a determinant method of defining submarkets work with large pre-specified geographies, such as political jurisdictions, zip codes or city sectors. The division of the market into submarkets that differentiate housing and neighborhood characteristics is constrained by these boundaries. In this regard, the method is more like the planners’ use of neighborhood constructs in policy-making, as variation within the area is largely ignored. Submarkets are large, contiguous, and homogenous within the given area. Maclennan (1992) examine price pressures caused by area-based latent demand by dividing the market into local authority’s administrative boundaries, large areas that do not allow for much detailed characterization. Maclennan and Tu (1996) find persistent differences in hedonic prices among distinct sectors of a city—northeast, east, etc. Adair et al (1996) first segment the city into three geographic areas, then examine housing product differentiation within the sub-regions. Two distinct lines of inquiry in this body of research have their underpinnings in theories of urban spatial structure that have testable implications for the structure of submarkets.

Submarket definitions based on the Alonso-Mills-Muth model

The Alonso-Mills urban land market model suggests that house prices follow a gradient increasing with distance from the central business district of a city. Higher income households trade higher transportation costs for larger amounts of land (at lower costs per unit of land), leaving lower income households closer to the CBD in more densely populated areas (Mills 2000 reviews the development of these models). This model is compatible with Park et al.’s (1925) concentric zone model of cities. In these conceptualizations of urban space, demographics and housing quality are uniform at a specified
distance from the CBD. The implication, in terms of submarkets, is that submarkets are defined primarily by location vis-à-vis the CBD and that distance creates the quality hierarchy of submarkets. Moving further from the core is equivalent to moving up the submarket ladder.

This notion of urban structure is underlying the research that defines submarkets by distinguishing among core urban, suburban, and fringe areas. Schnare and Struyck’s hedonic work (1976) defining submarkets was based on a core urban area/suburb distinction, stratifying zones based on distance to the CBD and income. Munro (1986) also concludes that submarkets are defined by a core/suburb gradient (in Watkins 1998:13). Bourassa et al (1999) test a concentric zone-based submarket definition that divides New Zealand cities into 5 rings, with boundaries chosen by distance to the CBD and population density. They find that these rings are the best spatial segmentation for estimating house prices in hedonic models (Bourassa et al 1999:167). The literature employing the Alonso-Mills-Muth theory of housing market structure defines areas as homogeneous if they are at an equivalent distance from the CBD. Price gradients increase monotonically with distance from the CBD, rather than varying widely in close proximity.

**Submarket definitions based on Tieboutian theory**

Submarket research based on the work of Tiebout (1956) also envisions large, homogeneous areas of housing quality, with the urban area divided by the boundaries of political jurisdictions. Tieboutian theory depicts households competing to enter desirable communities, with the result that households sort into jurisdictions based on the quality of their services. Within a political jurisdiction, housing quality is constant, and household demographics are likely to be homogeneous (Ross and Yinger 1999). Hamilton (1975) posits that zoning regulations assure uniform, optimal housing quality levels and finds that household sorting into jurisdictions is absolute. The implication of Tieboutian theory is that each political jurisdiction’s boundaries define a distinct housing quality
level submarket.

The approach of defining submarkets as distinguished by political boundaries implicitly follows Tieboutian theory. Palm (1978) confirms counties in the San Francisco metropolitan area as housing submarkets. Goetzmann and Spiegel (1997), also testing models for the San Francisco Bay Area, find that hedonic prices for neighborhood attributes vary across bounded areas, concluding that submarkets are important for house price studies. Heikkila (1996) explicitly argues that municipalities in the Los Angeles area are Tieboutian, testing the homogeneity of jurisdictions in terms of land use and demography.

3.5.2 Agnostic approaches to spatial submarket definition

More recent work investigates the spatial nature of housing submarkets in an exploratory manner, building submarkets from the smallest possible unit of geographic aggregation. This approach allows for submarket areas to be irregularly shaped or interspersed with other levels of quality. Hancock and Maclennan (1990) work from the assumption that housing within a very small area is in the same submarket, regardless of unit characteristics. Comparing F-values for hedonic equations block group by block group, they find 5 to 6 locationally distinct submarkets with disparate hedonic prices in a city of half a million. Maclennan (1994) further investigates the spatial nature of submarkets by mapping units based on their physical characteristics, finding that the product-based submarkets are spatially distinct. These areas, he reports, had significantly different rates of price inflation over time. Bourassa et al (2002) report that submarkets defined as small, homogenous geographic areas have more practical utility than do submarkets defined by techniques that ignore spatial contiguity, writing that “submarkets matter, and geography is what makes them matter” (2002: 25-7). Their research concludes that while appraiser-established neighborhoods are acceptable geographic divisions for home valuation purposes, they are not adequate for more involved
analyses. It is important to use statistical methods to construct submarkets for the analysis of urban dynamics (Bourassa et al 2002:27).

This body of literature does not impose any particular spatial structure on the distribution of submarkets, as do the Alonso-Mills and Tieboutian approaches to submarkets. Nor does it require submarkets to be contiguous or for quality to be uniform within smaller areas. However, these works have not explicitly discussed the spatial distributions found in their statistical construction of submarkets. It is unknown whether the researchers found that submarkets did generally confirm the price gradient model of the urban housing market, whether submarket boundaries are gradual or differ sharply between quality levels, or whether submarkets are found to cross jurisdictional boundaries.

3.6 Relationship of Submarket to Neighborhood

It is important to note that policy impacts on housing in a city are described as occurring within a particular submarket, not in a neighborhood. However, again, neighborhoods change because housing quality is clustered—therefore changing supply and demand conditions in a particular submarket affect some neighborhoods more than others. While the conceptual definition of neighborhood is not equivalent to that of the submarket, it may be that housing quality clustering is such that neighborhoods would be acceptable geographic units for defining submarkets and could be used to analyze potential policy choices. Megbolugbe et al. (1996) write that neighborhoods can be thought of as representing submarkets. Bourassa et al (2002) find that neighborhoods are homogeneous in terms of housing quality, although they do not depict the extent of a submarket with the neighborhood construct.

Grigsby et al (1987:22) do not define the submarket as a neighborhood, stating that neighborhoods may be submarkets only if the neighborhood supplies different characteristics not replicated in any other area of the city, and households bid up prices in
such a defined neighborhood rather than moving elsewhere. However, it is more likely that the characteristics judged by households in defining submarkets are not physically bounded by the lines drawn to define a historic or social neighborhood—what they refer to as a place made up of a contiguous area plus a social “something else.” Environmental amenities or disamenities may cross neighborhood boundaries—for example, a park that is surrounded by multiple neighborhoods, or a polluting industrial site at the edge of one neighborhood. School districts are likely to encompass several neighborhoods. Architectural housing styles and land use patterns may extend beyond a neighborhood to other areas built in the same era. Grigsby et al conclude that “neighborhoods are likely not the scale at which households make decisions about housing quality. The locational attributes of housing that are important to household decision making may be external to or extend beyond neighborhood boundaries” (Grigsby et al 1987:11). If the neighborhood does not bound a submarket, it cannot be substituted into the analysis of supply and demand necessary for understanding policy impacts. Therefore, traditionally defined neighborhoods would be inappropriate areas for understanding the housing effects of interventions. Instead, submarkets must be defined on the basis of the way households make decisions about housing in a given urban area in order to understand which areas of the city are within the same submarket or in closely related submarkets. This definition requires a process distinct from that of planners’ mapping neighborhoods.

3.7 Operationalizing Housing Market Segmentation

The field of housing economics has evolved from the housing services approach to examine unit attributes and finally to the recognition of the housing market as fragmented into quality level submarkets. The submarket approach offers both theoretical and empirical evidence to describe the interconnections of different types of housing in the overall supply and demand of the market. The operationalization of the conceptual
definition of the submarket as a quality-level segment of the housing market has been explored in several empirical studies. This literature reveals that defining housing submarkets through statistical methods requires the use of several methodologies to create a quality-based hierarchy and confirmation through hedonic price models. The approach should acknowledge spatial relationships in the urban market area, and should be agnostic in determining the shape and size of the submarket in order to test extant theories of urban housing market spatial structure. In the following chapter, I describe the specifics of applying these methods to segmenting and analyzing the housing market for the city of Philadelphia.
The current research will address the spatial distribution of housing submarkets in the metropolitan area relative to both extant theory and to neighborhood planning practice. This chapter describes the research design, data, and statistical methods used in answering the questions raised about whether revitalization planning appropriately takes into account household decision making about housing. This chapter is divided into four sections. First, the research design is described in general, including discussion of the strengths and weaknesses of the design. Second, I provide a description of the Philadelphia case. Third, I discuss the statistical methods for defining housing submarkets and describing their spatial distribution, including comparisons with neighborhood geographies. Finally, the data used in the study are described and their advantages and disadvantages discussed.

4.1 Research design

In order to address the questions of the spatial distribution of housing quality submarkets relative to theorized urban spatial structures and to policy target neighborhoods, I must first define submarkets as spatial areas consisting of constant quality. The distri-
ution of these submarkets is mapped and compared to pre-existing geographies using several statistical techniques. The empirical study is conducted for the metropolitan housing market of Philadelphia, Pennsylvania, which is described in detail in this section. Throughout the section, the research design choices are evaluated for their strengths and weaknesses.

4.1.1 Defining submarkets

The process of defining submarkets in a metropolitan area is a three-step method based on the work of Maclennan (Hancock and Maclennan 1999, Maclennan and Tu 1996) and Bourassa et al (1999, 1999b, 2000, 2002). Housing market segmentation into submarkets requires defining groups of housing of equivalent quality, which are considered substitutes by housing consumers. As explained in Bourassa et al (1999, 1999b, 2000, 2002) this process requires the careful definition of the dimensions of housing quality and then grouping small areas into distinct market segments according to their quality. Submarket types are defined using neighborhood indicators key to housing quality assessment. First, multiple measures of housing quality are reduced to more generalized dimensions with confirmatory factor analysis. Second, the composite variables are in turn entered into a cluster analysis that groups tracts with other areas of similar housing stock into submarkets. Finally, the statistically created submarkets are tested by using submarket dummies in a prediction of individual unit sales price to determine if the groupings of areas are acceptable for creating significantly different quality level submarkets.

Spatial assumptions

As in Maclennan and Tu (1996), Bourassa et al (1999, 1999b, 2000, 2002), and Day (2003), this approach assumes that all housing in a block group is in the same submarket. This approach is taken because of the dominance of locational quality factors
in determining housing quality and thus household preferences. Here I define submarkets based on census block groups as the smallest geographic unit of data collection available. While it would be preferable to have an even smaller unit of measurement, the block group is a relatively homogenous area that can capture the locational qualities of housing important to households. As it is far smaller than predefined policy areas, it captures variation in housing quality variables at a level that can be aggregated upward to evaluate whether predefined areas define consistent levels of housing quality.

Alternate approaches to empirical market segmentation

This multi-step method is the most appropriate for defining housing submarkets, according to the conceptual and empirical literature. As explained by Watkins (1998:4), the submarket, conceptually, arises when segmented demand (different types of households) matches to a differentiated housing stock (different types of housing units). The first step in examining the segmentation of a product market, in the general case, is to assess whether distinct commodities are offered in the market. Producers offer these distinct commodities in order to connect with particular demander groups (Kotler 1972, in Watkins 1998:6). In the case of a somewhat less heterogeneous product, distinctions may be made rather easily: One can observe a two door versus four door sedan, for example. In the housing case, this requires a more complicated procedure to first define the different available products, distinguished by unit, physical environment, social environment, and other characteristics. The second step is to determine whether the product groups identified are, in fact, viewed by consumers as different products that are not entirely substitutable. Again, are the two and four door sedans priced differently based on differences in consumer demand for each type? In the housing case, the question translates as: does product group membership alter the equilibrium marginal prices found through hedonic modeling?

Other approaches to submarket definition do not fulfill this conceptualization of a
segmented product market. Rothenberg et al (1991) simply divide the market into deciles of predicted hedonic price for the unit, arguing that similar prices indicate indifference among the units offered at that price band. However, there is no reason to assume that consumers divide the market by deciles, rather than quantiles, quintiles, or a non-uniform division of prices. Further, this method does not allow for prices to vary among submarkets based on the unique combinations of attributes each delivers. Units with the same total predicted price may not be considered substitutes by different types of households—price alone is not sufficient to define a market segment, only to confirm its functioning as a submarket. A second alternate approach is to explore each block group one by one, testing for structural stability in marginal price coefficients in a hedonic regression. One can imagine cases in which marginal prices for an attribute are the same among units that are not actually substitutes. Galster (1996: 1800) and Watkins (1998:10) agree that conceptually, the work of Dale-Johnson (1982), which first defines distinct quality levels for housing, then tests their marginal prices, hews most closely to the substitutability criterion of Grigsby’s definition of submarkets.

**Submarkets over time**

Defining housing areas as submarkets should not be seen as a one-off operation. Changing supply and demand conditions mean that areas can shift their submarket membership. Because the data for this study are, for the most part, indicators of quality in the year 2000, the study’s findings of submarket boundaries and conditions should, strictly speaking, be considered a snapshot of the 2000 housing market. Changing conditions may alter household assessment of housing quality in a given area, changing it submarket membership. In order to plan in a dynamic environment, policy-makers would need to update their assessments of market conditions in response to changing housing conditions on the ground.
Housing quality as a multi-dimensional construct

In order to define distinct quality levels in the housing market, there must first be a careful definition of the construct of housing quality. In this analysis, I use confirmatory factor analysis to construct factors representing the latent variables for the multiple dimensions of housing quality. The dimensions of housing submarkets that are defined in this study include both characteristics of the housing areas available, in terms of housing type, land uses, physical quality, location, and services, and characteristics of demander groups, measured in socio-demographic terms. These dimensions capture both the unique supply and unique demand components of market segmentation. Many indicators representing different facets of housing quality are used in this process. The choice of these indicators follows a large body of literature that measures the importance of various housing and environmental characteristics to housing quality assessment. Some of the most important variables for housing quality measure the general economic status of the neighborhood-its income distribution, homeownership rates, and signals of decline or turnover (Kiel and Zabel 1997, Can and Megbolugbe 1997, Arguea and Hsiao 2000, Bourassa et al 2002). Additionally, the land use mix and property status is important, particularly vacancies and subsidized housing (Kain and Quigley 1970, Zabel 1999, Somerville and Holmes 2001). Public school quality is a well documented factor in housing values (see, for example, Bogart and Cromwell 2000). Finally, crime in the area should also be a key component of housing quality (Kain and Quigley 1970).

The dimensions chosen for the representation of housing quality levels are still driven, to some extent, by data availability. However, the multiple factors chosen in this analysis do capture many of the dimensions of housing quality identified in the research on house value. The factors that will be tested and estimated are: housing wealth, which captures tenure and equity dimensions significant for distinguishing areas; physical blight in the area; the presence of rental housing, which is separated into market rate renters and subsidized renters; a socioeconomic indicator of poverty and deprivation, which distinguishes
demander groups in the area; public school quality, which is important in itself and serves to proxy for public services in general; non-residential land uses, both commercial and industrial; housing unit type; racial demographics, which test for submarkets characterized by the race of the residents; measures of change or stability in terms of population and house price changes; and location relative to the central business district. These twelve latent variables will be estimated using a large number of measured indicators, and the structure of the dimensions confirmed through statistical significance testing. The procedures are described in the later section on statistical methods.

4.2 The Case Study: Philadelphia

The submarket analysis in this study is conducted in the metropolitan area of Philadelphia, Pennsylvania. The first section of the empirical analysis focuses on the city of Philadelphia, and is followed by a metropolitan-wide examination of the housing market. This area was chosen because it represents a particular challenge for urban revitalization planners. Philadelphia is a declining northeastern industrial city with extensive revitalization needs and a number of fragile neighborhoods. The central city lost 10% of its population from 1980 to 2000, a total of over 170,000 people (Brookings Institution 2003:11). Its neighborhoods are of widely varying quality; some are experiencing rapid gentrification, others severe distress. Physical blight is concentrated in declining neighborhoods, and the number of vacant lots and abandoned buildings per capita, 36.5 per 1,000 residents, is the greatest of any city in the U.S. (Uzelac 2001, in Pooley 2001:4). The city’s problems clearly require a strategic approach to the use of revitalization funds to meet its extensive needs. This approach may require a regional policy, which could incorporate information about the larger metropolitan housing market, yet the Philadelphia metropolitan area has no regional housing development or urban revitalization strategy (Whitman and Pine 2002:3).
4.2.1 Philadelphia’s housing market

Before considering the segmentation of Philadelphia’s housing market, it is first important to understand the overall context of the market. This context includes population demographics and changes in the region, the housing stock available, and the overall price levels of housing.

The Philadelphia region consists of nine counties: Bucks, Chester, Delaware, Montgomery, and Philadelphia counties in Pennsylvania and Burlington, Camden, Gloucester, and Salem counties in New Jersey (Federal Reserve Bank of Philadelphia). Along with Philadelphia proper, the city of Camden is a major urban center in the metropolitan area. While, as previously mentioned, the city of Philadelphia (pop. 1,517,550) has been steadily losing population, its region (pop. 5,387,407) continues to grow. The total regional population grew 3.6% from 1990 to 2000, but the suburban areas grew 7.4% (calculation from U.S. Census data). Chester, Montgomery, and Bucks Counties are among the fastest growing in Pennsylvania, with growth rates over 10% for the 1990-2000 period (TRF 2003:5). The region’s population as of 2000 was majority minority, with 42.6% black, 8.5% Hispanic, and 4.5% Asian population (calculated from Census 2000). However, immigration to Philadelphia is low relative to other major cities-Philadelphia is the fifth largest city in the U.S., but ranks 55th out of the 100 largest cities in terms of immigrant population (Brookings Institution 2003:24). Most of the foreign-born population in the region is in the suburban counties.

The housing stock in the Philadelphia region varies widely from city to suburbs, as in most metropolitan areas. The city’s housing stock is somewhat unique among large cities in that the vast majority of housing stock is a rowhouse style. Eighty percent of owners and half of renters in Philadelphia live in rowhouses. There are few large multi-family dwellings compared to other central cities, where most renters live in large apartment buildings. (Hiller and Culhane 2003:24). The large numbers of rowhouses in the city creates additional problems when units deteriorate. Because of the structural interde-
pendence of the row of units, demolishing one leaves exposed walls and can destabilize the row’s foundations and walls, potentially worsening the condition of the standing units. The suburban part of the Philadelphia region has a wide range of housing stock and land use, from streetcar suburbs along the Main Line to rural residential areas, and including some large towns with significant physical deterioration.

As the city of Philadelphia has lost population, it has also lost housing stock. Approximately 13,000 units were lost to abandonment from 1990-2000 (Whitman and Pine 2003:3). At the same time, the surrounding suburban region gained over 150,000 new units in low density development (Whitman and Pine 2002:3). New housing construction is greater than household growth in the area, creating an oversupply of some types of housing. Development within the city has been difficult due to high construction costs. According to the Philadelphia branch of the Federal Reserve Bank, the city has the sixth highest construction costs among the fifty largest metropolitan markets in the U.S. Costs, which are 20% above average, are greater than market value for some inner city properties (Santomero 2005). Despite oversupply in the suburbs and the difficulty of constructing new units in the central city, house prices appreciated 16% per year over the 1995-2000 period. Some neighborhoods in the city have experienced rapid appreciation, such as Center City, where prices grew 120% over the five year time period (Santomero 2005). Still, Philadelphia’s house prices remain affordably for many families, which explains the high homeownership rate compared to other central cities. Homeownership reached a high of 62% according to the 1990 Census, but actually dropped to 59.3% in 2000 (Hiller and Culhane 2003:2). Whitman and Pine (2003:5) relate this decline in ownership to increased foreclosure rates; many properties convert to rental after seizure and resale. The increased foreclosure rate is a challenge for a city that has typically been majority homeownership.
4.2.2 Philadelphia’s Neighborhood Transformation Initiative

Philadelphia is currently pursuing a neighborhood-focused revitalization strategy, the Neighborhood Transformation Initiative (NTI). NTI is particularly focused on combating physical blight, with some areas slated for extensive demolition. Currently, revitalization efforts are underway in 34 neighborhoods, with specific policies applied according to the neighborhood’s present quality level. The Reinvestment Fund, Inc. (TRF), a private firm, created a classification system to be used for targeting resources in the NTI strategy. The resulting typology designates the lowest quality neighborhoods for “Reclamation”—they may be slated for extensive demolition and redevelopment. Target neighborhoods for revitalization are those with “unique locational, institutional, and social assets” and would receive interventions designed to stem decline (TRF website).

NTI activities include clearing vacant lots, towing abandoned cars, graffiti removals, hazardous tree removal, demolishing vacant properties, and an overall crackdown on building code violations in target neighborhoods (City of Philadelphia 2003: 7).

Initially, the major activities of NTI have been the demolition of vacant and abandoned housing units and cleaning vacant lots in order to assemble land for development. The Philadelphia City Planning Commission refers to NTI as a “predevelopment” program designed to prepare areas for private investment. From 2000 to 2003, the city of Philadelphia allocated approximately $275 million to the Neighborhood Transformation Initiative. Of that amount, $117 million (approximately 43% of the total) was used for property demolition, $14 million for property stabilization, and $74 million for land assembly for new development (City of Philadelphia 2003: 7). The city also completed construction on 5,128 new affordable housing units (over 2,800 of which are public

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1The NTI planning neighborhoods are: Nicetown, Tioga, South of South, Point Breeze, Grays Ferry, Jefferson Square/7th Street, Fox Chase, Burholme, Upper Northwest, Lawndale, Upper Holmesburg, Mt. Airy, Germantown, Olney, North Central, Strawberry Mansion, Sharswood/Brewerytown, Francisville, Fairmount, Fairhill/St. Hugh, Hawthorne, Kingsessing/West Shore, Mantua, West Powelton/Saunders Park, Wynnefield, West Parkside, Overbrook/Carroll Park/Haddington, Frankford, Wisinoming, Parkwood, and Callowhill.
housing units), with nearly 3,700 more units under development (City of Philadelphia 2003:27). Approximately 2,500 units were rehabilitated by the city itself, and over three years, almost 12,000 homeowners were allocated subsidies for their own maintenance and upgrading activities (City of Philadelphia 2003:28).

This research argues that when policies are based on an insufficient consideration of the housing market, it may be difficult to anticipate results and choose the best revitalization strategies. Philadelphia’s NTI plan illustrates this problem. Once the classification and policy strategies were developed, the city began to implement policies within the framework of its historically identified neighborhoods. As Philadelphia is popularly known as a “City of Neighborhoods,” these geographic units likely have great social and political importance. However, it is not clear whether their use in a housing policy schema captures the variations important for understanding how policies might affect the housing market. The neighborhood classifications calculated for the NTI plan may not correspond well with consumers’ assessment of the area as a housing market, which is the basis of household decision-making around housing behaviors. The system is based on: housing tenure; the age of housing; the proportion of properties that are demolished, vacant, or dangerous; the percent of properties categorized as commercial; the year, value, unit type, and price for the most recent property sale; the total number of residential units; and the percent of households with “high risk” credit scores (TRF website). The data used are indicators of some aspects of the real estate market, but are not likely sufficient to classify areas based on the choices and behaviors of consumers in the housing market. This classification does not adequately measure neighborhoods as areas of housing; it does not encompass residential preferences on housing units and neighborhood amenities. The most apparent missing piece to the classification is the lack of data on housing itself. A housing market-based typology should better describe the types of properties available—the living area, structural qualities, and amenities. The neighborhood and location of the areas are key components of a housing market clas-

47
fication system. For example, important measures of housing quality are public school quality, a major component of house value and a major reason for the difficulty of attracting families to live in the central city, the presence of industrial brownfields, and the location vis-à-vis the central business district, none of which are included in the neighborhood classification. The current research seeks to create a housing submarket typology that would better allow planners to consider the housing market in their policies by including these and other factors that are key to defining the housing supply in the area.

The Neighborhood Transformation Initiative’s identification of policy areas as historically recognized neighborhoods makes Philadelphia an excellent case study for examining the research questions identified. However, the analysis of one city makes generalizability more difficult, so here I define a target population of large, older cities with major revitalization needs and limited resources for neighborhood redevelopment. Philadelphia has a decaying urban center with population loss and extensive blight, and is actually beginning to implement triage as its main revitalization strategy. The choice of this type of urban center as a study area makes this research relevant for the many highly distressed urban core cities in the older industrial northeast/Midwest. These cities have similar supply and demand conditions; the construction of submarkets for Philadelphia will be more applicable than for fast-growth or booming cities.

4.3 Statistical Methods

4.3.1 Defining spatially based housing quality level submarkets

The empirical definition of spatial housing submarkets requires the multi-step method discussed above. First, confirmatory factor analysis defines the multiple dimensions of housing quality. The factors defined are then used to segment the market with cluster analysis, a technique for grouping similar data. Finally, these clusters of similar housing
areas are confirmed as submarkets using hedonic models that test for significant price differentials among the groups.

4.3.2 Confirmatory factor analysis defines dimensions of housing quality.

The first step of the analysis relates the abstract concept of housing quality, which divides the market into submarkets, to defined dimensions of quality that can be measured. Confirmatory factor analysis offers a framework for reducing multiple measured indicators to a smaller number of more generalized dimensions with an empirically estimated model. The factor model reduces also measurement error by capturing more of the housing quality construct than single variables can.

Confirmatory factor analysis first requires the careful definition of the abstract concept (in this instance housing quality) as a multi-dimensional construct (Bollen 1989:180). Bollen (1989) describes the senses in which this definition and the model derived from it should be valid. The theoretical definition should meet standards of content validity by tapping the meaning or content of the concept in a theoretical sense (Bollen 1989:185). Each dimension defined in the first step is represented by several measured indicator variables, which should be highly correlated with one another to meet the requirement of criterion validity (Bollen 1989:186). Construct validity is met when the variables relate to other variables in the direction expected based on theory and prior research (Bollen 1989:187). Furthermore, the factor analysis model should be reliable, which can be tested using Cronbach’s alpha (a lower bound for reliability) to test if the variables that make up a dimension hang together well. In order to meet the standard of content validity, the choice of indicators follows a large body of literature that measures the importance of various housing and environmental characteristics to housing quality assessment. In determining which measures to employ in capturing these dimensions, I consider the cor-
relation matrices and Cronbach’s reliability scores separately for each dimension’s group of indicators. After assessing the validity and reliability of the available indicators, the factor model can be estimated.

The model estimation relates the measured variables to the theorized dimensions with factor loadings, which are the correlations between the measured indicator and the latent dimension variable. The typical estimation method is maximum likelihood, which gives consistent and unbiased estimators, and also provides overall fit measures for the model (Bollen 1989:107). A factor score is computed for each latent variable for each observation by multiplying the vector of standardized values of the measured variable by the factor loading structure matrix. These scores can then be used as variables, for example as predictors in a regression (Bollen 1989:180, Kline 1998:189). In this instance, the factor scores are entered into the cluster analysis that is the second step of the housing market segmentation process.

4.3.3 Cluster analysis groups similar areas

In order to assess the similarities of block groups’ housing and create relatively homogenous submarkets, cluster analysis is performed on the factor scores (as in Bourassa et al 1999, 1999b, 2001, 2002). Cluster analysis searches across observations for a natural grouping of observations that are similar to one another. Romesburg (1990) describes clustering as used for planning applications as aiding in decision-making by finding “classes of objects that should be treated or addressed in the same way” (1990: 69). In the housing market segmentation, I seek to find the classifications that are most strongly related to the variables of interest (here, house prices).

The agglomerative hierarchical model used here starts at the individual block group observation level and merges similar block groups into clusters. The idea is to maximize similarities among units within the cluster, while minimizing similarities between clusters (Griffith and Amrhein 1991). The analysis does not begin with an assumption about the
number or structure of groups, but simultaneous determines these parameters from the
given data. In Ward’s method, chosen for its ease of interpretation and efficiency of
computation, clusters are merged based on variance from a cluster mean. Each cluster
has a mean score for all attributes; each other cluster has a difference from that mean. The
clusters are merged that minimize the sum of squared differences from the first cluster’s
mean. This process is iterated until all the observations are in one group (Romesburg
1990:130).

The clustering tree is analyzed to determine which number of clusters best defines
the data. The definition of submarkets is sensitive to the clustering techniques used,
in particular, in the choice of cut points for clusters. Since the technique is basically
exploratory, the choice of which clusters to define as submarkets is in the researcher’s
hands. Through trial and error, the clusters that are “maximally related to the variable
of interest” are chosen (Romesburg 1990:215). The variable of interest for assessing the
appropriateness of the cluster analysis is house price, which is not included in the clustering,
but is used to confirm the decision to segment the data. The market segmentation
suggested by the clustering of block groups is tested to see if it is useful for predicting
house prices. The final submarket definition step of hedonic regression, then, mitigates
the arbitrariness of cluster choice by confirming that the clusters are significantly different
in the context of house prices.

4.3.4 Hedonic price regression confirms spatial submarkets

The submarket is a break point for hedonic prices (Hancock and Maclennan, Maclen-
nan and Tu 1996). Because of different supply and demand pressures from submarket to
submarket, marginal prices differ. Hedonic regression can be used, then, to confirm the
structure of submarkets in a metropolitan area suggested by the cluster analysis. Points
at which marginal prices differ significantly are the conceptual boundaries of the submar-
et. In order to test whether the block group-level submarkets appropriately describe
quality differences among individual properties, hedonic price regressions are performed on property sales data. The hedonic price regression confirms that the created submarkets capture significant price differences as assessed by consumers.

Hedonic regression is the method for determining how each characteristic of a housing unit contributes to its price. The housing unit is considered a bundle of qualities, each of which is related to the market rent or price in a function

\[ p(H) = p(h_1, h_2, \ldots, h_n) \]  (4.1)

where \( H \) denotes the housing unit and \( h_i \) denotes the vector of attributes that describes the unit (Rothenberg et al 1991).

This relationship, explicated by Rosen (1974), reveals the market-clearing prices for each attribute specified. The first derivatives of each attribute with respect to price show how the final price of the unit changes with marginal changes in quality. Housing attributes are regressed on price; the linear coefficients are the marginal prices for the corresponding attribute. The basic formula is:

\[ V = \beta_0 + \beta_k X_k + \epsilon \]  (4.2)

where \( V \) is owner-occupied value and \( X \) is the vector of characteristics chosen to represent housing services in a particular unit.

The resulting coefficients represent the marginal price of each attribute of the housing unit. The usual significance tests for individual variables (t-test or p-value test) determine which variables are statistically significant components of overall housing price. The magnitude of the coefficient shows how much that attribute contributes to the overall price.

As do Bourassa et al (1999), I employ dummy variables for submarket membership to test the classification. First, the regression R squared is compared to see that adding
submarket membership improves the predictive power of the regression. Second, the significance of the parameters for the submarket is important for testing whether these groupings of quality are substantially and significantly different from one another and therefore are appropriate for describing different segments of the housing market. I also test a hedonic model that considers how unit attribute prices change across submarkets, using interaction terms. In this model, a unit’s price may change due to submarket membership, and the marginal price of an attribute may also differ from submarket to submarket. Each of these model formulations is examined for the usual statistical significance and for its accuracy in predicting unit sales prices.

4.4 Examining Submarket Spatial Distribution

The next section describes the assessment of the distribution of housing submarkets in geographic space. It is important to note that the clustering method used to segment the housing market into submarkets is not spatially predetermined. That is, when clustering block groups of similar quality, there is no prior constraint on the contiguity of block groups. Block groups that are non-contiguous, and indeed far from one another, may be joined in the same cluster. Using this approach, I can observe whether or not different locations in the city offer substitutable quality housing; i.e. whether a submarket is found across the city in noncontiguous areas.

I examine two indicators of the distribution of submarkets to assess the level of spatial clustering in the housing market. First, I calculate a spatial proximity coefficient for the six submarkets. This index is often used to calculate the degree of racial segregation in an area. If the coefficient is greater than one, it denotes that a block group in a given category submarket is most likely to be adjacent to a block group in the same submarket rather than a different submarket.

The Moran’s I and Local Indicators of Spatial Association (LISA) statistics and maps
further explore spatial clustering and spatial outliers of housing quality. The Moran’s I statistic measures global spatial autocorrelation in the data, showing whether there is significant spatial clustering of data points rather than spatial randomness. The statistic ranges from -1 to 1, with a positive statistic indicating that there is significant clustering of high or low values, and a negative statistic meaning the values are randomly distributed through space.

Both of these methods require the a priori definition of a spatial weights matrix. The matrix defines “neighbors” for each observation by giving weights to all other observations, with a weight of 0 indicating the observations are not neighbors. The definition of neighboring units can rely on a number of measures. I have chosen to examine a nearest-neighbors matrix that analyzes the 8 closest block groups for each block group.

4.5 Comparing Submarkets to Predefined Planning Areas.

In assessing the level to which neighborhoods represent areas that conform to household decision making about housing, I consider the adequacy of the Philadelphia City Planning Commission’s Planning Analysis Section (PAS) and historically recognized neighborhoods to represent a housing submarket. First, I assess the level to which Planning Analysis Sections capture the key dimensions of housing quality using ANOVA techniques. I determine whether the PAS have significant differences in housing quality. I also compare the degree to which the divisions into housing submarkets and PAS capture differences in housing quality using the eta squared measure. The eta squared statistic, interpreted similarly to a regression R squared, gives the proportion of variance in a dependent variable explained by class membership (a categorical independent variable). In this instance, I compare the eta squared for housing quality dimensions derived from dividing block groups into housing submarkets with the eta squared for
housing quality dimensions derived from dividing block groups by their Planning Analysis Section membership. I also consider whether traditionally defined neighborhoods are homogeneous in terms of housing quality. In order to analyze the homogeneity of neighborhoods in terms of housing submarket composition, I utilize an entropy index of dissimilarity typically used to measure residential segregation. In this instance, I am testing for the level to which neighborhoods are dominated by one submarket type as opposed to being made up of block groups evenly distributed among submarkets. The entropy index, first defined by Theil and Finizza (1970), measures the concentration of groups in a given area among an unlimited number of groups. The standardized index ranges from zero to one, with higher numbers indicating more even distribution among groups and lower numbers indicating the domination of one group in the population. The formula in the residential segregation context is:

\[
H = -\sum [P_k/P \ast \ln(P_k/P)]
\] (4.3)

Where \(H = \) unstandardized index

and \(P_k = \) population of the kth subgroup in the population

and \(P = \) total population

And

\[
H' = H/\ln(k)
\] (4.4)

Where \(k = \) number of subgroups.

This analysis will quantify the level to which historically recognized neighborhoods are areas of constant housing quality, or are highly heterogeneous. My contention is that very heterogeneous neighborhoods are not good candidates for the uniform application of a revitalization policy. To the extent that neighborhoods are homogenous, they may be good representations of a submarket but heterogeneous neighborhoods are not adequate
4.6 Data

4.6.1 Data sources for the City of Philadelphia

The portion of this study that focuses exclusively on the City of Philadelphia itself is conducted using a rich data set assembled from a number of georeferenced data sources. These data capture detailed information on housing quality and land use, house sales figures, area demography, crime, and school quality. Combined, they offer a wide range of indicators to capture many dimensions of housing quality that are important for segmenting the market. (See Appendix Table A1 for a full list of variables, definitions, and sources, and Table A2 for variable means for the city of Philadelphia.)

Data on property characteristics and land uses are obtained from Philadelphia’s Board of Revision of Taxes, via the University of Pennsylvania Cartographic Modeling Laboratory (Penn CML). These data include, at the block group level, the condition of units and the proportion of residential and non-residential properties. At the unit level, this data set describes the size, building materials, and outbuildings of residential properties and contains sale prices for properties sold in 2000, numbering approximately 14,000 units.

The Geolytics Neighborhood Change Database is the source of demographic data from the U.S. Census. The Geolytics database links 1970-2000 Census data, geocoded and normed to 2000 tract boundaries enabling a panel study of block groups over time. The variables available include household composition, income, educational status, occupation, race, and housing tenure, giving a fairly complete picture of socioeconomic status.

One contribution of this study is the addition of two aspects of household assessment of housing quality that have not previously been analyzed in the submarket definition.
literature. The first is crime, at the block group level, which is reported by the Penn CML based on data from the Philadelphia Police Department. Crime data includes both crimes against property and persons, from petty to serious incidents. Second, the data includes school quality, an extremely important factor in house prices. School quality is operationalized here using Pennsylvania System of School Assessment (PSSA) scores for public elementary schools. Assessment scores are reported as the percentage of students in 5th grade in a school scoring in the proficient, advanced, basic, or below basic ranges for reading and math. The Penn CML provided elementary school catchment boundaries as of 2000. These testing data do not cover charter schools that are not administered by the Philadelphia School District, nor private schools, which have student populations that are not geographically bounded in the same way that public schools are.

4.6.2 Data sources for metropolitan Philadelphia

Metro Philadelphia encompasses nine counties across two states, and data must be found that is uniform for all these jurisdictions. Unfortunately, detailed data on property characteristics could not be assembled at the metropolitan level. Therefore, metropolitan area housing market segmentation is based largely on Census data, at the tract level, obtained from the Geolytics database described above. The data are available for the nine county Philadelphia metropolitan housing market area.\(^2\) Table A3 shows variables, definitions, and sources, and Table A4 contains means for the metropolitan area. Additional data roughly describing school quality was obtained from the Philadelphia Inquirer’s school quality supplement, which describes student-teacher ratios, expenditures per pupil, and average years of teacher experience, at the school district level. School data are available only at the district level, not for individual schools (as is available for the city alone). This geographic level of school data means that the market segment-

\(^{2}\)Bucks, Chester, Delaware, Montgomery, and Philadelphia counties in Pennsylvania and Burlington, Camden, Gloucester, and Salem counties in New Jersey.
tation is somewhat constrained; as within school district differences are masked by the importance of school quality to housing choice. The drawbacks of having different data availability in the two scales of analysis are in the lesser detail at the metropolitan level and the difficulty in directly comparing the two scales of analysis.

Even though the same level of detail is not available for market segmentation based on housing quality, it is important for planners to consider the overall housing market when making revitalization policy, as reactions in the market will not be confined to a single political jurisdiction but will occur through the entire housing market area. In the sense of defining the total housing market area, the nine county definition has some of this problem of arbitrariness, as the perceived market area may not follow county boundaries. However, as the nine county area is considered the commuting shed for the city of Philadelphia (Federal Reserve Bank of Philadelphia 2003), it is a good approximation of the range at which people live and still consider themselves in the Philadelphia housing market.

4.7 Conclusions

The empirical testing of submarkets relative to extant theories of urban spatial structure and to policy target neighborhoods requires several statistical procedures. First, submarkets are statistically defined on the basis of clustered quality levels. Next, the spatial distribution of the submarkets are examined for spatial clustering and outliers and compared to existing neighborhood boundaries. The methods are applied in the Philadelphia region, an area with extensive revitalization needs and a neighborhood-focused policy of redevelopment. In the following two chapters, I provide detailed results of the segmentation of Philadelphia’s housing market into submarkets and spatial distribution of submarkets, including the comparison of these submarkets with the two levels of policy boundaries, the PAS and the neighborhood.
CHAPTER 5

Housing submarkets are described

In order to understand the geography of household decision-making in response to policies, it is necessary to understand the geography of the housing market. In this chapter, I use statistical techniques to segment the housing market by product type and quality. The multi-step analysis described in the previous chapter results in the definition and description of six distinct housing submarkets for the City of Philadelphia. I examine the dimensions of housing quality that segment the housing market, describe the distinct clusters generated from the data, and demonstrate that the submarket definition improves the prediction of house prices. I first examine the city of Philadelphia in great detail at the Census block group level, describing housing quality in 12 distinct factors. Next, I use a wider lens to describe the submarkets structure of the metropolitan housing market, albeit at a lesser level of detail.

5.1 Defining Submarkets for the City of Philadelphia

5.1.1 Dimensions of Housing Quality

In the first step of defining housing submarkets, I create a measure of housing quality for the City of Philadelphia. Housing quality is a multi-dimensional construct that is best
represented as a set of latent variables. Using confirmatory factor analysis, I estimate
twelve distinct dimensions to the housing quality concept. Seven of the dimensions are
composed of multiple indicators and five are individual variables. The dimensions defined
are: wealth and home equity, physical blight, renters (divided into market rate renters
and subsidized renters), poverty and deprivation, crime, school quality, non-residential
land uses (commercial and industrial), racial demographics, building type, neighborhood
change indicators (house price appreciation and population change), and access to the
central business district (See Table 5.1.)
Table 5.1: Confirmatory Factor Analysis of Housing Quality Dimensions for City of Philadelphia

<table>
<thead>
<tr>
<th>Variable</th>
<th>School Quality</th>
<th>Equity</th>
<th>Blight</th>
<th>Subsidized Rental</th>
<th>Market Rate Rental</th>
<th>Poverty &amp; Deprivation</th>
<th>Crime</th>
<th>Variable Explanation</th>
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<tr>
<td>Adv. Math</td>
<td>0.76</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>0.58</td>
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<td>Prof. Math</td>
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<td></td>
<td></td>
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<td></td>
<td>0.83</td>
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<tr>
<td>Below basic Math</td>
<td>-0.96</td>
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<td></td>
<td>0.91</td>
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<td>0.80</td>
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<td></td>
<td>0.64</td>
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<td></td>
<td>0.81</td>
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<td>Below Basic Read</td>
<td>-0.95</td>
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<td>0.91</td>
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<tr>
<td>Detached House</td>
<td>0.47</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.22</td>
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<tr>
<td>Mortgage approval</td>
<td>0.80</td>
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<td></td>
<td></td>
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<td></td>
<td>0.64</td>
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<tr>
<td>Median income</td>
<td>0.61</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.38</td>
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<tr>
<td>Vacant Land</td>
<td>0.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.69</td>
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<tr>
<td>Vacant Residential</td>
<td>0.55</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.65</td>
</tr>
<tr>
<td>To be demolished</td>
<td>0.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.64</td>
</tr>
<tr>
<td>Clean/Seal</td>
<td>0.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.31</td>
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<tr>
<td>Dangerous</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.57</td>
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<td>Code Violations</td>
<td>0.91</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.84</td>
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<tr>
<td>LIHTC units</td>
<td></td>
<td>0.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.13</td>
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<tr>
<td>Public housing units</td>
<td></td>
<td>0.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.52</td>
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<tr>
<td>Section 8 units</td>
<td></td>
<td>0.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.02</td>
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<tr>
<td>Multifamily housing</td>
<td></td>
<td></td>
<td></td>
<td>0.33</td>
<td></td>
<td></td>
<td></td>
<td>0.11</td>
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<tr>
<td>Percent with B.A.</td>
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<td></td>
<td>0.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.03</td>
</tr>
<tr>
<td>Renters</td>
<td></td>
<td></td>
<td>0.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.90</td>
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<tr>
<td>Professional occupation</td>
<td></td>
<td></td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.06</td>
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<tr>
<td>Poverty rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.76</td>
<td></td>
<td></td>
<td>0.58</td>
</tr>
<tr>
<td>Male unemployment</td>
<td></td>
<td></td>
<td></td>
<td>0.79</td>
<td></td>
<td></td>
<td></td>
<td>0.62</td>
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<tr>
<td>Female unemployment</td>
<td></td>
<td></td>
<td></td>
<td>0.76</td>
<td></td>
<td></td>
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<td>0.72</td>
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<td>Female headed households</td>
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<td>0.85</td>
<td></td>
<td></td>
<td></td>
<td>0.83</td>
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<tr>
<td>Families on welfare</td>
<td></td>
<td></td>
<td></td>
<td>0.91</td>
<td></td>
<td></td>
<td></td>
<td>0.58</td>
</tr>
<tr>
<td>Burglary rate</td>
<td></td>
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<td></td>
<td>0.71</td>
<td>0.50</td>
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<tr>
<td>Quality of life crime rate</td>
<td></td>
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<td></td>
<td></td>
<td>0.87</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug crime rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.18</td>
<td>0.03</td>
<td></td>
<td></td>
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<td>Car theft rate</td>
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<td></td>
<td></td>
<td>0.86</td>
<td>0.74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Taken together, the validity, reliability, and fit standards suggest that these 12 latent variables are highly appropriate for representing the variation among block groups in terms of housing quality. The measures of the 12 dimensions all correlate highly and significantly with median house value, demonstrating validity for defining housing quality. The loading of each measured indicator on its latent variable (dimension) is statistically significant and in the expected direction, meeting the standard of construct validity defined by Bollen (1989). Additionally, the variation of nearly every individual indicator measured is largely explained by the factor structure. The overall model fit measures (normed fit index, comparative fit index, and goodness of fit index), analogous to a regression $R^2$, are good, meaning that this factor structure fits the data well. The twelve latent variables are described in the following paragraphs.

**Public School Quality**

Public school quality, measured in terms of standardized test scores for elementary students, is another measurement of submarket quality that is unique to this research. The proportion of students scoring “proficient” and “advanced” in reading and math is positively related to quality, while the proportion scoring in the “below basic” category has a heavy negative loading. Families seeking housing frequently seek out information on public school quality, and school assessments contribute substantially to house prices.

**Wealth and Equity**

Housing quality levels are associated with wealth. As found in prior research (Day 2003, Bourassa et al 1999, Kain and Quigley 1970), the wealth and equity in the block group is a significant component of the variation in housing area quality in Philadelphia. High incomes, mortgage approval rates and loan amounts, and detached homes are indicators of wealth in terms of home equity.
Physical Blight

Physical blight, measuring the proportion of properties in the block group that are deemed physically inadequate or are vacant, is another key factor. The measured indicators include properties that the City’s Licensing and Inspections Department has rated as dangerous, condemned for demolition, or sealed; properties with building code violations; and vacant land or residential properties. The strong association of the physical condition of housing in the area with the variation in block group housing quality was expected, given the results of Bourassa et al’s (1999,2002) research findings. The importance of this dimension in assessing a house in its neighborhood context is great in a city like Philadelphia, which has wide variation in its levels of physical deterioration.

Subsidized Rental

Consistent with prior work (Day 2003), the presence of low-income housing is a key dimension of housing quality. The Subsidized Rental factor shows high scores for higher concentrations of project-based Section 8 subsidized units, Low Income Housing Tax Credit financed units (excluding those renting at market rate), and public housing units. These are distinct from measures of low income, perhaps because these units may be in less physically attractive properties that have an effect on house values over and above the general effects of poverty on neighborhood physical quality. The three subsidy programs measured here are distinct from one another in terms of population (with public housing residents having by far the lowest income levels) and, likely, physical quality (with tax credit properties, which have higher rent levels and include some market rate units, having the highest quality design and maintenance). However, as there are so few block groups with subsidized units, these three indicators do covary. All three programs tend to locate units in lower income areas, whether due to historical discrimination in the public housing program, lower land costs for developers, or the additional tax credits allotted to low-income areas.
Market Rate Rental

Also related with higher median house values was the factor capturing High End Rental, which are areas of college educated professionals with high proportions of multi-family housing and high rentership rates. This housing is likely qualitatively different from rental housing targeted toward low-income households in its aesthetic qualities and upkeep.

Poverty and Deprivation

Housing quality is also defined by poverty levels in the area. Measures of poverty and deprivation create another multi-indicator factor negatively associated with house prices. The measures include poverty rates, unemployment levels, and welfare dependence as well as family structure.

Crime

Crime is an important factor for housing submarket division, yet has not been analyzed in previous research. The expanded dataset available here makes it possible to assess how crime rates relate to housing market segmentation for the first time. While many neighborhoods do not suffer from high levels of theft or burglary, these are important indicators in terms of their impact on assessments of area quality. As drug sales are often visible activities that include the intimidation of residents, it is unsurprising that the rate of arrests for drug-related crimes—possession or sale of illicit drugs—is a component of this dimension. The crimes indexed in the quality of life crime category include other visible activities such as loitering, public drunkenness, and vandalism.

Neighborhood trends

Population change and house price change over the previous census period, two individual indicators, add to the housing quality construct by capturing different pressures
of demand for housing in different areas. These changes might signal a larger trend, such as turnover or gentrification. As expected, population growth is associated with higher house prices, as these areas are experiencing increasing demand. However, the relationship between appreciation levels and house prices is less straightforward. Some areas of lower house prices experienced large price increases in the 1990-2000 time period, suggesting the possibility of gentrification in those areas.

**Land Uses**

Non-residential land uses are also important for the quality construct. The levels of commercial and industrial land use in the neighborhood, measured as single variables, are key to explaining house values (confirming the findings of Kain and Quigley 1970). These are measured as two separate indicators because commercial and industrial sites are not highly correlated in the city, but are found in areas distinct from one another.

**Racial demography**

The racial makeup of the block group’s population can also segment the housing market into submarkets. Here I measure demography as the proportion of the block group population that is black. This measure does not indicate housing quality, per se, but reflects household preferences for racial heterogeneity or homogeneity in their housing choices. The previous research by Bourassa et al (2000) and Day (2003) finds that some submarkets are defined by the dominance of a racial group; this finding can be tested by including racial demography here. Because of Philadelphia’s low levels of immigration, I did not find that Asian or Hispanic populations contributed to the overall housing quality measurement model. However, these ethnic groups’ location is important for housing submarket definition at the metropolitan level.
Access to CBD

Another component of housing quality divisions in the market is the housing’s location in the city. This analysis does not directly measure physical access to specific amenities. It captures the accessibility dimension of housing quality by measuring the distance of the block group to Center City, the downtown central business district of Philadelphia. This factor also relates to the Alonso-Mills-Muth model of urban spatial structure, which posits that wealthier households live further from the city’s center, trading increased transportation costs for larger units and more land. If this factor is dominant in the clustering analysis, submarkets will be defined largely by distance to the CBD, confirming the Alons-Mills-Muth theory of housing price gradients and its implied spatial distribution of submarkets.

Building type

In addition, the proportion of rowhouses in the block group also explains submarket quality. This indicator is perhaps somewhat unique to the building patterns of the city. At the turn of the century, Philadelphians did not build the high rise tenement slums of New York City; instead, low-income residents lived in small rowhouses on interstitial streets cut into larger blocks. As the majority of the residential housing stock is in the rowhouse style, I expect areas with fewer rowhouses to be distinct in terms of submarkets. Those areas have either twin-style semi-detached houses or detached houses (the other categories of unit type in the property classification by the Bureau of Revision of Taxes).

5.1.2 Creating variables

Having defined the above 12 dimensions of housing quality, the factor loadings are used to create variables for each block group. As described in the previous chapter, the individual measured indicators, weighted by their loadings, constitute the composite
latent variables. These composite variables are entered into the cluster analysis in order to classify the block groups into distinct segments of the housing market. Accounting for missing data, there are 1,597 block groups with measures for all of the variables to be created.

5.1.3 Cluster analysis finds six submarkets in the city

In the second step in defining submarkets, I use cluster analysis to group similar block groups together on the basis of their housing quality. Six distinct clusters emerge when the factor scores for block groups are entered into Ward’s method for hierarchical clustering. Each cluster represents a set of block groups defined by similar housing quality. The types of housing submarket areas vary from extreme distress and undesirability to gentrifying areas to high value, high quality areas. Confirming that the clusters represent distinct levels of quality, ANOVA tests show the difference in housing quality characteristics (measured by factor score means) are highly significant among the 6 groupings of block groups. The typology of housing submarkets is described by examining the characteristics of each cluster (see Table 5.2 for a typology). The submarkets are described from worst quality to best quality, as determined by their overall quality and value. The descriptive labels of the submarkets are derived from their key features as areas of housing quality.
<table>
<thead>
<tr>
<th>Cluster</th>
<th>Description</th>
<th>Block Groups</th>
<th>Prop Sold 2000</th>
<th>Mean Sale Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Unit Distressed and Undesirable</td>
<td>Mostly rowhouses &amp; very small properties; worst population loss &amp; highest poverty; most industrial properties; very poor schools</td>
<td>333</td>
<td>1,942</td>
<td>$26,137</td>
</tr>
<tr>
<td>Distressed</td>
<td>Worst property conditions; most subsidized rental housing; worst schools</td>
<td>45</td>
<td>101</td>
<td>$36,063</td>
</tr>
<tr>
<td>Minority Homeownership</td>
<td>Predominantly black &amp; majority homeownership; poverty, crime, &amp; school</td>
<td>410</td>
<td>2,075</td>
<td>$36,117</td>
</tr>
<tr>
<td>Potential Transition</td>
<td>Predominantly white homeownership areas further from the CBD; very few subsidized units; some population growth; income below median</td>
<td>299</td>
<td>4,624</td>
<td>$54,013</td>
</tr>
<tr>
<td>Market rate rental and gentrifying</td>
<td>Very good property conditions; mostly semidetached homes; most high income renters; high appreciation rates</td>
<td>205</td>
<td>1,296</td>
<td>$89,611</td>
</tr>
<tr>
<td>High Value</td>
<td>Highest incomes and house values; highest appreciation rates; detached homes; highest school quality; virtually no subsidized rental</td>
<td>305</td>
<td>3,545</td>
<td>$93,203</td>
</tr>
</tbody>
</table>
**Small Unit Distressed Submarket**

The Small Unit Distressed Submarket is comprised of 333 block groups with the worst overall quality of all the submarkets. Of the 13,583 housing units sold in 2000 in Philadelphia, 1,942 properties are in this submarket. These are the lowest income areas, with poverty rates averaging nearly 42% and with almost 20% of households on welfare. School performance is poor and crime is a problem, particularly the quality of life crimes (on average, 40 per 1,000 residents in the block group) and drug sales (22 per 1,000 residents), with nearly twice the rate of the Distressed submarket.\(^1\) Relative to most of the city, the presence of industrial properties is high at 2%. The block groups average 59% black, but with a large standard deviation (approximately 34), this submarket is not distinguished primarily by racial composition. This submarket is distinguished from other poor areas in the city by its undesirable residential properties, which are predominantly small (approximately 1200 square feet) rowhouses close to the city’s core. The mean sales price for properties sold in 2000 in the Small unit distressed submarket was $26,317.

**Distressed Submarket**

The Distressed Submarket is smaller, with only 45 block groups falling into this category. This submarket has the worst property conditions of the six, with over half of properties having code violations and half listed as dangerous, pending demolition, or prepared for being sealed. These areas also have the highest concentrations of public housing (5.5 units per 1,000 residential properties) and industrial properties (3.7% of all properties) deemed to be undesirable neighbors. School quality is very poor, the worst on average of the submarkets, with 71% of students in math and 65% in reading scoring “below basic.” However, house sales are substantially higher than the lowest quality submarket; the average price in 2000 was approximately $10,000 higher than in

\(^1\)Quality of life crimes are defined as trespassing, disorderly conduct, vandalism, graffiti, illegal dumping, loitering, and public drunkenness
the Small unit distressed submarket. Fewer properties are rowhouses, just 65% compared to 93% in the Small unit distressed submarket. One-third of the units sold in 2000 were semi-detached. The residential properties are also slightly bigger. This difference in residential properties available is likely the factor that creates a distinction in price and makes this market segment a distinct submarket.

Minority Homeownership Submarket

The Minority Homeownership submarket is of substantially higher quality than the first two submarkets described. Poverty rates are lower by 10 percentage points; crime rates are lower by half; and school performance is distinctly better. Properties are in fair condition, with about a quarter of houses cited for code violations but only 2% deemed dangerous and 3.75% awaiting demolition. The majority of residents here are homeowners; the ownership rate is nearly two-thirds. These areas are also predominantly black, averaging almost 90% African-American populations. Racial demographics distinguish this submarket from the White Potential for Change submarket. There is population loss, but house prices are rising in the minority homeownership areas—44% in the 1997 to 2002 period. The properties are again slightly larger. Residents of these areas, however, do not achieve a 50% mortgage approval rate and their homes sell for well below the median house sale price. Incomes are slightly below the city’s median.

White Homeownership with Potential for Change Submarket

The block groups in the submarket Potential for Change are slightly further from the CBD. It is difficult to say whether these areas are on the verge of gentrification or decline. This submarket consists of 299 block groups with 4,624 properties sold in 2000, a substantially higher number of sales per block group than other submarkets. This cluster of block groups is the first in the hierarchy with growing population from 1990 to 2000. However, while the mean growth is positive, the population change figures range from -
25% to +74%, making it less clear what the status of these areas are in terms of demand. Incomes are just slightly above the city’s median, yet few professionals live in these submarkets. The population is mostly white; these areas include what are historically ethnic white working class neighborhoods. While the majority of residents, 75%, are homeowners, the properties available are not desirable. The submarket consists of the smallest rowhouses in the city (average 1178 square feet), not a typical building stock for a gentrifying neighborhood. Sandwiched between distressed and gentrifying areas, these block groups are potentially changing, either through gentrification or turnover and decline. This submarket is distinguished from the Minority Homeownership area by racial demography and the rapid rate of home sales at substantially higher prices.

Market Rate Renters and Gentrifying Submarket

The fifth submarket defined for Philadelphia includes 205 block groups with 1,296 units sold in 2000. The average sale price here jumps from $54,000 in potentially changing areas to over $89,000 in the high end rental and gentrifying submarkets. The incidence of property problems is very low, with very few houses in serious condition. There are more commercial properties (5%) in this submarket than in either the Minority homeownership or White homeownership areas, which are more traditional residential neighborhoods rather than these mixed-use areas. Half of the residents of these areas are renters, but with a high rate of college-educated and professional residents, the housing stock consists of a relatively large number of market rate multifamily buildings. More of the residences here are semi-detached houses (approximately 46%) and are substantially larger, with the average area 1708 square feet for properties sold in 2000.

High Value Submarket

The high value submarket includes the most desirable areas of the city. School quality is the best among the submarkets; incomes are substantially higher and poverty
and deprivation substantially lower. There is virtually no subsidized housing in these block groups and properties are in very good condition. With a substantial proportion of detached and semidetached houses, this submarket’s average sales price in 2000 was over $93,000.

5.2 Defining Submarkets at the Metropolitan Level

Adding the suburban counties that comprise the Philadelphia area allows the examination of the housing market as a whole, but the reduced level of detail makes this analysis fuzzier in terms of making distinctions among types of housing. In the following section, I will describe the quality measures and cluster analyses that define housing submarkets for the 9 county metropolitan area. As at the city level, the quality factors describing housing encompass housing condition, social demographics, and land use and building types. Six submarkets are defined for the area and are described below. In the subsequent chapter, these submarkets will be examined in light of current planning practice boundaries.

5.2.1 Metropolitan housing quality

Using primarily Census-based data, housing quality at the metropolitan level can be described in terms of ten distinct factors that segment the housing products available on the market. Again, these factors are measured at the level of a geographic unit describing the general quality in the census tract. Seven of the dimensions of quality that relate to market segmentation are multi-indicator factors; three are single indicators. Table 5.3 contains factor loadings for the metropolitan area.
Table 5.3: Confirmatory Factor Analysis of Housing Quality Dimensions for Metropolitan Philadelphia

<table>
<thead>
<tr>
<th></th>
<th>Immigration</th>
<th>Deprivation</th>
<th>School Quality</th>
<th>Income</th>
<th>Renters</th>
<th>Row Houses</th>
<th>Suburban</th>
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<td>Hispanic pop.</td>
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<td>Asian pop.</td>
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<td>Foreign born pop.</td>
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<tr>
<td>Noncitizen pop.</td>
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</tr>
<tr>
<td>Ling. isolated</td>
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<tr>
<td>School dropout rate</td>
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<td>Non graduates</td>
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<td>Unemployment rate</td>
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<td></td>
<td>0.79</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poverty rate</td>
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<td></td>
<td>0.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Families on welfare</td>
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<tr>
<td>Carless household</td>
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<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Female headed</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Teacher experience</td>
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<td>0.52</td>
<td></td>
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<tr>
<td>Spending per student</td>
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<td>0.86</td>
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<tr>
<td>Class size</td>
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<td>College educ.</td>
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<tr>
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<tr>
<td>One bedroom units</td>
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<td></td>
<td>0.88</td>
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<td></td>
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<tr>
<td>Multiunit bldgs</td>
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<td>Lg multiunit bldgs</td>
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<td>0.83</td>
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<tr>
<td>Two bedroom units</td>
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<td></td>
<td></td>
<td>0.75</td>
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<td></td>
<td></td>
<td>0.54</td>
<td></td>
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<tr>
<td>Sm multiunit bldgs</td>
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<td>0.82</td>
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<tr>
<td>Owners</td>
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<td></td>
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<tr>
<td>Detached houses</td>
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<td></td>
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<td></td>
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<td>0.91</td>
</tr>
<tr>
<td>New housing</td>
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<td></td>
<td>0.53</td>
</tr>
<tr>
<td>Four bedroom units</td>
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<td></td>
<td></td>
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<tr>
<td>Five bedroom units</td>
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<td></td>
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<td></td>
<td>0.32</td>
</tr>
<tr>
<td>Population density</td>
<td></td>
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<td></td>
<td></td>
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<td>-0.70</td>
</tr>
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</table>
Race and ethnicity: African-Americans and immigrants

Two distinct factors describe the social demography of the tract as it relates to housing market preferences. The first is a single indicator of African-American population in the tract. The second is a multi-indicator factor indicating an immigrant destination. This factor is measured by the presence of residents who are foreign-born or non-citizens, by high percentages of Asians or Hispanics, and by linguistic isolation among adults. Areas with high scores on this factor have substantial concentrations of immigrants, relative to other areas. This factor did not appear at the city only level because of limited variation in immigrant presence within the city limits of Philadelphia. However, once we consider the entire metro area, the concentrations of immigrants in Philadelphia and some suburban areas are more apparent. This factor represents the desire for ethnic homogeneity among housing consumers.

Economic status: deprivation and high SES

Economic status of the area is related to a factor measuring poverty and deprivation and a factor measuring high socioeconomic status. Poverty and deprivation, as at the city level, are related to unemployment, poverty, welfare dependency, and low educational attainment. The factor for high SES indicates the levels of college educated residents, incomes, and proportion of professionals.

School quality

School quality is a key factor in assessing housing quality. At the metropolitan level, school quality is operationalized with three variables that create a single dimensional factor. The average number of years of teacher experience and spending per student in the district are positively associated with this factor, while average class size for elementary schools is negatively associated. These indicators are published each year in the Philadelphia Inquirer and on its www.philly.com website, shared with the Philadelphia
Daily News. It is reasonable to assume that area families refer to this widely disseminated document when considering the joint decision about housing location and school choice. These variables are all measured at the level of the school district, so comparisons among individual schools are not possible, which makes the geographic breakdown into submarkets less fine-grained.

**Housing and land use patterns: renters, rowhouses, and suburban**

Housing and land use patterns are described in four different dimensions of measurement. First, the factor for suburban/exurban land use loads on large, detached single-family homes, new housing, low population density, and high homeownership rates. Second, as in the city level analysis, rowhouses are a key factor; here, two to three bedroom and attached units represent this housing type. Rental areas, the third dimension, are indicated by studio and one bedroom units, multi-unit buildings, and low levels of homeownership. These three factors depict differences among preferences for density and residential stability perhaps related to a household’s life cycle, as well as, to some degree, household SES. Finally, a single measured indicator of housing vacancies signals overall quality and condition, although not at the detailed level available for the city alone.

**House price appreciation**

Finally, the segments of the metropolitan market can be distinguished by appreciation rates, which signal differing levels and pressures of demand.

**5.2.2 Six submarkets at the metropolitan level**

The six submarket clusters that emerge from the metropolitan Philadelphia housing data each have a distinct mix of housing and land use as well as demographic characteristics. As at the city level, there is a wide disparity between the highest and lowest priced submarkets, which is not surprising given the area’s reputation as a “doughnut-hole”

**Wealthy Suburban Submarket**

The mean price of a home in the Wealthy Suburban submarket (256 tracts) is approximately $212,000, a much higher average than in the most expensive city submarket, with average values around $93,000. The Wealthy Suburban areas have the lowest population density of any metropolitan submarket, and there is virtually no multifamily, attached, or rental housing in these areas. With very high household incomes, and 50% professional employment, this submarket’s homeownership rate is nearly 90%. A plurality of the houses in this submarket are four bedroom units. This submarket’s population is majority white, with only 10.5% black, Asian, or Hispanic residents.

**High Appreciation in Urban Fabric Submarket and Mature Suburban Submarket**

The next most expensive submarket is the High Appreciation in the Urban Fabric submarket. This small group of tracts (68) has extremely high appreciation rates, on average 181%, and high-income households, but unlike the wealthy suburban submarket is located in an urban land use pattern. Approximately one half of the housing units are attached houses. This submarket may represent the latest “hot spots” for real estate in the City of Philadelphia.

Nearby is the Mature Suburban submarket (410 tracts), which also has high house values, has a more traditional land use pattern seen in the streetcar suburbs rather than an exurban or sprawl pattern seen in the Wealthy Suburban submarket. Population densities are twice that of the Wealthy Suburban areas, and residential units are mostly 3 bedrooms with 22% attached units. These areas consist of predominantly white homeowners in more modest homes than the Wealthy Suburban area, but the housing stock
is still of high quality. Schools rate very highly in these areas.

**Urban Market Rate Renter Submarket**

The Urban High End Renter submarket (181 tracts) at the metropolitan level is very similar to that of the city level analysis, with similar boundaries near the city center. This submarket is diverse demographically, with significant black (17.5%), Hispanic (5.8%), and Asian (4.4%) populations. Half the houses are attached, and rentership is approximately 40%. While school quality in the city is not as great as that of the suburban counties, house prices here remain strong at an average of $91,000.

**Black Urban Submarket and Immigrant Urban Submarket**

The two lowest quality submarkets, in terms of overall housing quality and price, are the Black Urban and Immigrant Urban submarkets. These submarkets are located in the metropolitan area’s central cities of Philadelphia, Chester, and Camden, all of which have experienced rather severe physical decay across large areas. The Black urban areas (154 tracts), located in West and North Philadelphia, Chester, and downtown Camden, have very few non-black ethnic minorities. While over one-half the population in these areas own their homes, high vacancy rates (approximately 16%) signal deterioration in the housing stock. Immigrant urban areas (69 tracts) also have substantial black populations, but with an average 33% Hispanic and 13% Asian populations, the demography is distinct from the predominantly black central city areas and from the metro area as a whole, which averages only 5% Hispanic and 3% Asian in a census tract. The Immigrant urban submarket has the lowest income households and the highest deprivation factor score of any submarket, although homeownership is, again, approximately 50%. For both of these submarkets, average house price is around $47,000, but the immigrant areas are slightly poorer and have more vacant housing, signalling distress.

Similar to Day’s (2003) and Bourassa et al’s (2002) findings, there exists a clear
demarcation between a submarket of predominantly minority homeownership and that of white homeownership. The city’s Distressed Homeownership submarket is 90% black and somewhat poorer than the Potential for Change areas, which are 75% white areas, though in other characteristics, they are similar. However, all of the city submarkets have substantial non-white populations. Only the two highest quality submarkets, High end rental/Gentrifying and High value areas, do not have majority minority populations, which perhaps is to be expected in a central city such Philadelphia, which has a substantial minority population. In contrast, Day’s study area in Scotland was predominantly white (nearly 97%), with a small ethnic immigrant population that was distinctly segregated into certain parts of the city, and Bourassa et al’s New Zealand site had a small indigenous community, but most of the submarkets were essentially white residential areas. At the metropolitan level, the comparison with Day becomes more direct, as there exists an ethnic immigrant submarket distinct from the native black population submarket.

5.3 Regression on Individual Unit Sales Price Confirms Submarket Definition for City

Watkins (1998) explains that a crucial piece of the submarket concept is differentiation in prices among the submarkets. Therefore, the final step in defining submarkets is to determine whether clustering block groups as submarkets significantly alter marginal attribute prices and improves the prediction of individual unit sales prices. If so, then I can conclude that an area-based method is acceptable for defining submarkets. Because of data limitations, this analytical step is taken only for the city-level submarket analysis. Using 2000 sales data from the Philadelphia Bureau of Revision of Taxes, I regress unit sales price on unit characteristics such as building materials, property type, living area, and the availability of a garage, with the expected results. (Table 5.4) Without account-
ing for submarkets at all, the regression accounts for about 35% of the variation in house prices. The $R^2$ is likely low because of limited data on the individual properties—for example, the lack of information on condition—and limited variation in the available variables (nearly all the properties are brick, and most are rowhouses).

In the conceptual model espoused by Bourassa, submarket dummies are added to the regression, which represent each submarket (except one reference category). To test for the significant of the market division, each unit associated with its block group and submarket membership. The purpose of the submarket dummies is to determine whether the defined combinations of housing quality attributes are, in fact, distinct from one another. Of course, simply adding neighborhood quality variables to the regression would improve estimation of house prices. However, this would not meet the conceptual definition of the submarket as a group of units with a particular set of attributes that makes the units good substitutes in the market. Neighborhood quality variables do not capture this definition, and in fact give misleading regression results. As note in the previous description of city submarkets, not all quality variables are monotonically increasing with house price levels. For example, crime rates are higher in the Market Rate/Gentrifying submarket than they are in the Minority and White Homeownership submarkets, yet sales prices are also substantially higher, just as there are more undesirable land uses in the Distressed submarket than in the Small unit distressed and undesirable submarket, despite a large difference in sale prices. It is not the increasing values of quality attributes that makes the market segment distinct, but rather a particular combination of certain levels of each attribute that distinguishes one submarket from another.

The submarket dummy variables test whether adding submarket membership improves the estimation of price and whether the submarkets are significantly different from one another. (Table 5.4 Panel 2) Adding submarket membership to the regression achieves both goals. First, the submarket dummies are jointly significant and their addition substantially improves the model fit, shown by the increase in $R^2$. The improve-
Table 5.4: Hedonic Regression on Individual Unit Sales Price, 2000

<table>
<thead>
<tr>
<th>Property Characteristics</th>
<th>Submarket Membership</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
</tr>
<tr>
<td>Intercept</td>
<td>15,899</td>
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<tr>
<td><strong>Building Material</strong></td>
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<tr>
<td>Brick</td>
<td>68,897</td>
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<td><strong>Property type</strong></td>
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<td>Rowhouse</td>
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<tr>
<td>Semidetached</td>
<td>-51,561</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td></td>
</tr>
<tr>
<td>Living area</td>
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<td>Stories</td>
<td>28,794</td>
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<td>Garage</td>
<td>23,517</td>
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<td><strong>Submarket</strong></td>
<td></td>
</tr>
<tr>
<td>High Value</td>
<td>22,723</td>
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<tr>
<td>Potential Transition</td>
<td>-5,556</td>
</tr>
<tr>
<td>Minority Homeownership</td>
<td>-26,201</td>
</tr>
<tr>
<td>Distressed</td>
<td>-31,294</td>
</tr>
<tr>
<td>Sm. Unit Dist and Undesirable</td>
<td>-33,154</td>
</tr>
</tbody>
</table>

R² 0.38  R² 0.46
n=15,598  F 1,006  *  F 875.55  *
ment in $R^2$ is comparable to previous researchers’ findings of an 8 to 10 point increase when accounting for submarkets. Bourassa et al (2001:13) further test for improvements in hedonic modeling by comparing the residuals of predicted prices with actual sales prices. As do these authors, I compare the average error in price prediction, expressed as a percentage of actual sales price, between the two models. The submarket classification reduces error in unit price prediction by 3.04 percentage points, which is also comparable with their findings of a 2.4 percentage point decrease in error (Bourassa et al 2001:13). Second, the submarket membership substantially and significantly alters the unit price, with distinct differences among submarkets.\footnote{Results from the second conceptual model, which allows attribute prices to differ across submarkets, are available in Appendix B.} With the dummy variable approach, each submarket price for a given housing unit is compared to the price for the Market rate/gentrifying submarket.\footnote{Running the regression model with different submarkets as the omitted comparison group shows significant differences among all submarkets, regardless of which is the omitted group} The price difference is by far the least between the Market rate and White homeownership submarkets, and is substantial for all other submarket comparisons. Of course, it is important to recognize that the \textit{ceteris paribus} housing unit is not an accurate depiction of the housing available in each of these areas. Each submarket has a distinct unit type associated with it, which magnifies some of the differences in price seen in the regression model.

These hedonic models confirm submarket definition, as submarket membership significantly alters sales price and attribute marginal prices, and adding submarket definitions substantially improved the model fit. I can now feel confident that the spatial-unit based submarket method does define distinct substitutable groups of housing units and move forward in applying this submarket definition to the comparison of submarkets and planning boundaries.
5.4 Conclusions

Segmenting the housing market into its quality-defined submarkets requires first the
definition of the dimensions of housing quality. Using a conceptual definition of housing
quality garnered from the literature, I have defined a multi-factor model of housing
quality that takes into account unit type and condition, social and demographic factors,
and land uses, based on an areal unit. These factors are the basis for subdividing the
housing market into distinct types of areas, at both the city and the metropolitan level.
Importantly, these area-based submarkets defined for the City of Philadelphia hold up
under the test of attribute price differentiation, and in fact, better explain housing price
variation than do traditional, non-segmented housing market models. The area-based,
factor based housing segmentation is confirmed as an appropriate model for housing
submarket definition. Next, I will turn to the question of how these housing submarkets
relate, geographically, to the policies implemented by revitalization planners.
CHAPTER 6

Housing Submarkets as Urban Spatial Structure

Having statistically defined a quality-segmented, spatially based housing submarket structure in the previous chapter, it is important to consider the actual distribution of these market segments in urban space. The constructed submarkets are compared to two distinct theorized spatial structures. First, I discuss the submarket distribution for Philadelphia relative to the implied submarket structure of both the Alonso-Mills-Muth and the Tieboutian urban models. This comparison is made by visually examining maps of the city and regional submarkets and by considering statistical measures of spatial clustering and outliers. Second, I discuss submarkets’ spatial distribution relative to the historic and socio-cultural structure of neighborhoods, which, along with the Planning Analysis Section, are Philadelphia’s defined policy areas. In order to predict and analyze the effects of policies on the housing market, it is necessary to understand the geography of the housing market. In other words, are the geographic areas defined for planning congruent with the geography of the housing market as defined by household preferences? This comparison is made by visually examining maps of the three geographic scales (submarket, Planning Analysis Section, and Neighborhood) and by using indices
of dissimilarity to quantify the heterogeneity of housing quality in neighborhoods. Finally, I suggest that the results of these analyses have implications for both extant urban housing theory and for policy; these conclusions will be discussed fully in the next and final chapter.

6.1 The Distribution of Submarkets Compared to Theory

Existing theories of urban spatial structure suggest that housing submarkets follow a defined spatial distribution: the distance gradient and concentric zones of the Alonso-Mills-Muth model, or the political jurisdictions of Tieboutian theory. Much of the literature defining submarkets as spatial areas follows one of these two models of urban space. In this research, the submarket definition has not been predefined according to theory. Instead, the clusters are allowed to emerge based on housing quality dimensions without a constraint on contiguity of areas. In this section, I discuss the results of market segmentation for Philadelphia in spatial terms, comparing the distribution to the two theories of urban structure. As each of these theories imply a certain regularity to the distribution of housing quality in space, I examine spatial autocorrelation statistics that depict the clustering of submarket areas and also discuss the distribution as apparent in maps of the Philadelphia region.

6.1.1 The spatial distribution of submarkets in the city of Philadelphia

Housing submarkets relate to neighborhoods and feature in Philadelphia. The Market Rental/gentrifying submarket is found in part in Center City and University City, near the University of Pennsylvania and Drexel University. These locations attract young pro-
essionals who may desire proximity to work and school, and the mobility of renting over homeownership. The more distressed submarkets are in North and West Philadelphia, long recognized as troubled sectors of the city, but there is variation within these areas, with multiple submarkets represented in close proximity to one another.

Areas further from the central business district are of higher quality, a finding that follows the Alonso-Mills-Muth theory that wealthier households trade more space for small increases in commuting costs, locating at the edges of the city. However, in the central city of Philadelphia, the downtown and edge of the city are linked by their high status, lack of physical decline of the housing stock, and low levels of poverty and crime. There are also scattered areas of these highest quality submarkets in other sectors. Since this section of the analysis considers only central city residences, these areas are more similar to one another than the central city’s core and the low density suburban periphery considered in Bourassa et al.’s (1999) analysis that confirmed a distance gradient for housing submarkets. Nevertheless, the city level analysis does not appear to support the implied submarket structure of the concentric zone model. Areas of equal distance from Philadelphia’s downtown are highly varied, despite the submarket definition depending in part on location relative to the CBD.

Submarkets include noncontiguous areas throughout the city that are linked by their similar housing quality. Viewing a map of the City of Philadelphia’s housing submarkets, it is apparent that block groups of each submarket type tend to be clustered together, with large contiguous areas of one level of housing quality (see Figure 6.1). This visual finding can be confirmed by computing a spatial proximity coefficient for the six submarket types. The spatial proximity measure is an analog to measuring the integration of a city’s racial groups, whether members of a minority tend to live close to one another than they do to the majority population. In this case, the spatial proximity index is expanded to a multi-group case, providing a statistical test for whether submarkets are clustered or dispersed throughout the city evenly (White 1983; Grannis 2002). The overall spatial
proximity index for the city is greater than one, which means that block groups in any
given submarket tend to be closer to one another than they are to any other submarket.

While the tendency is for submarket types to be in contiguous proximity to one
another, there are also areas visible on the map where widely different submarket types
are located adjacent to one another. The existence of variation within an overall spatial
pattern can be examined in terms of clusters and outliers, as described in the previous
chapter. First, I examined the overall spatial clustering with the global measure Moran’s
I. The Moran’s I statistic for the city of Philadelphia is 0.63, indicating spatial autocorre-
lation, or clustering of submarket types, exists in the area.\(^1\) While this global pattern of
clustering is apparent from the map, I can also measure local spatial relationships with
the LISA statistic and mapping techniques. In the Local Indicator of Spatial Autocor-
relation (LISA), there are areas of clustering of submarket types, but also statistically
significant spatial outliers, or places where very different submarkets exist near one an-
other. Many areas are significant spatial clusters, where submarket types spread across
large contiguous areas. Approximately one tenth of the block groups in the city are cen-
ters of high-low or low-high spatial outliers—that is, either high quality submarkets near
low quality submarkets, or vice versa.\(^2\) The pattern can be seen on the map following,
Figure 6.2, which designates clusters with dark colors and outliers with light colors.
Nearly all of these outlier block groups are areas of the submarket types Potential for
Transition, Minority Homeownership, and Market Rent and Gentrifying, abutting the
most distressed submarkets. These LISA statistics and maps further demonstrate that
while in general, like submarkets are near like submarkets, that there are significant areas
of heterogeneity in submarket type, including areas where extremes of submarket types
are in very close proximity.

\(^1\)Moran’s I ranges from -1 to 1, so the high positive value represents high clustering.

\(^2\)These are the block groups that are outliers at the alpha=0.01 confidence level. They should be
considered the center of an outlier group with the strongest results, and are often contiguous to other
similar pairings of high/low or low/high submarket types.
Figure 6.1: Philadelphia housing submarkets
This finding of many significant spatial outliers, along with the generally observed pattern of heterogeneity across urban space, undermines the Alonso-Mills-Muth model of gradually increasing housing quality along the distance from CBD gradient. The land use pattern does follow, generally, one of decreasing housing density. However, the price gradient does not follow the pattern; overall housing quality can vary sharply from low to high quality within the same distance band. The failure of the concentric zone model to predict prices and quality can be attributed to both physical and social factors in Philadelphia. Geographic features in the city have strongly affected development. The Schuylkill River and Fairmount Park provide desirable locations for wealthier residents. Rail lines were corridors of development for the middle classes, with infill between the main commuter lines occurring in different building patterns. Race and ethnicity also play a major role in Philadelphia’s urban spatial structure. Some neighborhoods of white ethnic residents are strongly defended territories; North Philadelphia has become a black sector that reaches from the central city to the edges of Philadelphia. While the building patterns are similar across the outer edges of the city, the demographics and prices are not. Finally, wealthy residents have also reclaimed parts of Center City, seen by the submarket connection between Northwest Philadelphia and Center City neighborhoods.

6.1.2 The distribution of submarkets in the metropolitan area

At the metropolitan level, the typical finding that the highest quality areas are located at the periphery holds true (see Figures 6.3 and 6.4). Exurban land use areas have the highest values, as predicted by the Alonso-Muth model. Some political jurisdictions have uniform quality within their boundaries, as predicted by Tiebout. Within the general patterns discussed by the classic urban models, however, there is substantial variation in the spatial distribution of housing submarket types. There is no clear concentric pattern, in which housing quality increases consistently with distance from the CBD. Rather, along with the major cities of Philadelphia and Camden, New Jersey,
Figure 6.2: Housing Submarket Local Indicators of Spatial Autocorrelation
there are other, smaller distressed towns, with low-density suburban development in the interstitial areas. Some very high quality, low-density areas directly abut the more distressed areas of the central cities, while a more dense urban fabric exists at some distance from the core cities in smaller urbanized areas.

The metropolitan level analysis allows for a consideration of the Tieboutian theory that political jurisdictions define unique levels of housing quality through public service provision and restrictive zoning. Looking at the maps of the metropolitan housing structure (Figures 6.3 and 6.4), it is apparent that housing quality submarkets are not confined by counties or minor civil divisions, but overlap these political boundaries to link different areas in the housing quality hierarchy. Philadelphia, Camden, and Chester have similar issues with large swaths of poor black and immigrant submarket areas; smaller towns such as Norristown, Lansdale, and Upper Darby also have areas of stagnation. These jurisdictions have equivalent housing conditions despite their rather great distance from one another. The City of Philadelphia also shares market conditions along its borders with immediately neighboring boroughs and townships. Submarkets are present across county lines just as they are across minor civil divisions. This finding of substantial linkages within the fragmented political context of the Philadelphia region is in contrast to Heikkila’s (1996) conclusion that the jurisdictions of the Los Angeles area define distinct areas of quality, unconnected to one another. With more detailed data at a lower level of spatial aggregation, the variation within jurisdictions and connections between jurisdictions might become more pronounced.

6.1.3 Comparing city and metropolitan submarket structure

The submarket structure at the city and metropolitan levels for the City proper is different because of data aggregation, variables available, and the issue of relative versus absolute quality. As explained previously, the geographic unit for the metropolitan analysis is the census tract, and detailed property data are not available for study. Addi-
Figure 6.3: Philadelphia regional housing submarkets and counties
Figure 6.4: Philadelphia regional housing submarkets and minor civil divisions
tionally, the use of school quality data at the district, rather than the individual school, level, means that all areas of the city have the same measured school quality, although in the city level analysis, there was wide variation from school to school. This aggregation obscures differences among areas of the city proper. Finally, the relative measures of quality among city block groups and among metropolitan tracts are different since the latter consists of a full range of building and environmental types, from central city areas predominated by multi-family dwellings to very low density exurban areas with large single family homes. The breakdown of segments differs because some areas of the city are viewed as less distinct from one another when seen in the context of the full range of available housing area types. However, the broad patterns remain similar between the two levels of analysis. The north and west of the central city are low quality, high poverty areas, while the northeast and upper northwest are gentrifying and high end rental areas with higher values.

6.2 The Distribution of Submarkets Compared to Policy Boundaries

6.2.1 Housing submarkets and Philadelphia’s Planning Analysis Sections

Having defined the geography of the housing market structure of Philadelphia, I next examine the question of whether predefined planning and policy areas and historically recognized neighborhoods are good approximations of that structure. First, I compare the housing submarkets to the 12 Planning Analysis Sections defined by the PCPC. Table 6.1 shows the distribution of submarkets across the 12 designated PAS. These statistically defined clusters of housing quality submarkets do a better job of accounting for variation in housing quality than do the PAS, as shown by the superior eta squared
statistic for this grouping. The eta squared statistic measures the amount of the variation in the indicator that is explained by dividing the sample into groups. As shown in Table 6.2, these statistics are much greater for the clustered submarket division than they are for the planning analysis sections. On the dimensions of housing quality important in the market, the statistically created submarkets better explain variation than do the pre-defined PAS for all but one factor. In fact, the statistically created submarkets do a substantially better job of capturing variation in housing quality in terms of house price change, school quality, physical blight, and crime. The exception of distance to the CBD makes sense given that access is a locational issue; since the PAS are defined strictly as spatially contiguous zones, housing within them will have similar access to the CBD. The more spatially scattered submarkets have greater variation in their access to these amenities. We can conclude from these findings that PCPC’s Planning Analysis Sections do not define a geography that is most relevant for analyzing and implementing housing-related revitalization policies, as they do not consist of similar enough housing types.

Table 6.1: Submarket Composition of City Planning Analysis Sections (Proportion of block groups in each submarket)

<table>
<thead>
<tr>
<th>Submarket</th>
<th>Minority Distressed</th>
<th>Home-Ownership</th>
<th>Potential Trans</th>
<th>Rent/Gentrifying</th>
<th>High Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.0</td>
<td>0.0</td>
<td>5.0</td>
<td>5.0</td>
<td>12.5</td>
</tr>
<tr>
<td>B</td>
<td>30.3</td>
<td>2.8</td>
<td>21.8</td>
<td>35.2</td>
<td>1.4</td>
</tr>
<tr>
<td>C</td>
<td>19.3</td>
<td>2.3</td>
<td>52.3</td>
<td>23.9</td>
<td>2.3</td>
</tr>
<tr>
<td>D</td>
<td>16.5</td>
<td>2.6</td>
<td>51.1</td>
<td>8.2</td>
<td>17.8</td>
</tr>
<tr>
<td>E</td>
<td>55.5</td>
<td>12.4</td>
<td>14.4</td>
<td>6.4</td>
<td>5.9</td>
</tr>
<tr>
<td>F</td>
<td>51.4</td>
<td>2.9</td>
<td>42.0</td>
<td>0.0</td>
<td>2.9</td>
</tr>
<tr>
<td>G</td>
<td>39.7</td>
<td>0.8</td>
<td>1.7</td>
<td>43.8</td>
<td>0.8</td>
</tr>
<tr>
<td>H</td>
<td>0.0</td>
<td>0.0</td>
<td>4.2</td>
<td>2.1</td>
<td>2.1</td>
</tr>
<tr>
<td>I</td>
<td>2.3</td>
<td>0.8</td>
<td>37.7</td>
<td>3.1</td>
<td>40.8</td>
</tr>
<tr>
<td>J</td>
<td>3.9</td>
<td>0.6</td>
<td>44.5</td>
<td>26.4</td>
<td>19.2</td>
</tr>
<tr>
<td>K</td>
<td>4.1</td>
<td>0.7</td>
<td>1.9</td>
<td>32.0</td>
<td>16.4</td>
</tr>
<tr>
<td>L</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>5.1</td>
<td>15.4</td>
</tr>
</tbody>
</table>

The submarkets are then mapped within the boundaries of the PAS. (Figure 6.5) Comparing these areas visually further demonstrates that the PAS do not sufficiently de-
Table 6.2: Eta squared statistics for City of Philadelphia (Proportion of variance in variable explained by segmenting market)

<table>
<thead>
<tr>
<th>Submarkets</th>
<th>Population Change</th>
<th>House Price Change</th>
<th>Rowhouses</th>
<th>Black Population</th>
<th>Distance to CBD</th>
<th>School Quality</th>
<th>Equity</th>
<th>Blight</th>
<th>Subsidized Rental</th>
<th>Market rate rental</th>
<th>Poverty and Deprivation</th>
<th>Crime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population Change</td>
<td>0.07</td>
<td>0.42</td>
<td>0.46</td>
<td>0.58</td>
<td>0.26</td>
<td>0.67</td>
<td>0.48</td>
<td>0.56</td>
<td>0.31</td>
<td>0.15</td>
<td>0.58</td>
<td>0.53</td>
</tr>
<tr>
<td>House Price Change</td>
<td>0.02</td>
<td>0.07</td>
<td>0.23</td>
<td>0.50</td>
<td>0.89</td>
<td>0.27</td>
<td>0.34</td>
<td>0.39</td>
<td>0.34</td>
<td>0.24</td>
<td>0.42</td>
<td>0.03</td>
</tr>
</tbody>
</table>

fine areas of housing that are relevant to household choices. The Planning Analysis Sections are so large that each encompasses multiple submarket levels. These administrative boundaries are nearly irrelevant for the analysis of the housing market, as demonstrated by wide variation in housing submarkets found within each. The PAS simply do not define areas of consistent housing quality. Mapping quality based on the block group allows for a finer grain of analysis than examining the larger administrative area as defined by the planning department. The planner evaluating a policy’s effect by examining the large aggregated area would miss variation in key predictors of housing quality within the area. In order to appropriately analyze and intervene for revitalization, these large divisions need to be disaggregated.

6.2.2 Submarkets and traditionally defined neighborhoods

The PCPC has also identified historically recognized neighborhoods as smaller areas of planning attention, choosing a number of these neighborhoods as initial program areas
Figure 6.5: Philadelphia Housing Submarkets and Planning Analysis Sections
for the Neighborhood Transformation Initiative. Figure 6.6 shows the boundaries of the historically identified neighborhoods in Philadelphia in relation to the housing submarket areas defined here. The neighborhoods in Philadelphia are somewhat uniform in housing submarket quality level, with only one submarket represented within the neighborhood boundaries in one third of the neighborhoods. There are an additional number of neighborhoods with closely related housing submarkets represented within the boundaries, such as the high quality areas of the northwest of the city. This congruence makes it possible to analyze the neighborhood as a relatively homogenous unit in these cases. As Bourassa et al (2002) concluded, the pre-defined neighborhoods in Philadelphia are likely an acceptable level of analysis for basic housing price appraisals for some areas of the city.

There are notable exceptions, however, where neighborhoods do consist of areas of markedly different housing quality levels. A note of caution must be given for the two-thirds of neighborhoods with much greater variation in housing quality, particularly those that are located in border areas between housing submarkets. To analyze the degree of heterogeneity in these neighborhoods, I calculated an entropy index for each neighborhood to assess the extent to which neighborhoods are uniform in housing quality level. To reiterate, the entropy index varies from zero to one, with lower scores indicating the area is predominantly comprised of block groups in one submarket. In the neighborhoods that are homogenous in submarket composition, the entropy index is zero. In neighborhoods with non-homogeneous housing quality, the average entropy index is 0.35, with a range from 0.08 or nearly homogenous to 0.67, an extremely heterogeneous neighborhood.

Predefined neighborhoods may be acceptable proxies for housing quality in many cases where the historically recognized neighborhood is entirely or at least predominantly defined by a single housing submarket. However, as shown in Figure 6.6, the submarkets cover much larger areas, encompassing many adjacent and non-adjacent neighborhoods. Simply looking at a single neighborhood will not be adequate for predicting dynamics
Figure 6.6: Philadelphia Housing Submarkets and Neighborhoods
in the housing market, as Bourassa et al further reasoned (2002:27). In the case of Philadelphia, it becomes clear that their argument rings true. While single traditionally defined neighborhoods may be defined by only one submarket, the converse is not true: a submarket is not uniquely defined by a single neighborhood in any case. As they plan for neighborhoods, planners should be aware of the larger area that will experience repercussions when one neighborhood’s housing conditions are changed. It is the larger submarket area that is subject to the supply and demand changes induced by policies. As submarkets adjust to housing supply changes, other neighborhoods in the same submarket may change in ways that are detrimental to the residents. For example, extensive redevelopment that displaces poor residents will push them to other neighborhoods in the same submarket, which may destabilize those areas further. The isolated neighborhood of redevelopment may not be able to sustain change if the areas surrounding it that are in the same submarket experience decline.

Furthermore, the PCPC’s chosen target neighborhoods are comprised of the entire range of housing submarket quality levels. Figure 6.6 also highlights the neighborhoods chosen for revitalization efforts in blue borders. Not only are the areas of a wide range of housing quality overall, many of the neighborhoods themselves consist of several submarkets. The entropy indices for neighborhoods targeted for revitalization in the first phase of the Neighborhood Transformation Initiative range from zero to 0.68. The areas of focus for immediate attention in the Neighborhood Transformation Initiative consist of some areas of the extremely distressed submarkets, some areas defined as partly declining or potentially declining and partly gentrifying, and some areas that are of reasonably high value.

6.2.3 Submarkets and political jurisdictions

Philadelphia’s revitalization policies, like most cities’ attempts to fight urban blight, are confined to the city proper. Turning to the analysis of housing submarket structure at
the metropolitan level allows us to investigate the policy as it applies to a single political jurisdiction, the City of Philadelphia, in light of the distribution of submarkets across the nine county housing market area. Examining the maps and statistical tests, it appears that at the geographic level of policy implementation, city housing submarkets are not particularly well aligned with areas targeted for policy intervention. Where submarkets cross political jurisdictions, conditions in central city neighborhoods are linked to conditions in suburban or nearby city areas as well. Planning for individual civil divisions does not allow policy-makers to target the entire area facing a single housing condition and may not allow them to target an area sufficient to make a significant change in conditions. Even planning at the county level would not sufficiently capture housing submarket variation, as shown in Table 6.3.

Table 6.3: Eta squared statistics for Metropolitan Philadelphia (Proportion of variance in variable explained by segmenting market)

<table>
<thead>
<tr>
<th>Submarkets</th>
<th>Submarkets</th>
<th>County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Population</td>
<td>0.77</td>
<td>0.24</td>
</tr>
<tr>
<td>Vacant housing</td>
<td>0.47</td>
<td>0.18</td>
</tr>
<tr>
<td>Appreciation</td>
<td>0.57</td>
<td>0.05</td>
</tr>
<tr>
<td>Immigration</td>
<td>0.49</td>
<td>0.11</td>
</tr>
<tr>
<td>Deprivation</td>
<td>0.68</td>
<td>0.38</td>
</tr>
<tr>
<td>School Quality</td>
<td>0.46</td>
<td>0.66</td>
</tr>
<tr>
<td>Income</td>
<td>0.46</td>
<td>0.17</td>
</tr>
<tr>
<td>Renters</td>
<td>0.21</td>
<td>0.07</td>
</tr>
<tr>
<td>Rowhouses</td>
<td>0.57</td>
<td>0.24</td>
</tr>
<tr>
<td>Suburban</td>
<td>0.71</td>
<td>0.41</td>
</tr>
<tr>
<td>Median House Value</td>
<td>0.46</td>
<td>0.24</td>
</tr>
</tbody>
</table>
6.3 Conclusions

In Chapter Five, I defined a set of quality dimensions that can segment the housing market, with measured indicators of wealth, physical and land use conditions, crime, demographic change, and access to the CBD. These dimensions were used to defined submarkets for the city and metropolitan areas of Philadelphia. Mapping the statistically constructed submarket areas in relation to historically recognized neighborhood targets in Philadelphia, I find wide variation in housing quality conditions within the Planning Analysis Sections. Furthermore, while smaller neighborhoods are relatively homogenous with respect to housing quality, their boundaries do not represent the extent of a housing submarket in the city. Each housing submarket does include large spatially contiguous areas, but is also found throughout the city. The variation of housing quality in space suggests that the Alonso-Mills-Muth and Tieboutian theories are not descriptive of the housing market in the Philadelphia area. Submarket research should move forward with estimations that allow spatial relationships to be determined by the statistical methods, rather than being constrained by these models.

This exploration of the incongruity between planning boundaries and housing submarkets suggests that in order to predict and analyze the effects of revitalization on the housing market, planners will need to use techniques to define target areas more relevant to the geography of the housing market. In the next and final chapter, I will further explore the ramifications of this incongruity and discuss the implications for policy and planning practice.
CHAPTER 7

Contributions and Policy Implications

In this research, I have examined the practice of neighborhood revitalization planning, in particular the use of neighborhood boundaries to determine policy implementation areas, in light of the theoretical model of the housing submarket. I have defined a segmentation of the housing market in the Philadelphia area based on quality factors and analyzed its relationship to neighborhood revitalization policy targets. The results give insights into the theory of submarket definition and have implications for the policy of urban revitalization. These results, along with future work, may lead to the conclusion that current planning practice in revitalization will not succeed in addressing housing issues without increased attention to housing market dynamics.

7.1 Summary of the Research

The standard approach to revitalization planning is to focus policy attention towards neighborhoods. Planners use the neighborhood geography as a manageable scale for policy-making, taking advantage of pre-existing social and organizational relationships
to build on available resources. The neighborhood literature offers important constructs of social capital, networks, and institutional relationships that are used to consider the social and political implications of revitalization policy. However, the neighborhood may not be sufficient for considering the effects of policy on the housing market. However, the housing market is also affected by revitalization planning, and neighborhoods may not constitute a geography that allows for analysis of policy effects on quantity and quality of housing. Understanding the structure of a segmented housing market in geographic space would allow planners to assess housing outcomes of neighborhood planning. This conceptualization of urban spatial structure is directly related to household (consumer) preferences and behaviors vis-à-vis housing.

The submarket approach defines the housing market as a set of quality-defined submarkets. Submarkets are, in the most basic definition, collections of substitutable units. Each submarket reaches an internal supply and demand equilibrium, and also adjusts to conditions in other submarkets to create a segmented market without a single, stable equilibrium point. The recognition that similar units are clustered geographically lead to the investigation of submarkets as mappable areas. The spatial submarket definition literature includes models that assume certain spatial structures for submarkets, typically the Alonso-Mills-Muth distance-price gradient or the Tieboutian model of municipal differentiation. These models could be explored to determine whether their implications for housing submarket location can be empirically confirmed.

This research considers two questions about the structure of the urban housing market. First, does the spatially-defined submarket structure conform to extant theories of housing market geography? Second, are submarkets contiguous to neighborhoods, or a separate geography that needs to be considered in itself? These questions are answered through the definition of housing submarkets for the city and region of Philadelphia and a comparison of submarket geography to extant theory and to planner-defined policy target neighborhoods. Submarkets are defined as spatial units on the basis of multiple
dimensions of housing quality in a Census block group or tract, including, physical quality, socioeconomic status, demography, land uses and building patterns, school quality, and crime. Submarkets are classified for both the city and region, with quality ranging from high priced, low density suburban areas to the highly distressed and blighted inner city.

An analysis of the spatial distribution of these submarket areas shows that while many neighborhoods are homogenous, others are highly varied in terms of housing: these often contain a wide range of housing quality levels. This variation makes it more difficult to predict policy outcomes. Additionally, while it may appear that the city and suburban jurisdictions would be separate submarkets, due to different entities with different levels of services, in fact, there are close connections between Philadelphia and its suburbs. Jurisdictions are not uniform in submarket level. There are also strong connections among the main cities of the metropolitan area. These findings suggest that neither the Alonso-Mills-Muth nor the Tieboutian models depict the housing market of Philadelphia.

7.2 Theoretical contributions

This work on defining the quality-segmented housing market confirms the most recent work on submarket definition (Bourassa et al 1999, 2002, Macleman and Tu 1996). The creation of a hierarchy of submarkets, based on a multi-dimensional concept of housing quality, significantly improves the prediction of housing prices. Furthermore, it demonstrates that different attribute prices prevail in different submarkets due to the varied supply and demand conditions in each segment of the market. Including submarket definition in hedonic regression improves the prediction of prices, in particular explaining the sometimes unexpected results in attribute pricing. The area-based approach to defining submarkets works well in terms of creating distinct quality levels and in price prediction. Submarkets are, in fact, spatial entities that should be conceived of as places on a map,
not just a collection of units unrelated to one another spatially. This approach is most practical for use in policy-making, as planners focus on physical places for revitalization. This research does improve on the statistical methods used to define submarkets by using confirmatory (rather than exploratory) factor analysis to define dimensions of quality along which housing can be arrayed. The confirmatory technique allows the researcher to use theoretical constructs to pre-define the factors (dimensions) estimated and to test the fit of the model, rather than having a purely data-driven definition of housing quality. Additionally, the dimensions measured here include two that have not been previously employed in submarket definition: school quality and crime.

The current research on submarkets in Philadelphia is also the first to explicitly discuss and quantify the spatial distribution of submarkets, even among works that define spatially based submarkets. Most of the literature defining spatially based submarkets assumes a certain uniformity in distribution across the urban area. The spatial structure may be based on an Alonso-Muth concentric zone theory, with assumed increasing price gradients with distance from the CBD. Grigsby et al’s (1987) work on neighborhood change assumes that neighborhoods are essentially uniform in submarket makeup, although they make it clear that neighborhoods do not bound the full extent of submarkets. Metropolitan-wide studies often assume Tieboutian sorting among municipalities. This empirical work is not consistent with these theories of urban spatial structure in finding significant variation in housing quality within small areas and municipalities and non-uniform price gradients across the metropolitan area. This work is the first to discuss the variations in distribution of submarkets in light of these assumed spatial structures. By examining the spatial clustering and variation in areas, it shows that significant quality differences occur within an overall clustered pattern of submarkets. This finding provides no support for the implications of the Alonso-Mills-Muth and Tieboutian models for submarket structure, suggesting that submarket research should not start by assuming a pre-defined spatial structure, but should work in a spatially exploratory
method to capture variation.

7.3 Implications for neighborhood planning

This research is the first work to compare a housing based spatial structure with the socio-cultural structure of neighborhoods. This research examines the differences in spatial structure as defined through two different theoretical approaches and uses the disaggregated submarket areas to quantify housing heterogeneity (entropy) within the socio-cultural structure. These analyses contribute to the planning literature on neighborhoods and revitalization planning by bringing a concept of housing submarkets from the economics literature to an applied setting, assessing its relationship to neighborhood planning practice and its potential for creating revitalization policies that are more sensitive to the housing market. The results of the comparison of submarkets to planner-defined neighborhoods and policy targets demonstrate that traditionally defined neighborhoods are not sufficient in describing housing market conditions in a given area. Many neighborhoods are heterogeneous in their submarket types, and no neighborhood defines a submarket singularly. There are connections across the city, both contiguous and far apart, among areas of the same submarket. The analysis suggests that revitalization efforts are not well focused to particular submarkets, with possible impacts throughout the housing market. In order to be sensitive to the conditions of these very different types of submarkets, it would be important to devise policies that drew careful boundaries distinguishing the outlier areas from nearby distressed areas. At the metropolitan level, submarkets are found to cross political jurisdictions, and to follow no clear pattern with respect to distance from the central city. Revitalization efforts are focused solely to the city proper, despite its connections with these other areas. Enacting revitalization policies in the city neighborhoods will likely have an effect on these adjacent areas, for example inducing out-migration across the city boundary if housing is demolished in a
The spatial distribution of submarkets described in this research suggests three advantages to adding a housing market approach to the current practice of neighborhood planning. First, the approach is based on measurable household preferences for housing quality, driven by data and the supply and demand clearing relationship captured in the hedonic model. These data and models can be updated to reflect changes in the housing market and in the demography or preferences of residents. This updating would not require the potentially lengthy iterative process of redefining neighborhood boundaries through resident and stakeholder mapping. Second, the submarket approach discussed here is disaggregated spatially, building the submarket up from the smallest possible geographic unit. This disaggregated approach captures changing household preferences across the urban area, allowing planners to see variation within relatively small areas, including sharp changes in housing quality level and demand from block group to block group. Analysis aggregated to the neighborhood geography obscures the level of quality variation seen in many Philadelphias neighborhoods. Finally, the submarket approach also aggregates geographically. It links across geographic areas within the framework of consumer preferences. Instead of viewing singular, unconnected neighborhoods, it makes connections among places that households consider equivalent areas for housing location and investment. Neighborhood plans that would induce changes to the supply and quality of housing could be analyzed in terms of their potential impact in other parts of the city and region, based on their common submarket identity. The neighborhood geography does not provide a theory for assessing commonality among places in considering policy options. The housing submarket approach to defining urban spatial structure offers a tool through which planners can consider revitalization policy with respect to the housing market subject to changes across some submarkets. The findings of submarket spatial distribution have implications for policy at both the city level and the regional level.
7.3.1 Implications for City Policy

In the City itself, policies that target neighborhoods as though they are homogenous housing areas may be problematic and lead to policy failures. The policies that are being applied may not be appropriate for all parts of a neighborhood, if it is heterogeneous. Further, altering housing market conditions across a wide spectrum of submarkets makes it hard to predict outcomes in the residential housing market. One example of inappropriate targeting in the Neighborhood Transformation Initiative is reported in the neighborhood immediately adjacent to the campus of Temple University, in North Philadelphia. This area is an Neighborhood Transformation Initiative target area, in which aggressive demolition policies are being undertaken. The Department of Licenses and Inspection was tasked in 2002 with tagging any vacant properties—regardless of their condition or reason for vacancy—with notices of violation and pending demolition. This sweep of the neighborhood resulted in 500 of 7,500 properties’ being marked for demolition by the city. While city officials have yet to make official plans available, the general idea for the neighborhood is to create a suburban style development of single family houses with garages and lawns. The demolition and development plan are being applied throughout the neighborhood area, without regard to the conditions of the housing market, which are in fact quite varied. The area consists of several submarkets (See Figure 7.1), all of which consist predominately of rowhouses. The submarket analysis shows a high end rental area immediately adjacent to the university, and some of the low-moderate income homeownership areas on the eastern side of the neighborhood, while the western half is extremely blighted and undesirable. Confirming this analysis are the reactions of developers and politicians working in the neighborhood. Developers in the area find there is a strong market for housing near the university citing the hundreds of Temple University students who protested in the streets in 2000 asking for more housing near the campus. Yet the latent demand they observe is for the brownstone/rowhouse renovations and warehouse lofts (Brook, City Paper Oct 2002). They say NTI is demolishing potentially
valuable buildings that could be converted to fit into the housing market conditions in the neighborhood—a statement that is supported by my finding of a market rent/gentrifying area. State representative Jewell Williams, observing the larger area that I have labeled Minority Homeownership, offered another suggestion to help homeowners renovate their houses and rent rooms to students arguing that such a strategy would help senior citizens maintain their homes and house the student population, as well as maintain the historic character of the neighborhood. It is unclear at this point whether families seeking a suburban land use and housing type are interested in moving into a central city area that directly adjoins some of the most distressed and crime-ridden parts of the city (Brook, City Paper Oct 2002).

Rather than creating multiple strategies for this highly heterogeneous area, as suggested by these stakeholders, the redevelopment authority and Philadelphia City Planning Commission are working with a uniform blight removal policy for the area bounded by the neighborhood lines. The housing submarket analysis offered here could improve revitalization planning for this neighborhood in two ways. First, it allows policy makers to observe the mix of housing quality types available and consider policies that work with the market: identifying the groups of demanders who might be interested in such housing and supporting current owners in property maintenance that would prevent the area from downgrading to a lower submarket. Second, the submarket approach clearly maps the likely relocation areas of similar housing quality for any residents displaced in the revitalization process. The neighborhoods containing these submarkets could be stabilized or residents could be assisted to find housing in areas less sensitive to an influx of low-income households. Previous experience in Philadelphias neighborhoods suggests that this additional level of analysis might have prevented negative effects of revitalization policy.

The Temple University neighborhood has been targeted for revitalization in the past under Philadelphias 1956 Central Urban Renewal Areas plan. This plan, like NTI, ranked
Figure 7.1: Temple University Neighborhood Submarkets
neighborhoods in a quality classification and chose only those deemed to have potential for major public reinvestment. Under the 1956 Central Urban Renewal Areas plan (CURA), neighborhoods were categorized into three levels of quality: A, the most blighted; B, moderately blighted; and C, conservable, but with potential for rapid racial and income turnover (Bauman 1987:144). The residential areas in class A and B were either targeted for slum clearance or for near-total public disinvestment. The neighborhoods in class C were promoted to private developers and investors as neighborhoods with potential, although many in the private sector did not assess them in the same way (Bauman 1987:145). The clearance policies of 1956-1958 demolished approximately 2,000 occupied units, 75% of which housed families. While the neighborhood was considered only moderately blighted, the plan called for major demolition and displacement (Bauman 1987:151). Most of the displaced families moved to what planners called transitional areas; a lack of planning to absorb lower income black families into housing in these other neighborhoods aggravated white flight. By failing to take into account the housing needs of these families, and the location of the appropriate submarket types, planners actions hastened neighborhood decline in other neighborhoods even as they attempted to resuscitate the Temple area. The results for the neighborhoods of Philadelphia were not particularly positive. About one-quarter of the displaced households moved into unsatisfactory (non-code compliant) housing in other parts of the black ghetto, further concentrating poverty in the neighborhoods nearby (Philadelphia Redevelopment Authority survey, cited by Bauman 1987:149). Households with more financial means moved into the transitional conservable neighborhoods further from the center of Philadelphia, fomenting racial turnover and driving investment capital from the neighborhoods (Bauman 1987:151). A lack of planning to absorb lower-income black families into housing in other neighborhoods aggravated conditions in areas of the same, low quality submarket, and created decline in areas of a slightly higher quality submarket. The Central Urban Renewal Areas plan ranked neighborhoods according to, in part, housing quality, but the
neighborhood framework did not offer the tools needed to consider the market relationships between the areas. Without an additional method of housing-oriented analysis, the policy caused negative spillover effects that might have been better anticipated with a housing market analysis.

7.3.2 Implications for Regional Policy

The Philadelphia Neighborhood Transformation Initiative is a city-run program that does not include cooperation with suburban governments. Single-city revitalization planning is the norm, as cities focus on their neighborhoods, yet it may not be the most effective, given the relationship of cities and their suburbs in the housing market. The metropolitan housing market area is not structured as a simple concentric model of increasing housing quality nor as a Tieboutian mosaic of jurisdictions. Rather, the central city has links with other areas both immediately adjacent and at some distance away, through similar positions in the housing quality hierarchy. Philadelphia is relatively isolated in its governance, with little regional cooperation on major development issues. In fact, according to the Miller Metropolitan Power diffusion index, in 2000 Philadelphia ranked as the most politically fragmented metropolitan area in the country (Rusk 2003:4). Regional governance focuses on sharing services such as road maintenance and snow removal, not in coordinating land use, economic development, or public infrastructure investments (Rusk 2003:20). While Philadelphia does not coordinate decision-making with its metropolitan neighbors, its revitalization policy affects and is affected by them through submarket links. Rusk, in his study of governance in Pennsylvania, calls the entire urbanized area the real city of Philadelphia. Its unified labor, housing, and consumer markets are the space of activity for households, despite the political fragmentation of its jurisdictions. According to Rusk’s documentation and argument, both problems of the central city and overall metropolitan growth slowdowns can be attributed in large
part to the lack of coordination among boroughs, townships, and cities in the region. Policy-making for improved housing conditions in Philadelphia should take into account this greater housing market area, particularly the strong connections among areas of the same submarket type that are immediately adjacent to the city and in other distressed urban core areas. It could also consider mobility strategies for displaced residents that would support households’ moving into higher quality submarkets across the city boundaries. Analyses of the regional submarket structure could offer an argument in favor of greater cooperation and coordination of revitalization policies with suburban land use planning, as it shows clearly the interconnections within the metropolitan area.

7.4 Implications for planning practice

The submarket approach could allow planners to consider a disaggregated view of a neighborhood’s housing quality types, and also to consider how areas across the city aggregate into a quality level submarket. While most revitalization planning still occurs under a rubric of “neighborhoods”, there are some planning efforts focused towards the submarket, at least semantically. Some of these shifts are not very useful in that they fail to capture the full concept of the submarket as a distinct level of housing quality for example, planning for the “submarket of Brooklyn” (a large and obviously heterogeneous borough of New York City) or the “residential submarket” (without distinguishing even among types of residential building). The national government of Scotland offers an example of the submarket approach. It has recently required its cities to use the submarket concept in their Local Housing Strategies plans. Cities are required to define a local housing market area, with quality-defined submarket areas. As some of the key pioneers

\footnote{The city of Philadelphia is losing population at rapid pace (previously cited), and had only 60% of suburban income levels in 2000 (Rusk 2003:11). Although growth in income per capita is solid, job creation is far below the national averagetotal change of +28% compared to national average of 80% from 1969-1999 (Rusk 2003: 29).}
in considering submarkets and their supply/demand links are Scottish scholars (most notably Duncan MacIlenann), the instructions for planners are detailed and include a full description of the concept of submarkets and how to define them. While the techniques are complex beyond the typical housing and neighborhood plan, they are not beyond the reach of the planning profession as a whole. After all, transportation or economic development planners undertake complicated regional analyses to ascertain the most efficient and effective policies for cities and their metropolitan areas. Techniques for defining a segmented housing market are surely no more complex or computationally taxing.

Furthermore, if revitalization planning were to become viewed as a technique based on predictable principles that would lead to success, there may be increased political support for inner city improvement programs. Any revitalization program that chooses some areas for resources and others to receive little or no funding will suffer from political complications. Representatives of areas not chosen for resources may oppose revitalization strategies that operate only in some neighborhoods or submarkets. The suggested approach of targeting submarkets, along with neighborhoods, differently would surely not escape this difficulty of planning. I suggest that there are two potential political arguments to be made in favor of the submarket approach. First, increased attention to spillover effects of revitalization policy may decrease negative impacts in non-target neighborhoods. By carefully planning for housing market effects in other parts of the city, externality effects may be mitigated. This could reduce opposition to plans that could induce large population migrations or gentrification. Second, it may be that with improved policy results, overall political support for revitalization will increase. If neighborhoods that are currently a drain on city resources—due to widespread tax delinquency, unsafe properties, crime, or other issues that require public services—can be improved, increasing property values and tax revenues, then resources in other areas of government may be freed up to address neighborhood concerns in non-targeted areas. Insofar as considering housing submarkets can improve the housing outcomes of revitalization policy, it may
mitigate political concerns. However, this type of targeting strategy still faces the same political issues as any geographically-based revitalization policy.

7.5 Future Research

The results of the current study are suggestive, in that they indicate that planning efforts can be targeted at the wrong geographic scale for the best results. Submarkets, as defined in this study, are clearly not aligned with historically defined neighborhoods or with political jurisdictions. Future research might include an analysis of the robustness of these results. These analyses should take several approaches. First, this study’s methodology could be repeated in different cities, both similar to and different from Philadelphia. For example, a multi-centric metropolitan area or a lower-density, sprawling metropolitan area might have different submarket structures. Second, the methodology should be assessed by comparing different potential approaches to submarket quantification. These approaches might include a unit-based definition of submarkets, which could be compared to the spatial area definition; a definition requiring contiguity for submarkets, testing the notion that submarkets are not uniquely defined by place; and testing different criteria for clustering areas based on dimensions of quality, perhaps by weighting quality variables for their importance to consumers. Finally, these quantitative approaches should be complemented with qualitative studies that can directly inquire into consumer preferences and perceptions of submarkets. The current approach, while it is based in spatial area units, does not address the issue of space as perceived by the household. Future work should consider actual mobility patterns and stated preferences to determine whether households consider areas of great distance away to be substitute housing choices, or if the housing search range is relatively small.

However, the analysis cannot give a picture of housing market outcomes given certain policy prescriptions. The literature suggests that there are strong connections between
closely related submarkets, suggesting that the demolition policies of NTI may create disruptions in the neighborhoods that have similar housing conditions as those targeted. What is missing from the current submarket literature is a model that accounts for the spatial relationships among submarkets in measuring supply and demand adjustments in response to policy. The next step, then, in making conclusive statements about how revitalization policy affects housing submarkets, is to simulate the market interactions within and among submarkets. Modeling the hierarchy of submarkets as they reach equilibrium prices in the overall market will show the relationships among submarkets. Future research is needed to relate prices in spatially defined submarket, building models of the price changes induced by conditions in other submarkets, in particular their prices and supply. By calculating these elasticities, planners could estimate the effects of policies that change the conditions of supply and price in a particular submarket on other areas of the city. These results may show that neighborhood-based policies create negative repercussions in other neighborhoods in the city or in other parts of the metropolitan area.
Appendix A: Data Dictionary

The following tables list variable names, definitions, and sources, as well as means for both the city and metropolitan level analyses.
## Table A.1: City of Philadelphia: Variable definitions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Data</th>
<th>Source</th>
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</thead>
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<td>Dangerous</td>
<td>Percentage of tax assessed properties listed as “dangerous”, building unsafe</td>
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<td>†</td>
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<td>Vacant residential</td>
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<td>Percentage of households with incomes under the poverty rate</td>
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<td>†</td>
</tr>
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<td>Female headed households</td>
<td>Percentage of households headed by a single female</td>
<td>2</td>
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<td>Percentage of adult women in the labor force and unemployed</td>
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<td>Percentage of families receiving income from welfare</td>
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<td>Percentage of properties with Section 8 property-based subsidies</td>
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<td>LIHTC units</td>
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<td>Percentage of adult residents with at least a college degree</td>
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<td>†</td>
</tr>
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<td>Professional occupation</td>
<td>Percentage of employed adult residents with professional, white collar jobs</td>
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<td>Percentage of households renting their residence</td>
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<td>Percentage of tax assessed properties that are detached residential properties or single family dwellings</td>
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<td>Stolen vehicles or attempts at stealing vehicles per 1000 adult residents</td>
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<td>Narcotics sale/manufacturing or delivery per 1000 adult residents</td>
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**Notes**

Data Source
1 Philadelphia Licenses and Inspections
2 US Census, 2000
3 U.S. Department of Housing and Urban Development
4 Philadelphia Board of Revision of Taxes
5 Home Mortgage Disclosure Act
6 Philadelphia Police Department
7 Pennsylvania Department of Education, Pennsylvania System of School Assessment results

Data Archive
†University of Pennsylvania Cartographic Modeling Lab
‡Geolytics Neighborhood Change Census Database
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<td>Professional occupation</td>
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Data Sources
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<td>Carless household</td>
<td>16.0</td>
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</tr>
<tr>
<td>Female headed households</td>
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</tr>
<tr>
<td>Renters</td>
<td>30.0</td>
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<tr>
<td>Owners</td>
<td>68.0</td>
<td>72.0</td>
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<tr>
<td>Small multiunit buildings</td>
<td>9.5</td>
<td>7.0</td>
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<tr>
<td>Multiunit buildings</td>
<td>14.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Large multiunit buildings</td>
<td>4.9</td>
<td>1.0</td>
</tr>
<tr>
<td>Studio apartments</td>
<td>2.1</td>
<td>1.0</td>
</tr>
<tr>
<td>One bedroom units</td>
<td>13.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Two bedroom units</td>
<td>20.0</td>
<td>19.0</td>
</tr>
<tr>
<td>Four bedroom units</td>
<td>19.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Five bedroom units</td>
<td>5.0</td>
<td>3.0</td>
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<tr>
<td>Attached houses</td>
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</tr>
<tr>
<td>Detached houses</td>
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<td>45.0</td>
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<tr>
<td>New housing</td>
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<td>1.0</td>
</tr>
<tr>
<td>Vacant housing</td>
<td>6.0</td>
<td>4.0</td>
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<tr>
<td>Housing appreciation</td>
<td>36.2</td>
<td>12.5</td>
</tr>
<tr>
<td>Median house value</td>
<td>$127,150</td>
<td>$115,200</td>
</tr>
<tr>
<td>Teacher experience</td>
<td>10.9</td>
<td>12.0</td>
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<tr>
<td>Spending per student</td>
<td>$5,149</td>
<td>$5,242</td>
</tr>
<tr>
<td>Class size</td>
<td>18.5</td>
<td>21.0</td>
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Appendix B: Alternate Hedonic Model for Testing Submarket Definitions

Along with the Bourassa model of testing for submarket membership with dummy variables, the hypothesis that attribute prices differ across submarkets is tested. A submarket variable added to the regression tests whether the submarket are significantly different from on another in price. (Table B1 panel 1) First, the submarket variable is highly significant. Next the submarket membership is interacted with other characteristics and is found to alter attribute price (Table B1 panel 2). Not only does submarket membership directly affect unit price, but some attributes are differently valued in different submarkets. The total marginal price for an attribute is the attribute marginal price plus the value of the interaction term of submarket and attribute. For some submarkets, some attributes take on very different values relative to total price. For example, in the high value submarket, a rowhouse type compared to a detached house decreased price by an additional $28,800, whereas in the Potential for Change submarket, price is only decreased by $14,800 (compared to a detached house type). For units in the Distressed, Minority Homeownership, and Gentrifying submarkets, the rowhouse type had no additional effect on price above its attribute marginal price. Detached homes are particularly highly valued in the Potential for Change and High Value submarkets, more so than in other submarkets.

The average type house in the City of Philadelphia is a two story rowhouse made of masonry with 1298 square feet of living space and no garage. Using this second model to predict value, this house’s sales price would range from $17,951 in the Distressed and Undesirable submarket to $79,496 in the High Value submarket. When predicting prices for each submarket based on the typical unit in that submarket, the model proves quite accurate with respect to average submarket price. The submarket analysis demonstrates that there are distinct combinations of quality on all the factors defined that are associ-
ated with certain attribute pricing. The combination of attributes is valued at a certain level that is significantly different from any other quality level, which is the essence of the conceptual definition of submarkets.
Table B.1: Hedonic Regression on Individual Unit Sales Price, 2000 (Submarket interaction model)

<table>
<thead>
<tr>
<th>Submarket Membership</th>
<th>Submarket Interaction</th>
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<tbody>
<tr>
<td>Beta</td>
<td>Beta</td>
</tr>
<tr>
<td>Intercept</td>
<td>-45,622 *</td>
</tr>
<tr>
<td>Brick</td>
<td>56,037 *</td>
</tr>
<tr>
<td>Rowhouse</td>
<td>-55,984 *</td>
</tr>
<tr>
<td>Row*PC</td>
<td></td>
</tr>
<tr>
<td>Row*HV</td>
<td></td>
</tr>
<tr>
<td>Semidetached</td>
<td>-51,716 *</td>
</tr>
<tr>
<td>Semi*PC</td>
<td></td>
</tr>
<tr>
<td>Semi*HV</td>
<td></td>
</tr>
<tr>
<td>Living area</td>
<td>32.32 *</td>
</tr>
<tr>
<td>Stories</td>
<td>31,221 *</td>
</tr>
<tr>
<td>Garage</td>
<td>7,580 *</td>
</tr>
<tr>
<td>Submarket</td>
<td>12,669 *</td>
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<tr>
<td>Row*D&amp;U</td>
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</table>

<table>
<thead>
<tr>
<th>R²</th>
<th>0.42</th>
<th>R²</th>
<th>0.50</th>
</tr>
</thead>
</table>

n=15,598  F 1,006 *  F 670.05 *
References


131


