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IS URBAN DECAY BAD? IS URBAN REVITALIZATION BAD TOO?

Jacob L. Vigdor

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ABSTRACT

Many observers argue that urban revitalization harms the poor, primarily by raising rents. Others argue that urban decline harms the poor by reducing job opportunities, the quality of local public services, and other neighborhood amenities. While both decay and revitalization can have negative effects if moving costs are sufficiently high, in general the impact of neighborhood change on utility depends on the strength of price responses to neighborhood quality changes. Data from the American Housing Survey are used to estimate a discrete choice model identifying households' willingness-to-pay for neighborhood quality. These willingness-to-pay estimates are then compared to the actual price changes that accompany observed changes in neighborhood quality. The results suggest that price increases associated with revitalization are smaller than most households' willingness to pay for neighborhood improvements. The results imply that, in general, neighborhood revitalization is more favorable than neighborhood decline.

Jacob L. Vigdor
Terry Sanford Institute of Public Policy
Duke University
Durham, NC 27708
and NBER
jacob.vigdor@duke.edu

1. Introduction

For at least two decades, social science has lamented the decline of the economically integrated neighborhood. The absence of higher-SES households from inner city neighborhoods has been blamed for a range of urban maladies, ranging from teen pregnancy and high school dropout rates to poor public services (Wilson 1987; Jencks and Mayer 1990; Ellen and Turner 1997; Vigdor 2006). The implication of much of this research is that urban decay, by contributing to reductions in quality of life, has a detrimental influence on those who remain in declining neighborhoods.

When the opposite of urban decline occurs, however, social scientists and community activists alike have often raised a completely different set of concerns. In revitalizing neighborhoods, the primary concern is that poor renter households will be harmed by rising prices (Schill and Nathan 1983; Marcuse 1986; LeGates and Hartman 1986; Atkinson 2000; Kennedy and Leonard 2001).[1] From a naive perspective, it would thus appear that no neighborhood change is beneficial to the poor. Basic economic theory suggests, however, that these tales of the costs of urban decline and renewal are not contradictory, rather they both ignore potential countervailing benefits – urban decay reduces prices, and urban revitalization restores quality of life. Indeed, more recent evidence on gentrification suggests that the benefits exceed costs for the majority of affected households (Vigdor 2002; Braconi and Freeman 2004).[2] The goal of this paper is to more formally ground these notions of costs and benefits in an

1 It is generally presumed that owner-occupiers are insulated from rent increases, and benefit from revitalization through property value increases (Sinai and Souleles, 2005). Some observers voice concern, however, that owners may suffer from large increases in property tax bills or may be at risk for property condemnation if revitalization is government-initiated.

2 These studies employ a form of revealed preference analysis to determine whether the benefits of gentrification exceed associated price increases, by studying the rate of residential turnover. Both studies find lower rates of turnover in neighborhoods undergoing gentrification.

economic model, and to empirically determine whether price changes associated with urban decay and revitalization are commensurate with the value that households place on neighborhood quality.

After a brief review of basic evidence on neighborhood dynamics in the United States, Section 3 presents a basic model of neighborhood choice, where neighborhoods vary in quality and housing prices adjust to reflect these quality differences. So long as individual preferences obey a simple single-crossing property, it is straightforward to show that the impact of an exogenous change in neighborhood quality depends on the nature of price determination in equilibrium and the extent of moving costs. When mobility is universally costless and equilibrium prices are constrained to exceed some absolute minimum in all neighborhoods, declines in neighborhood quality have a broad negative impact that extends beyond the decaying neighborhood itself. When mobility is sufficiently costly for some group of agents, any large change in neighborhood quality, for better or worse, may have a negative impact on that group, particularly if they rent rather than own housing. Ultimately, theoretical predictions are ambiguous, which implies that the question of whether decay or revitalization is more harmful is fundamentally an empirical one.

In practice, do equilibrium housing price changes in revitalizing neighborhoods render existing residents worse off? In order to answer this question, it is necessary both to measure households' willingness to pay for neighborhood quality and the impact of revitalization on prices. These two exercises are undertaken in Sections 4 and 5, utilizing longitudinal data on housing units derived from the metropolitan samples of the American Housing Survey (AHS). The analysis employs four proxy variables for neighborhood quality: binary indicators for whether a survey enumerator noted abandoned housing within 300 feet of a sampled unit, an indicator for whether the enumerator observed houses with bars on the windows within the same radius, an indicator for whether the enumerator observed trash in the street outside the unit, and an indicator for whether the street itself was in disrepair. In some specifications, factor analysis is used to combine these four factors into a composite neighborhood quality index. Household valuations of neighborhood quality are then derived from a discrete choice conditional logit model of the decisions made by sample respondents who moved into their housing unit within the past year. Results suggest that households are willing to pay between one and three percent of their annual income for a one-standard-deviation increase in neighborhood quality. There is significant evidence of heterogeneity in this valuation.

The same AHS data are then used to determine the typical price changes associated with neighborhood decline and revitalization. Consistent with the notion that the chosen quality indicators distinguish neighborhoods at the low end of the distribution, and that price differentials in those neighborhoods are determined by consumers with low valuation of neighborhood quality, price movements associated with quality movements tend to be small. Across the entire sample of three- to four-year intervals, price increases in revitalizing neighborhoods are statistically indistinguishable from those in neighborhoods of persistent low quality. Point estimates suggest that the premium associated with revitalizing neighborhoods is on the order of one to five percent. Point estimates also suggest that declining neighborhoods experience price decreases of similar magnitude.

To address the concern that observed indicators measure latent neighborhood quality with error, additional specifications employ an instrumental variable strategy, exploiting the availability of multiple correlated indicators of neighborhood quality in later AHS panels. Ordinary least squares estimates of neighborhood quality impacts are larger when the sample is restricted to these later samples, which might reflect the increased precision of instructions given to enumerators over time. Point estimates from IV specifications are nearly identical to those from OLS, which suggests that attenuation bias is not a serious concern in the later AHS panels. The ultimate estimate of the impact of neighborhood revitalization on rents is 9%, a value that equates to the low end of the estimated willingness-to-pay distribution.

The analysis concludes by directly imputing changes in utility for householders who persistently reside in neighborhoods undergoing decay and revitalization. Imputed utility changes associated with revitalization are positive in the overwhelming majority of cases. While it is quite possible that these computations are skewed by endogenous exit from neighborhoods on the part of households who expect to be worse off following a quality change, there is little evidence of selective out-migration from revitalizing or declining neighborhoods.

Section 6 offers concluding observations.

2. How widespread are decay and revitalization?

Social scientists have repeatedly documented the rise and decline of individual cities, and have similarly analyzed both the causes and consequences of metropolitan obsolescence. Histories of individual cities provide substantial insight into the factors that promote and retard decay (Glaeser 2003; Gyourko 2005; Glaeser 2005). Though there are a few noteworthy analyses of individual neighborhoods (e.g. Gans 1962), the importance of idiosyncratic factors in their growth and decline, coupled with the comparative absence of longitudinal data, render such research efforts difficult if not impossible.

The empirical analysis in this paper will focus on neighborhoods in one of eighteen US metropolitan areas included in a subset of American Housing Survey (AHS) metropolitan files. While the set of included areas is not necessarily representative of the entire country, it does incorporate a number of cities that underwent notable declines in the late twentieth century (e.g. Detroit, Newark, Philadelphia), cities that grew consistently over the same time period (e.g. Los Angeles, Phoenix, Tampa), and some that declined through the early part of the sample period before beginning an urban renaissance (e.g. Boston, San Francisco).

In these metropolitan areas, the AHS tracked two sets of housing units longitudinally, with one set observed in 1974, 1977 and 1981, and the second set observed in 1985, 1989 and 1993.[3] These longitudinal observations permit the construction of variables measuring decay and revitalization in individual neighborhoods. While AHS enumerators asked household respondents many subjective questions about neighborhood quality, the enumerators themselves recorded a set of observations on the area immediately surrounding each sampled housing unit – either on the same street or within 300 feet – during each survey wave.[4] Among the enumerator-coded variables is an indicator for whether there were abandoned housing units in the immediate vicinity of the sample unit. This variable will serve as the primary indicator of neighborhood decline in the empirical portion of this paper. Three additional enumerator-coded variables, also potentially indicative of decline, note whether nearby housing units have bars on their windows, whether the streets are in disrepair, and whether there is litter on the streets and sidewalks. These additional indicators are available only in the later AHS panel. While these indicators are

3 The second panel is available in only 11 of the 18 MSAs.

4 The "same street" criterion applied in 1974, 1977 and 1981; the "within 300 feet" criterion applied thereafter. As will be seen in Table 2, the result of this change is to reduce the frequency of observed changes in neighborhood quality. Results reported below indicate that the change in methodology increased the signal-to-noise ratio of these indicators.

either dichotomous or trichotomous in nature, and may therefore overly simplify a complex phenomenon, they are relatively objective in nature and thus less susceptible to reporting bias. Moreover, they are recorded relatively consistently throughout the waves of the survey.

Table 1 reports sample proportions for the four enumerator-coded neighborhood quality variables. Across all MSAs and all sample years, roughly 7% of all housing units were recorded as having abandoned housing nearby. In the later AHS panel, 12% of all households had nearby buildings with bars on the windows; two-thirds of these had more than one such building nearby. More than a quarter of all housing units were located on streets that were in some state of disrepair, and a quarter were within 300 feet of an accumulation of trash.

Rough estimate of the correlations between these indicators, coding each trichotomous variable on a scale from 0 to 2, with 2 indicating the lowest degree of neighborhood quality, are uniformly positive and of a modest magnitude. The street repair and trash accumulation indicators show the strongest correlation, at 0.41, while street repair is least correlated with the bars on windows measure, possibly because bars are most likely to appear in cities with moderate climates. The remaining correlations are on the order of 0.2 to 0.3.

Beginning in 1985, the AHS supplemented enumerator-coded quality indicators with survey respondents' own assessments of the quality of their neighborhood, on a scale from 1 to 10. These self-assessments are most likely afflicted by Tiebout bias: individuals sort into neighborhoods that offer higher quality in their own estimation, which might differ substantially from the estimation of an impartial observer. Nonetheless, it would be reassuring to know that residents tend to value the characteristics employed as proxy measures for neighborhood quality in this analysis. Table 2 offers evidence to this effect, comparing the mean neighborhood rating from respondents in neighborhoods with differing values for the enumerator-coded variables.

In each case, mean neighborhood ratings tend to be lower in areas coded more negatively by enumerators. The gradient is particularly steep for the abandoned housing and trash-in-street indicators, where the difference between best and worst category translates into more than 2 points on a ten point scale. It is least pronounced in the case of street disrepair – much of the variation in road condition appears to be idiosyncratic and not necessarily related to latent neighborhood quality. The presence of buildings with bars on windows is slightly more indicative of low quality ratings than street disrepair, but this indicator is substantially less informative than either the abandoned housing or trash in street measures. Thus, each indicator is correlated at least to some extent with self-reports of neighborhood quality, but the degree of correlation varies.[5]

The cross-sectional statistics reported in Table 1 give little sense of the degree to which neighborhood quality changes over time. Table 3 provides basic information on the frequency of neighborhood transitions, defined as situations where enumerators record different values for an indicator in consecutive surveys. Given the overall frequency of neighborhood problems as recorded in Table 1, the frequency of transitions is quite high. The first two rows of Table 3 report the marginal and conditional probabilities of decline and improvement. Averaging across all time periods and MSAs, five percent of all neighborhoods witness the appearance of abandoned housing over three to four years. Among neighborhoods that begin a time period with abandoned housing, more than 60% witness some improvement by the end of the period. This statistic is somewhat surprising, given the generally accepted notion that the renewal of

5 This pattern corroborates willingness-to-pay estimates derived below: residential choice behavior is consistent with larger premiums for neighborhoods that lack abandoned buildings and trash in the streets, relative to premiums commanded by neighborhoods that lack bars on windows or streets in disrepair.

urban neighborhoods is rare (see, for example, Berry 1985). Aside from the conclusion that renewal takes place in the majority of decayed neighborhoods over any three-to-four year time period, there are two alternative explanations. The first is that this quality measure is statistically noisy. Enumerators may not consistently evaluate whether in fact there is abandoned housing within a given area. The second is that this form of "renewal" occurs when abandoned units are demolished, possibly to be replaced with vacant lots. Few would argue that such an occurrence truly constitutes revitalization. Additional evidence presented in Table 3 addresses these two alternative interpretations.

Changes in the coding of neighborhood quality indicators other than abandoned housing are similarly common across survey waves in the later AHS panel. According to enumerators, bars on windows appear in roughly 8% of neighborhoods at risk for them.[6] Street conditions worsen in 16% of all neighborhoods, and litter problems worsen in 13%.[7] The marginal probabilities of improvement in these conditions are comparable to the probabilities of decline, but the conditional probabilities are much higher. Between 50 and 65 percent of those neighborhoods at risk for improvement in neighborhood conditions actually experience them, regardless of the measure used. This evidence assuages concerns regarding the second alternative interpretation posed above – there is no obvious way that the removal of litter could be construed as a bad thing – but does little to address the first, as each of these measures is subject to similar concerns regarding statistical noise. This poses particular concerns for the empirical work undertaken below, as willingness-to-pay estimates are derived from cross-

6 Neighborhoods at risk for bars on windows include those with either no or exactly one building with bars at the beginning of the interval. Recall that two-thirds of housing units with barred windows nearby have more than one neighboring building adorned with them.

7 Neighborhoods at risk for worsening street or litter problems include those with at most minor problems at the beginning of the interval. Relatively few neighborhoods are coded as having major problems.

sectional analysis and the analysis of equilibrium responses to quality changes are derived from differenced models. Attenuation bias might therefore lead to an underestimate of equilibrium price changes relative to willingness-to-pay. An instrumental variable estimation strategy, where changes in some quality indicators are used as instruments for changes in others, will be implemented to address this concern.

The remainder of Table 3 breaks down the decline and revitalization indicators by time period and year. To these extent that these indicators are informative, rather than simply reflecting statistical noise, they should provide evidence consistent with received wisdom on the varying fates of cities and changes in trends over time. For example, Detroit should be a location marked by decline more than revitalization.

Generally speaking, these statistics offer at least some reassuring evidence that neighborhood change indicators are informative. The "net" increase in abandoned housing, computed as the difference between the probability of decline and revitalization, is highest in cities such as Detroit (4 percentage points) and Newark (2.2 percentage points), and comparatively low in Sun Belt cities (0.1 percentage points in Phoenix and Tampa). The appearance of bars on windows occurs more frequently in West Coast cities, but controlling for this regional effect, cities with more notorious crime problems do tend to witness bars on windows more often.

Changes in street disrepair and the presence of trash in the streets are more common than changes in the other quality proxy measures. The marginal probabilities of neighborhood change are between two and four times larger for these indicators. There are also some signals that neighborhood quality may not be unidimensional. For example, Minneapolis, which demonstrates very little fluctuation in abandoned housing or bars on windows, shows substantial evidence of net declines in street repair and litter. Detroit, by contrast, manages to post very little net change in the street repair and trash in street measures, despite substantial evidence of growth in abandoned housing over time. This variation across cities may reflect differences in government investment patterns across municipalities. Local governments in the Detroit area may simply be more aggressive about patching potholes and cleaning up the streets. This variation could also reflect differences in enumerator training or coding conventions across AHS sites. The possibility that neighborhood characteristics are measured with error will be an important consideration in empirical analysis below.

Neighborhoods undergoing transition are clearly not representative of the entire population. Table 4 reports basic summary statistics for households in neighborhoods observed in the AHS metro samples, classified by whether the neighborhood subsequently underwent decline, revitalization, or no change in status, according to indicators of abandoned housing or bars on windows. In the case of the bars on windows measure, neighborhoods undergoing transitions are further classified by whether that transition was rapid, a change of two coding categories in either direction, or moderate, signifying a change of one category in either direction.

Both declining and revitalizing neighborhoods are more disadvantaged than stable areas, according to a number of measures derived from AHS statistics on the households occupying sampled housing units. Areas undergoing transition have median incomes 10,000 1993 dollars lower than stable neighborhoods. Gross rents, which sum the amount paid directly to landlords with any tenant-paid utility costs, to adjust for situations where landlords pay these costs directly, are correspondingly lower as well. Transitioning neighborhoods have a higher proportion of black and female householders, slightly larger household sizes, and lower home ownership rates.

The *ex ante* differences between declining and revitalizing neighborhoods are generally more subtle than the differences between transitioning and stable areas. This is consistent with the notion that the indicators of neighborhood quality used here distinguish among neighborhoods that are generally at the low end of the quality distribution. Along several dimensions, however, evidence suggests that low-quality neighborhoods about to undergo revitalization are slightly better off than higher quality neighborhoods about to undergo decline. Household incomes tend to be a bit higher, female-headed households are slightly less prevalent, and home ownership rates are slightly higher. These observations provide some reassurance that the neighborhood quality measures used in this analysis provide some informational content.

3. Theoretical model

3.1 Basic setup

Suppose households receive utility from housing h and neighborhood quality q.[8] Quality varies continuously in a set of $n \in [1,N]$ neighborhoods, and the supply of housing in each neighborhood is fixed.[9] The price of housing in neighborhood $n=1$ is normalized to equal unity, and the prices in all other neighborhoods vary to equilibrate supply and demand for housing in each neighborhood.[10] This assumption is not innocuous; the consequences of selecting other

8 The addition of a numeraire commodity to the model does not influence the basic logic behind the results. Readers accustomed to seeing numeraire commodities in models of this type might imagine that utility takes the Cobb-Douglas form, which makes the omission of a numeraire here completely inconsequential.
9 Allowing elastic housing supply does not change the basic outcome of the model.
10 It is conceivable that conditions of excess supply may exist in certain neighborhoods. Reductions in demand for a certain location are generally not accompanied by reductions in supply, at least in the short-to-medium term (Glaeser and Gyourko, 2005). The presence of safety and tenants' rights regulations in the housing market may lead some landlords to refrain from allowing tenants to occupy a housing unit rather than lease it at market rates. There may also be scenarios where housing remains vacant even when local rent levels effectively fall to zero.

normalizations will be discussed in more detail below. Households choose a location to maximize

(1) $\max_{h,n} U(h, q^n)$

subject to the budget constraint

(2) $p^n h \leq y$.

In this scenario, a marginal increase in a neighborhood's quality, other things equal, will increase households' willingness to pay for housing in that neighborhood, with the exact amount determined by the relation:

(3) $$\left.\frac{\partial p}{\partial q}\right|_{U=\overline{U}} = \frac{\partial U / \partial q \, p}{\partial U / \partial h \, h},$$

where p without the n superscript denotes willingness to pay rather than a market equilibrium price. In general, willingness to pay for neighborhood quality is high when the marginal utility is high relative to the marginal utility of housing, is lower for households that consume more housing, and is higher when housing prices are higher.

Suppose further that household preferences for neighborhood quality can be indexed by a single parameter α:

(4) $$\frac{\partial^2 U}{\partial q \partial \alpha} > 0 \cdot$$

It follows from (3) that households with a stronger preference for neighborhood quality will have a higher willingness to pay for that commodity, other things equal. Thus, the price mechanism will generally encourage the sorting of consumers with stronger tastes for quality (high-α types) into higher quality neighborhoods. In the spirit of Epple and Romano (1991), which defines equilibrium as a scenario where no household wishes to move and there is neither excess demand nor supply for residence in any neighborhood, necessary conditions for equilibrium in this model consist of the following:

a) Neighborhoods are perfectly stratified; that is if any preference types α_1 and α_2 reside in the same neighborhood, then all types on the interval $[\alpha_1, \alpha_2]$ also reside in that neighborhood.

b) Associated with each neighborhood $n \in [2,N]$ is a boundary type, B_n, who is exactly indifferent between neighborhoods n and n-1. With the normalization of prices in neighborhood 1 mentioned above, prices in the n-1 other neighborhoods are determined by these indifference constraints.

c) There is assortative matching between households and neighborhoods. Formally, if α_i is the highest value of α in neighborhood i and α_j is the highest value in neighborhood j, $q_i > q_j$ if $\alpha_i > \alpha_j$. Moreover, it is straightforward to show that $p_i > p_j$ as well.

3.2 Effect of urban decline, under assumptions

Figure 1 graphically depicts equilibrium in this context, in price-quality space. Neighborhoods are indexed in order of increasing quality; the relation between quality and price is determined by the indifference curves of boundary types. Price-quality combinations yielding higher utility are those towards the lower and right sides of the graph. In this figure, indifference curves have been plotted as straight lines for simplicity, an innocuous assumption since the measurement of quality is arbitrary. This discussion will also make the simplifying assumption that households' demand for housing is fixed, or at least relatively price insensitive. While this assumption is less innocuous than the first, relaxing it does not substantially alter the conclusions. Finally, the supply of residential units in each neighborhood is presumed to be fixed. In the long run, one might expect that higher-valued neighborhoods would become more densely populated or replicated. The net effect would be to reduce observed price differentials over time.

The weakest preference for neighborhood quality belongs to a household having the indifference curve marked B_1 – this household is completely indifferent to quality. Such a household naturally sorts into the neighborhood with lowest quality. All households with indifference curves steeper than B_1 but less steep than B_2 also sort into this lowest-quality neighborhood, paying the equilibrium price p_1. The household with indifference curve B_2 is exactly indifferent between (q_1, p_1) and (q_2, p_2).[11] Similarly, the household with indifference curve B_3 is indifferent between (q_2, p_2) and (q_3, p_3). Households with indifference curves steeper than B_2 but less steep than B_3 sort into neighborhood 2.

In this setup, it is straightforward to show that an exogenous decrease in one neighborhood's quality results in lower utility for all households who strictly prefer that neighborhood *or any neighborhood with higher quality*. Figure 2 illustrates the impact of such a shock. When quality in neighborhood 2 declines from q_2 to q_2', prices must decline in that neighborhood in order to maintain household B_2's indifference between neighborhoods 1 and 2. Note that for any resident of neighborhood 2 with indifference curves steeper than B_2, the shift from equilibrium point (q_2, p_2) to (q_2', p_2') leads to a decrease in utility.

The decline in q_2 breaks household B_3's indifference between neighborhoods 2 and 3. With a fixed housing supply in each neighborhood, equilibrium is restored through an increase in

11 Note that given the assumption of a fixed supply of housing in each neighborhood, the identity of boundary households is determined by the distribution of preferences in the population.

prices in neighborhood 3, brought about through a bidding-up process instigated by households with indifference curves only slightly less steep than B_3. This increase in p_3 breaks the indifference between neighborhoods 3 and 4 for household B_4, which in turn leads to an increase in p_4. Thus in a city with N neighborhoods arrayed in order of quality, a quality decline in neighborhood n leads to a price decrease in n and increases in the N - n neighborhoods with higher quality.[12]

In this scenario, the projected impact of an exogenous increase in neighborhood quality is the simple reverse of the impact depicted in Figure 2. Prices increase in the improving neighborhood, however utility increases for all households in that neighborhood except the boundary household. Prices decline in neighborhoods with quality levels higher than the improving neighborhood.

3.3 Extensions: relaxing assumptions

The scenario displayed in Figure 2 and described above maintains certain severe assumptions: that the supply of housing is fixed in each neighborhood, and each households' demand is fixed. By neglecting potential wealth effects, the scenario also assumes that all households are renters and that housing is owned by absentee landlords. The assumption that prices are bounded from below is also potentially controversial. Finally, by assuming that households are freely able to arbitrage differences in living standards across neighborhoods, the scenario ignores the potential impact of moving costs. This section examines the consequences of relaxing each of these assumptions.

12 One would expect that in the long run, supply responses would reduce the size of neighborhood 2 and increase the size of neighborhoods 3 and 4 relative to the initial equilibrium. The implications of allowing variable supply are discussed in the following section.

Allowing demand and supply to vary. When housing demand and supply vary, changes in neighborhood quality may also bring about changes in neighborhood capacity. Increases in quality, by raising prices, lead households to consume less housing and producers to supply more. Conversely, reductions in quality, which lower prices, will lead towards increases in per-household consumption of housing and lower supply. Changes in neighborhood quality should thus covary positively with population growth.

Relaxing the fixed demand and supply assumptions implies that the identity of boundary households is not necessarily fixed. In declining neighborhoods, reductions in population imply that the range of households located in the declining neighborhood will shrink: referring to Figure 2, the boundary household determining p_2' will have an indifference curve steeper than B_2. The boundary household determining p_3' will have an indifference curve less steep than B_3. The net impact will be to slightly raise p_2' and to lower p_3' (and by extension new equilibrium prices in all higher quality neighborhoods). The main welfare result from the basic analysis continues to hold: quality decline in neighborhood *n* harms all those in neighborhoods from *n* to *N*.[13] Quality increases have the opposite effect.

Incorporating ownership. So long as quality changes are persistent, the asset value of houses in declining neighborhoods should reflect declines in rents. Owner-residents of declining neighborhoods thus experience negative wealth effects in addition to negative impacts on consumption, magnifying the net impact of the decline. Wealth effects negate the impact of decline in neighborhood *n* on owners in areas ranked above *n*, however. For these households, the present value of the stream of rent increases brought about by flight from the declining

13 The exception to this conclusion would be if supply in each neighborhood were completely elastic. This scenario is inherently uninteresting as it implies that all individuals (except perhaps those completely indifferent to quality) would sort into the highest-quality neighborhood, and no price premium would be supported.

neighborhood is exactly offset by increases in assets. Similarly, revitalizing neighborhoods convey duplicative benefits on owner-residents in those neighborhoods.

Changing the normalization of prices. The conclusions of this analysis are highly sensitive to the assumption that prices in all neighborhoods are constrained to be at or above some minimal level. Together with the standard Epple and Romano-style equilibrium conditions, this implies that the price response an increase in quality in any neighborhood is determined by the preferences of the neighborhood resident with the least valuation of quality. The assumption that land prices are bounded from below, either by the constraint that prices may not be negative, or by the presence of agricultural rents to land, is quite common in urban economics. Nonetheless, it is instructive to consider the potential impact of alternative assumptions.

If prices are constrained to be below some ceiling level in all neighborhoods, then the price response to a quality change in a neighborhood is determined by the resident with the highest valuation of quality. When the quality of neighborhood j declines, prices fall far enough to render most residents better off rather than worse off. Prices do not adjust, and hence resident utility is not impacted, in neighborhoods ranked above j in the quality distribution. Prices fall in neighborhoods ranked below j, as residents of those neighborhoods are drawn to the superior price-quality offering in j.

From a relative standpoint, the model's predictions are not sensitive to assumptions regarding price normalization. Neighborhood decline is relatively more advantageous to those who place little value on quality; revitalization is conversely more advantageous to those who value quality highly. The absolute implications, by contrast, are starkly different. Expectations regarding the impact of neighborhood quality changes on welfare depend significantly on one's priors regarding the nature of equilibrium price determination across neighborhoods. While it is certainly more common to assume that prices are bounded from below, the question of whether quality changes are positively or negatively correlated with welfare changes is fundamentally empirical.

Introducing mobility costs. Even maintaining the assumption that prices are normalized so that the minimum exceeds some threshold, introducing mobility costs can weaken the model's predictions. Note that in the scenario depicted in Figure 2, under assumptions maintained in section 3.2, there is no mobility in the transition from one equilibrium to another. Thus, introducing some forms of mobility costs – for example, costs that affect only a subset of the population – may have a minimal impact in this scenario. Mobility costs could theoretically influence the pace of transition to long-run equilibrium in a model with flexible demand and supply, but such transition costs would not fundamentally alter the model's predictions.

A more interesting scenario arises when mobility costs are substantial and a neighborhood undergoes a large change in quality. Figure 3 depicts a case where one neighborhood "leapfrogs" another, with the net impact of changing the rank order of neighborhoods by quality. Note that the modeled quality change is positive in this case: neighborhood 2 experiences an increase that leaves it ahead of neighborhood 3. In a frictionless world, much mobility between neighborhoods two and three would ensue. In the special case where the neighborhoods were of equal size, and supply and demand were fixed, the populations of the two areas would trade places. In the presence of mobility costs, some households may become "trapped" in their initial neighborhood. In Figure 3, residents of neighborhood 2 whose initial indifference curve traveled through the triangular shaded area are at risk for being made worse off by neighborhood improvement. This cone is bounded below by household B_2, and above by the household exactly indifferent between (q_2, p_2) and (q_2', p_2'). These households value the increase in neighborhood quality at or below the change in market price. They also at least weakly prefer (q_3', p_3') to (q_2, p_2). These households will suffer a net loss if their cost of switching from neighborhood 2 to neighborhood 3 exceeds the gain from relocating to a superior price/quantity combination.

In the presence of mobility costs, then, it is conceivable that both decay and revitalization could lead to reductions in utility for certain residents of urban neighborhoods. This scenario is most likely to apply to renters facing high mobility costs in areas undergoing particularly stark changes in neighborhood quality.

In the end, theoretical arguments leave a substantial amount of uncertainty regarding the impact of neighborhood quality changes on welfare. It is fairly clear that the impact is heterogeneous: owners and those who value quality highly are most likely to benefit when the quality of their own neighborhood increases; renters and those who value quality least are least likely to benefit. Renters who face high moving costs are likely to be harmed by substantial quality changes in either direction. The sign and magnitude of these welfare changes is difficult to ascertain without making more specific assumptions regarding the magnitude of moving costs and the nature of price determination in equilibrium.

Theory thus leaves several empirical questions to be addressed. How much are households with varying observable characteristics willing to pay for neighborhood quality? How much do prices change in neighborhoods that decline or revitalize? How do these price changes compare with willingness to pay? Is there any evidence that individuals become "trapped" in revitalizing areas, where price increases exceed their estimated willingness to pay for improved neighborhood quality?

4. The valuation of neighborhood quality

Suppose households *i* choosing among available housing units *j* have a utility function of the following form:

$$(5)\ U_{ij} = \alpha\,(Y_i - r_j) + \beta_i X_j + \varepsilon_{ij}\ ,$$

where Y_i represents the household's income, r_j indicates the rental price of the unit in question, and X_j is a vector of housing unit and neighborhood characteristics.[14] Note that the vector β is presumed to vary across households. The error term ε_{ij} represents an idiosyncratic household- and choice-specific shock to utility. When the error terms are independent and identically distributed across choice alternatives, following an extreme value distribution, and households systematically select the alternative that maximizes U_{ij}, the conditional logit procedure can be used to identify the parameters α and β. In most specifications below, elements of β will be estimated as linear functions of observed household characteristics.

A common obstacle in consumer choice models of this type is the correlation of price with unobservable components of quality. In the presence of such a correlation, estimates of the coefficient on post-rent income, α, will be biased downwards: households will appear to frequently choose more expensive housing units with little to offer in terms of observed

14 Note that this formulation treats income as exogenous to location choice. Some models, such as the spatial mismatch hypothesis (Kain, 1968), suggest that income is a function of location. Indeed, Vigdor (2002) posits that improved job opportunities form one potential benefit of neighborhood revitalization. Recent evidence, much of it derived from randomized mobility experiments such as the Moving to Opportunity program, suggest that the effect of location choice on earnings is insignificant (Orr et al. 2003).

amenities. Ferreira (2005) offers a means of circumventing this bias, by introducing a situation where two households may face different prices for the same housing unit. The source of variation are amendments to California's constitution, which allow certain households to move while retaining the property tax bill associated with their previous residence. In models presented here, Ferreira's estimate of α will be imposed as a parameter restriction. Effectively, these models will assume that Ferreira's estimate is free of the bias typically associated with estimation of such parameters.[15]

The relevant sample for the conditional logit estimates presented here consists of all renter households in our AHS samples who report having moved into a housing unit within the year prior to their interview. The potential choice set for each household is comprised of those AHS rental units in the respondent's MSA listed as vacant or having turned over in the past year. For purposes of analytical tractability, the choice set includes only a random sample of ten unchosen alternatives. Specifications control for the probability that a housing unit was included in the choice set, constraining the coefficient on this probability measure to equal one (McFadden 1978).

The vector X_j consists of housing unit characteristics and characteristics of the relevant AHS "zone." The AHS zone contains roughly 100,000 residents and can be mapped relatively reliably into Census geography.[16] While coefficients on household characteristics, including

15 In practice, conditional logit estimates of this equation that do not impose the Ferreira constraint produce coefficients that are uniformly much closer to zero, consistent with the presence of omitted variable bias. Readers inclined to discount the importance of omitted variable bias may think of willingness-to-pay values derived from the constrained estimates to be lower bounds. As will be seen below, the lack of a strong association between neighborhood quality and price trajectories implies that this paper's substantive conclusions are not sensitive to the values generated by the willingness-to-pay exercise.

16 Zone characteristics are only available in the AHS enumerations of 1985 and later. This constraint is only binding in the case of the abandoned housing measure, since the other enumerator-coded variables are also unavailable before 1985.

income, cannot be identified in a conditional logit framework, interactions between household characteristics and housing unit characteristics can. These interactions operationalize the parameter heterogeneity implied in equation (5).

Table 5 presents selected coefficient estimates from conditional logit specifications. In addition to the variables listed here, each specification controls for a set of housing unit characteristics, including the number of bedrooms, whether the unit is detached, and a categorical control for the decade in which the unit was built. These structural characteristics as well as AHS zone characteristics are fully interacted with household characteristics in the model. The five specifications examined in Table 5 focus on five different proxies for neighborhood quality: the four enumerator-coded indicators discussed above, as well as a composite index derived through factor analysis.[17] The enumerator-coded indicators are each transformed into binary indicators, combining the minor and major problem categories.

The first set of coefficient estimates in Table 5 examines the probability of selecting a housing unit that is in close proximity to abandoned housing. There is significant evidence of heterogeneity in the valuation of this measure of neighborhood quality. Among other things, the coefficients suggest that neighborhood quality is a normal good, as willingness to pay to avoid abandoned housing increases, albeit slightly, with income. More educated householders also display a tendency to avoid neighborhoods with abandoned housing, other things equal. Willingness to pay for this measure of neighborhood quality is lower among nonwhite householders, younger householders, and householders with children, other things equal.

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17 Factor analysis reveals that the four enumerator-coded variables load onto exactly one factor with an eigenvalue in excess of 1. No other factor has an eigenvalue greater than 0.07. The factor loadings are all in the same direction, implying that the factor can reasonably be considered to represent neighborhood quality. Note that the quality index is reverse-coded, with higher values indicating lower quality. The index has a mean of zero and an observed standard deviation of 0.75.

Table 6 uses the coefficient estimates provided in Table 5 to estimate households' marginal willingness to pay to avoid housing in neighborhoods with nearby abandoned units. These estimates are expressed on an annual basis, in 1993 dollars. The degree of heterogeneity in willingness to pay is substantial: the value of a relatively high-income white household is more than twice that of a more moderate income nonwhite household with similar family structure and education. The willingness-to-pay numbers are fairly substantial relative to income, equivalent to between 3 and 5% for each of the household types listed. Given the limited number of additional neighborhood characteristics included in the conditional logit specification, the abandoned housing measure is almost certainly standing in for a number of other neighborhood amenities, local public goods and services, or housing unit attributes. Bear in mind, however, that any such attributes loaded on to the abandoned housing measure must be orthogonal to average income and education levels in the unit's AHS zone.

The remaining specifications in Table 5 repeat this exercise, replacing the abandoned housing measure of neighborhood quality with the three other enumerator-coded variables as well as the composite neighborhood quality index. Entries in Table 6 reveal similar patterns in willingness-to-pay across the five measures of neighborhood quality. In each case, neighborhood quality is estimated to be a normal good, with a doubling of income associated with an increases in willingness-to-pay on the order of 50%. Less educated and nonwhite householders show less demand for quality, other things equal; older householders will pay a slightly higher premium for quality, other things equal. Householders living with children show a greater propensity to avoid neighborhoods with bars on windows, but are less averse to other manifestations of low quality. In general, abandoned housing and the presence of trash in the street are characteristics eliciting the strongest avoidance responses, which corroborates the earlier finding that these indicators are most strongly associated with survey respondents' own assessments of neighborhood quality. A unit increase in the neighborhood quality index, which corresponds to roughly 1.3 standard deviations, is associated with reductions in willingness-to-pay of 1 to 3 percent of annual income.

5. How do actual price changes compare with estimated valuations?

Evidence to this point suggests that the valuation of neighborhood quality is substantially heterogeneous. As discussed in Section 3 above, it is not inherently clear which valuation should matter most when neighborhood quality changes. This section presents evidence on the actual impact of quality changes on market prices.[18]

Table 7 presents the results of ordinary least squares regressions where the unit of observation is the rental unit/time interval[19]. The dependent variable is equal to the change in the logarithm of gross rent for the unit. Each specification controls for time period fixed effects as well as MSA fixed effects, to eliminate any MSA- or time period-specific trends in rents. The specifications include a binary indicator for whether the unit was located in a low-quality neighborhood at the beginning of the time period. In the first four specifications, initial quality is low if enumerators coded at least a minor problem along one of the four standard dimensions. In the final specification, initial quality equals the initial value of the neighborhood quality index.

The independent variables of interest are controls for whether neighborhood quality

18 Evaluating the effect of neighborhood quality change on observed prices to estimated valuations may give an inaccurate picture of the change in well-being residents experience if prices are trending upwards or downwards in the remained of the metropolitan area. An actual evaluation of the impact of quality change on resident utility based on repeat observation of AHS renter households appears in Table 9 below.

19 In the abandoned housing specification ,time intervals include 1974-77, 1977-81, 1985-89, and 1989-93. In the remaining specifications, only the 1985-89 and 1989-93 intervals are used.

improved or worsened over the four-year interval. In the first four specifications, these control variables exploit the trichotomous nature of the underlying quality indicators. Thus a neighborhood in the low initial quality state may transition in either direction, if in the initial period the enumerator coded only a "minor" degree of street disrepair or litter in the street, or spotted only one abandoned housing unit or one unit with bars on the windows. In the final specification, the change in neighborhood quality index is effectively interacted with an indicator for whether that change is for the better.

While the results vary in terms of the impact of initial quality on subsequent rent changes, point estimates are consistent regarding the impact of quality changes on rent changes.[20] These point estimates are generally not statistically significant, however. Taking them at face value, they suggest that improving neighborhoods do tend to post higher rent increases than other neighborhoods that begin at a low level of quality, and declining neighborhoods exhibit a decrease in rents. The estimated effects, in addition to being statistically insignificant, are of relatively modest magnitudes. Relative to other initially low-quality neighborhoods, for example, point estimates suggest that rents in neighborhoods where bars disappear from nearby windows increase by an average of 4.5%. With average monthly rent levels just over $500 in low-initial-quality neighborhoods, this suggests that revitalization is associated with annual price increases on the order of $300 in 1993 dollars. Referring to Table 6, this figure is well within the range of marginal willingness-to-pay estimates.[21]

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20 In three of five specifications, the impact of initial quality on subsequent rent growth is statistically indistinguishable from zero. Units located in neighborhoods where streets are in need of repair show a significant tendency to decline in price over the subsequent four-year period, while units in neighborhoods with trash in the street tend to increase in price over the subsequent period.

21 Note that this example refers to the specification with the largest point estimate, and the quality indicator with the lowest reported marginal willingness-to-pay estimates in Table 6. Coupled with the statistical insignificance of the result, it would be inappropriate to conclude that this estimate implies that neighborhood quality improvements leave some households worse off.

As discussed in section 2 above, these neighborhood quality indicators are best thought of as noisy indicators of a latent neighborhood quality variable. These specifications operate with first-differenced versions of these indicators, which will tend to amplify attenuation bias associated with measurement error. The true impact of neighborhood quality change on prices could conceivably be larger than what is estimated here.

The final specification in Table 7 addresses this concern to some extent by employing the neighborhood quality index, which incorporates information from multiple signals of the latent variable. If each of the four signals were independent of one another, use of a weighted sum could potentially increase the signal-to-noise ratio. It is possible however, that the errors in variables are correlated with one another, as they are all based on the observations of a single enumerator.

Table 8 presents a second method for addressing the potential for attenuation bias, instrumental variable analysis. In this case, changes in one neighborhood quality indicator, the presence of abandoned housing, are instrumented for with changes in the other three indicators. The analysis rests on the assumption that changes in the three other indicators should not influence growth in rents except through their impact on latent neighborhood quality, which the instrumented variable presumably also measures with error. If the measurement error in each neighborhood quality indicator were classical, this method would produce unbiased estimates of the impact of neighborhood quality changes on rent changes. For reasons discussed in the preceding paragraph, along with the fact that the quality indicators are discrete in nature, measurement error is not likely to be classical in this case. Under certain assumptions, however, OLS and IV coefficient estimates can be considered bounds on the true parameter when measurement error is non-classical (Black, Berger and Scott, 2000).

The first column in Table 8 shows the results of an OLS specification linking changes in the abandoned housing indicator to changes in log gross rent. Somewhat surprisingly, the impact of quality changes is estimated to be positive and significant in this specification, which also includes controls for time period and MSA fixed effects, as well as two binary indicators for initial presence of one or multiple abandoned housing units. In part, this discrepancy can be attributed to changes in the specification. This model estimates one quality change parameter rather than two, effectively constraining the effect of decay to be the opposite of the effect of revitalization. This model also excludes data from the 1974-1977 and 1977-1981 time periods. As discussed previously, the instructions to enumerators were different in these earlier time periods. Enumerators were asked to indicate whether abandoned housing was located on the same street, rather than within 300 feet. Summary statistics in Table 3 show that the frequency of neighborhood quality transitions was correspondingly larger in the earlier period relative to the late period. This evidence is consistent with the notion that the abandoned housing variable is a noisier indicator of neighborhood quality in the earlier period, owing to ambiguity in the radius of reference.

The point estimate suggests that rents rose an average of 9.1% in neighborhoods undergoing revitalization, relative to other neighborhoods in the same initial quality state. Initial quality has a strong association with price changes as well. With average rent levels just over $500, this implies a relative increase of nearly $600 in equilibrium annual rent levels. Compared with the marginal willingness-to-pay estimates in Table 6, this value appears somewhat modest.

Instrumental variable estimates of the relationship between neighborhood quality changes and rent changes, though estimated quite imprecisely, are remarkably similar to OLS specifications.[22] The IV estimate of the impact of neighborhood quality change on rent change is higher than the OLS estimate, which would be expected if attenuation bias were a concern, but the difference between coefficients is nearly imperceptible. The results suggest that attenuation bias is a serious concern in the earlier AHS panels, but not a significant impediment in the later period.

Overall, the regression results suggest that willingness-to-pay for neighborhood quality improvements tends to exceed the price changes associated with such improvements. Regression analysis necessarily obscures variation in the experiences of individual households in individual neighborhoods. Is there evidence that some households experience decreases in utility when their neighborhood revitalizes? Do households predicted to have a low willingness to pay for neighborhood quality display a propensity to exit when their neighborhood revitalizes? Do households predicted to highly value neighborhood quality tend to exit when neighborhoods decline? The remainder of the evidence presented here addresses these three questions.

For individuals that remain in the same housing unit between two AHS waves, it is possible to directly predict changes in utility. Table 9 reports the results of such an exercise, which amounts to reporting the change in predicted value derived by a representative conditional logit specification.[23] The table reports the mean change in predicted value, by neighborhood quality trend, as well as the proportion of estimated utility changes that are positive, for renters in

22 The first stage fit is quite good in this model. Change in bars on windows has a *t*-statistic of 19.5, change in street disrepair has a *t*-statistic of 5, and change in trash in street has a *t*-statistic of 8.25. It is thus unlikely that the IV estimates are subject to bias associated with weak instruments.

23 These predictions are derived from a conditional logit specification where both abandoned housing and bars on windows appear as choice-specific characteristics, and utilize potentially time-varying characteristics of households. Alternative sets of predictions, holding household characteristics constant and equal to their first-period values, produces similar conclusions.

the second of the two AHS metro longitudinal datasets.[24]

In general, the results of this analysis confirm the intuition generated by a simple comparison of willingness to pay to observed changes in rent. The highest mean changes in utility are experienced in revitalizing areas, the lowest in declining neighborhoods. Utility changes are comparatively modest in stable neighborhoods. In general, utility changes tend to be more positive in the latest time period covered in this analysis, between 1989 and 1993.

There is considerable heterogeneity in the utility changes predicted for individual households in the AHS sample, driven primarily by variation in rent changes for individual housing units. In stable neighborhoods, roughly 60% of all households have positive predicted changes in utility, averaging across both time periods and all available cities. In neighborhoods marked by the disappearance of abandoned housing, 80% of all households had positive predicted changes, while only 30% of households in areas where abandoned housing appeared had positive predicted changes. Using the bars-in-windows criteria produces somewhat less stark contrasts, but utility changes continue to be more reliably positive in revitalizing areas.

While it is not accurate to state that no households suffer decreases in utility in revitalizing neighborhoods, households forced to choose one of these three states of nature from behind a "veil of ignorance" would almost certainly choose revitalization if it appeared in their choice set. Neither stability nor decline offer any assurances against utility-decreasing increases in rent.

This analysis could be misleading if the set of individuals who remain in declining or revitalizing neighborhoods is not representative of the entire population in those areas.

24 Recall that this represents the time period where measurement error in neighborhood quality does not appear to be a severe issue.

Revitalization may look positive, for example, because all those individuals with negative predicted utility changes exit the neighborhood. Tables 8 and 9 address this concern by analyzing mobility patterns among households initially located in neighborhoods that subsequently experienced decline or revitalization, respectively.

Table 8 presents coefficients derived from probit specifications that examine the propensity for AHS renter households to exit their residence between consecutive waves of the survey. The sample is restricted to households initially residing in neighborhoods at risk for decline, according to the abandoned housing criterion in the first specification and the bars on windows criterion in the second. The specifications control for a number of householder characteristics, an indicator for whether the neighborhood exhibits decline between survey waves, and interactions between the decline indicator and the various household characteristics. Coefficients on main householder effects are omitted from the table.[25]

Generally speaking, these specifications provide little in the way of consistent evidence. Interaction terms in the two specifications, which employ different definitions of neighborhood decline, are often of opposite sign. Of the sixteen interaction terms presented in the table, three attain some level of statistical significance. In all three cases, these statistically significant coefficients have opposite-sign counterparts in the alternative specification. The most appropriate conclusion to take away from this evidence is that there are no robust, strong associations between household characteristics and responses to neighborhood decline. It is interesting to note, however, that the three statistically significant coefficients all present evidence consistent with the willingness-to-pay exercise above. Households with children

25 The main effects reveal that female-headed households, nonwhite households, households with children present, married-couple households, and households headed by older, more educated, and higher-earning householders are less likely to move out of a rental unit between survey waves.

generally have lower willingness-to-pay to avoid abandoned housing, and those households are also relatively less likely to depart when abandoned housing appears in a neighborhood. Willingness-to-pay for neighborhood quality tends to rise with education, and more educated householders show a relatively high propensity to move out of neighborhoods when bars appear on windows. It thus appears that selective attrition from declining neighborhoods may lead to an understatement of the negative effects of decline in Table 7. But this evidence is far from strong.

Table 9 offers an analogous set of results, examining the propensity to move out between survey waves among those individuals in neighborhoods at risk for revitalization. The smaller sample sizes in these specifications reflect the smaller number of neighborhoods in this state at any one point in time. Once again, there is little evidence of any systematic pattern in these results. Of the sixteen displayed interaction terms, only one attains statistical significance. That result suggests that college-educated householders are more likely to exit low-quality neighborhoods when a sign of revitalization – the removal of bars on windows – is observed by a survey enumerator. There is little evidence, in particular, that those households with low willingness-to-pay for neighborhood quality show a disproportionate tendency to exit when quality increases.

To summarize the results of this exercise, most evidence points to the existence of accelerated rent growth in neighborhoods undergoing revitalization, and to relative rent declines in neighborhoods experiencing decay. Estimates suggest, however, that the magnitude of these price movements is small relative to the distribution of willingness-to-pay for neighborhood quality. Predicted utility changes for householders in revitalizing neighborhoods are much more likely to be positive than predicted utility changes for householders in stable or declining neighborhoods. This evidence is consistent with the notion that equilibrium price differentials in low-quality neighborhoods are determined by households with a relatively low valuation of quality.

6. Conclusions

Could a rational householder truly oppose both neighborhood decline and neighborhood improvement? It is relatively easy to construct a theoretical model that predicts opposition to one trend or the other. By incorporating moving costs, it is also possible to construct a model that predicts opposition to all forms of neighborhood change. The question of which model is most likely to hold in reality is fundamentally empirical.

Discrete choice analysis of household location decisions shows that individuals do place a value on neighborhood quality, and there is significant evidence of heterogeneity in this valuation. Household will pay a sum on the order of several hundred 1993 dollars to avoid residing in a housing unit with abandoned housing nearby. More generally, estimates suggest that households will pay between 1 and 3 percent of their annual income for a neighborhood roughly one standard deviation higher in latent quality. Estimates imply that this willingness to pay is significantly lower for certain types of households, including those with low incomes, less-educated heads, or children present.

Households could be harmed by revitalization if associated price increases exceed their willingness-to-pay. Specifications exploiting the longitudinal nature of the AHS reveal that there is some price appreciation associated with quality improvements, but the average price increase is modest relative to the distribution of willingness-to-pay. Direct prediction of utility levels for long-term neighborhood residents are much more likely to be positive in revitalizing neighborhoods than in declining ones.

The term “gentrification” has negative, even alarming, connotations in some urban areas. The evidence provided here suggests that those who fear neighborhood revitalization have made a basic error of attribution, by associating it with price increases that appear more strongly linked to other, albeit not fully identified, market forces.

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Table 1: Summary statistics for enumerator-coded neighborhood quality variables, AHS

Indicator	Sample proportion, all years and metro areas	Correlation with:		
		Bars on windows	Streets in disrepair	Trash in street
Abandoned housing (on same street pre-1984; within 300 feet thereafter)	6.9%	0.31	0.21	0.32
Bars on windows of at least one building within 300 feet	12.1 (8.1% more than one)		0.16	0.29
Minor or major repairs needed to street within 300 feet	26.2 (3.4% major)			0.41
Minor or major accumulation of trash within 300 feet	25.3 (2.9% major)			

Note: sample proportion calculations exclude observations coded “not applicable” or “not answered.” For puproses of computing correlations, the bars on windows, streets in disrepair, and trash in street variables are coded on a 0, 1, or 2 scale, with 2 indicating more than one building with bars on windows, major repairs needed, or major accumulation of trash, respectively.

Table 2: Comparing enumerator- and respondent-coded neighborhood quality

Enumerator-coded variables		Mean respondent-coded neighborhood quality (1-10 scale)
	none	7.93
Abandoned housing	one	6.43
	more than one	5.68
	none	7.99
Bars on windows	one	7.13
	more than one	6.81
	no repair needed	8.05
Streets in disrepair	need minor repair	7.37
	need major repari	7.27
	none	8.19
Trash in street	minor accumulation	7.00
	major accumulation	6.02

Note: Source is AHS samples from 1985 and later.

Table 3: Neighborhood decline and revitalization in a set of American cities

	Percent of neighborhood/time period observations exhibiting decline based on:				Percent of neighborhood/time period observations exhibiting revitalization based on:			
	Abandoned housing	Bars on windows	Streets in disrepair	Litter	Abandoned housing	Bars on windows	Streets in disrepair	Litter
Marginal probability	4.8%	7.0%	15.5%	13.0%	3.90%	5.5%	17.1%	15.1%
Conditional probability	5.2	7.7	16	13.4	61.7	50.0	64.4	60.7
Marginal Probabilities:								
By time period								
1974-1977	5.9	---	---	---	4.4	---	---	---
1977-1981	4.7	---	---	---	4.5	---	---	---
1985-1989	3.7	8.1	16.7	14.8	2.2	5.5	17.5	15.7
1989-1993	2.4	5.1	17.6	13.5	2.8	5.5	16.3	14.1
By city								
Anaheim	1.4	---	---	---	1.3	---	---	---
Boston	5.7	3.4	15.0	10.9	4.1	1.9	21.9	15.9
Dallas	3.9	6.5	9.6	8.4	3.6	5.7	24.9	20.8
Detroit	10.3	7.8	22.2	13.7	6.3	7.8	21.2	13.1
Fort Worth	3.5	7.1	15.5	10.2	2.9	5.4	18.3	18.6
Los Angeles	4.1	17.4	25.2	27.7	5.8	11.0	11.1	15.1
Minneapolis	2.0	1.0	24.8	20.5	2.0	0.8	15.3	13.1
Newark	6.7	---	---	---	4.5	---	---	---
Orlando	4.3	---	---	---	3.9	---	---	---
Philadelphia	5.7	9.8	16.4	15.8	5.1	7.4	19.4	16.0
Phoenix	3.8	7.6	11.4	13.5	3.7	6.2	11.0	11.7
Pittsburgh	6.0	---	---	---	4.9	---	---	---
San Francisco	5.0	11.6	18.7	17.0	2.9	9.0	13.1	15.6
Spokane	2.9	---	---	---	3.8	---	---	---
Tacoma	4.4	---	---	---	3.6	---	---	---
Tampa	1.9	5.6	10.4	10.3	1.8	4.5	15.6	14.8
Washington	4.9	6.1	14.1	11.1	3.5	5.0	16.0	14.9
Wichita	3.0	---	---	---	3.6	---	---	---

Note: Indicators of decline and revitalization are based on enumerator-coded variables in the AHS. Prior to 1984, enumerators were instructed to code conditions in the area "on the same street" as the sample unit. After 1984, this definition changed to "within 300 feet." Marginal probabilities show the proportion of all housing units that transition from one state to another between survey waves. Conditional probabilities show the proportion of housing units with the potential to decline (revitalize) that actually decline (revitalize) between survey waves.

Table 4: A comparison of conditions in declining, revitalizing, and stable neighborhoods

Summary statistic	Initial value of statistic in neighborhoods exhibiting:							
	Increase in abandoned housing	No change in abandoned housing	Decrease in abandoned housing	Rapid increase in bars on windows	Moderate increase in bars on windows	No change in bars on windows	Moderate decrease in bars on windows	Rapid decrease in bars on windows
Median income (1993 dollars)	$26,370	$38,119	$27,496	$30,284	$30,820	$41,406	$32,877	$32,292
Median gross rent (1993 dollars)	$410	$509	$407	$509	$517	$590	$512	$498
Mean household size	2.88	2.78	2.92	2.63	2.65	2.55	2.58	2.54
Percent black	37.3	10.2	35.8	34.9	32.8	8.7	34.4	36.6
Percent female-headed households	23.6	10.7	19.3	22.3	22.3	12.5	21.0	22.3
Home ownership rate	43.6	60.4	47.8	42.0	45.6	56.6	46.5	43.8
N	9,101	171,508	7,406	2,253	3,534	43,800	2,764	1,641

Note: Abandoned housing statistics are based on observations from 1974, 1977, 1985, and 1989. Bars on windows statistics are based on observations from 1985 and 1989. A "rapid" decrease (increase) is defined as progressing from more than one (no) nearby house(s) with bars on windows to none (more than one). A "moderate" increase is defined as progressing from zero to one, or from one to more than one; moderate decreases are defined analogously. Statistics are based on the characteristics of households occupying AHS sample units.

Table 5: Conditional logit coefficient estimates

Independent variable	Neighborhood quality proxy: Abandoned Housing	Bars on Windows	Streets in disrepair	Trash in streets	Composite Quality Index
Annual rent (in 1993 dollars)	-2.11	-2.11	-2.11	-2.11	-2.11
Neighborhood quality proxy (NQP)	-254.7	443.7	676.3	1091.6	493.12
	(5.785)	(3.799)	(2.538)	(2.139)	(1.773)
Nonwhite householder*NQP	1231	740.1	218.8	593.14	612.89
	(2.446)	(1.494)	(1.362)	(1.661)	(1.079)
Family income*NQP	-0.06	-0.02	-0.02	-0.04	-0.03
	($1.1*10^{-4}$)	($4.8*10^{-5}$)	($3.7*10^{-5}$)	($2.6*10^{-5}$)	(1.9*10-5)
Householder's age*NQP	-7.76	-6.56	-14.21	-21.13	-12.02
	(0.070)	(0.069)	(0.048)	(0.030)	(0.033)
Presence of children under 18*NQP	700.1	-147.9	110	440.7	244.5
	(2.407)	(1.834)	(1.633)	(1.397)	(1.253)
Householder has HS diploma*NQP	-1102	-876	-647.7	-1335.3	-818.28
	(2.947)	(2.101)	(1.433)	(1.461)	(1.084)
Mean family income in zone	-0.03	-0.02	-0.02	-0.02	-0.02
	($2.3*10^{-4}$)	($2.1*10^{-4}$)	($2.6*10^{-4}$)	($1.7*10^{-4}$)	(1.8*10-4)
Percentage of adults w/ HS diploma in zone	-2623	-2768	-2470.1	-1746	-2251.12
	(23.96)	(25.56)	(21.39)	(16.8)	(17.67)
Percent nonwhite in zone	-8381	-8847	-8796	-8290	-8489.17
	(10.05)	(9.322)	(9.66)	(7.896)	(7.71)
Structural characteristics controlled	Yes	Yes	Yes	Yes	Yes
Structural/household characteristic interactions	Yes	Yes	Yes	Yes	Yes
Zone/household characteristic interactions	Yes	Yes	Yes	Yes	Yes
Observations	403,671	403,671	396,551	411,520	387,060

Note: Standard errors in parentheses. Unit of observation is the household/choice alternative. Estimates pool observations across three waves of AHS metro data, from 1985, 1989, and 1993.

Table 6: Implied marginal-willingness-to-pay (per year) for neighborhood quality, 1993 dollars

Household characteristics	Implied MWTP to avoid: Abandoned housing	Bars on windows	Streets in disrepair	Trash in streets	Unit decrease in NQI
Age 30, income $30,000, white, no children, HS graduate	1533.14	524.87	457.97	912.26	736.28
Age 30, income $60,000, white, no children, HS graduate	2314.02	752.03	727.73	1409.18	1148.02
Age 30, income $30,000, white, no children, HS dropout	1011.61	110.29	151.44	280.31	349.02
Age 30, income $30,000, nonwhite, no children, HS graduate	950.56	174.60	354.42	631.55	446.22
Age 30, income $30,000, white, children, HS graduate	1201.81	594.86	405.92	703.69	620.57
Age 60, income $30,000, white, no children, HS graduate	1643.33	617.97	659.73	1212.26	906.94

Table 7: OLS estimates of the impact of quality change on rent change

Independent variable	Neighborhood quality proxy: Abandoned housing	Bars on windows	Streets in disrepair	Trash in street	Composite quality index
Low initial quality	-0.027	-0.021	-0.037	0.081	0.002
	(0.109)	(0.014)	(0.015)	(0.017)	(0.010)
Neighborhood quality indicator declines	-0.013	-0.026	-0.028	-0.025	-0.003
	(0.008)	(0.023)	(0.013)	(0.013)	(0.006)
Neighborhood quality indicator improves	0.006	0.045	0.013	0.034	0.006
	(0.014)	(0.031)	(0.021)	(0.021)	(0.007)
MSA fixed effects	Yes	Yes	Yes	Yes	Yes
year fixed effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.039	0.039	0.038	0.042	0.056
no. of observations	57,205	13,743	13,527	14,079	12,253

Note: Standard errors in parentheses. Unit of observation is the housing unit/time interval, where time intervals are based on repeat observations in AHS data.

Table 8: IV estimate of the impact of quality change on rent change

Independent variable	Quality indicator: abandoned housing	
	OLS	IV
change in neighborhood quality indicator	0.091	0.093
	(0.021)	(0.101)
Abandoned housing present in initial period	-0.142	-0.143
	(0.038)	(0.074)
Multiple abandoned housing units present in initial period	-0.202	-0.204
	(0.033)	(0.08)
MSA fixed effects	Yes	Yes
year fixed effects	Yes	Yes
R-squared	0.041	0.041
no. of observations	12,978	12,978

Note: Standard errors in parentheses. Unit of observation is the housing unit/time interval, where time intervals are based on repeat observations in AHS data. The instrumental variable specification employs changes in three other neighborhood proxy variables – bars on windows, streets in disrepair, and trash in street – as instruments for changes in abandoned housing. The change in neighborhood quality indicator is coded such that improvements in quality are positive and reductions in quality are negative.

Table 9: Predicted changes in utility for "stayer" households

	Abandoned housing criterion			Bars on windows criterion		
	Declining	Revitalizing	Steady	Declining	Revitalizing	Steady
All cities, all periods						
Mean	-1946	2380	413	-225	835	383
Proportion positive	0.28	0.81	0.59	0.42	0.67	0.6
N	167	110	2925	332	264	2606
1985						
Mean	-1555	3224	-18	-271	589	-57
Proportion positive	0.31	0.86	0.51	0.39	0.65	0.51
N	127	50	1840	243	152	1622
1989						
Mean	-3189	1677	1144	-97	1169	1109
Proportion positive	0.18	0.77	0.73	0.52	0.7	0.74
N	40	60	1085	89	112	984

Note: Utility predictions are based on conditional logit models incorporating heterogeneity in the valuation of neighborhood quality attributes, and controlling for both abandoned housing and bars on windows. Utility comparisons are made only for renter households.

Table 10: Who exits declining neighborhoods?

Independent variable	Abandoned housing criterion	Bars on windows criterion
Declining neighborhood	0.393	-0.030
	(0.352)	(0.540)
Female householder*declining nbhd.	-0.074	-0.014
	(0.057)	(0.095)
Nonwhite householder*declining nbhd.	0.002	-0.034
	(0.053)	(0.086)
Children under 18 present*declining nbhd.	-0.112	0.151
	(0.057)	(0.102)
Married householder*declining nbhd.	-0.076	0.037
	(0.079)	(0.106)
Householder's age*declining nbhd.	0.001	0.006
	(0.002)	(0.003)
Householder a HS graduate*declining nbhd.	-0.034	0.427
	(0.065)	(0.103)
Householder a college grad.*declining nbhd.	-0.094	0.372
	(0.117)	(0.136)
ln(family income)*declining neighborhood	-0.042	-0.037
	(0.033)	(0.053)
N	44,290	47,856

Note: Table entries are probit coefficients, standard errors in parentheses. Sample consists of renter households observed in the 1985 and 1989 waves of the American Housing Survey metro data in neighborhoods at risk for decline. All specifications include main effects for each household characteristic listed.

Table 11: Who exits revitalizing neighborhoods?

	Abandoned housing criterion	Bars on windows criterion
Revitalizing neighborhood	-0.085 (0.600)	-0.121 (0.816)
Female householder*revitalizing nbhd.	0.033 (0.102)	-0.084 (0.141)
Nonwhite householder*revitalizing nbhd.	0.072 (0.097)	0.040 (0.133)
Children under 18 present*revitalizing nbhd.	-0.018 (0.103)	0.002 (0.161)
Married householder*revitalizing nbhd.	0.087 (0.158)	0.004 (0.168)
Householder's age*revitalizing nbhd.	-0.004 (0.003)	0.006 (0.005)
Householder a HS graduate*revitalizing nbhd.	-0.014 (0.121)	0.105 (0.159)
Householder a college grad.*revitalizing nbhd.	-0.328 (0.250)	0.483 (0.208)
ln(family income)*revitalizing nbhd.	0.030 (0.057)	-0.025 (0.080)
N	3,467	1,681

Note: Table entries are probit coefficients, standard errors in parentheses. Sample consists of renter households observed in the 1985 and 1989 waves of the American Housing Survey metro data in neighborhoods at risk for revitalization. All specifications include main effects for each household characteristic listed.

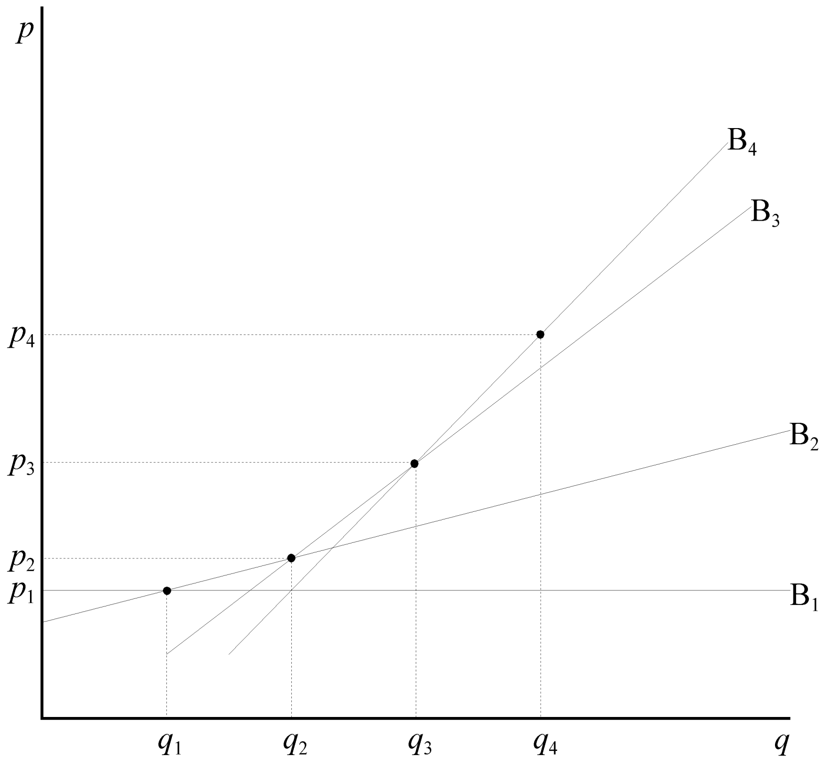

Figure 1: Equilibrium with four neighborhoods of varying quality.

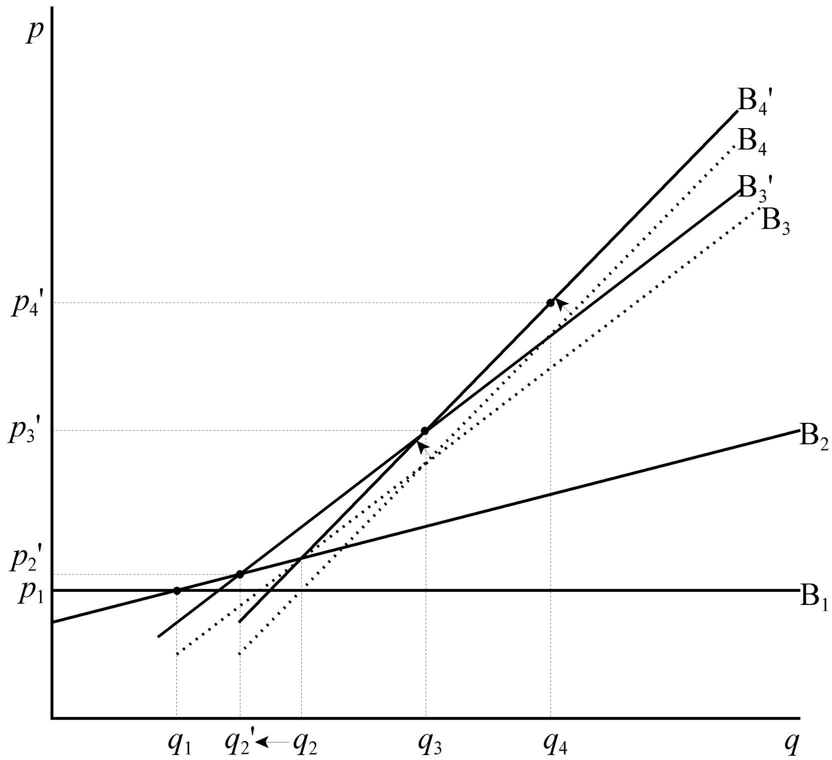

Figure 2: Transition to a new equilibrium following a decrease in quality in neighborhood 2.

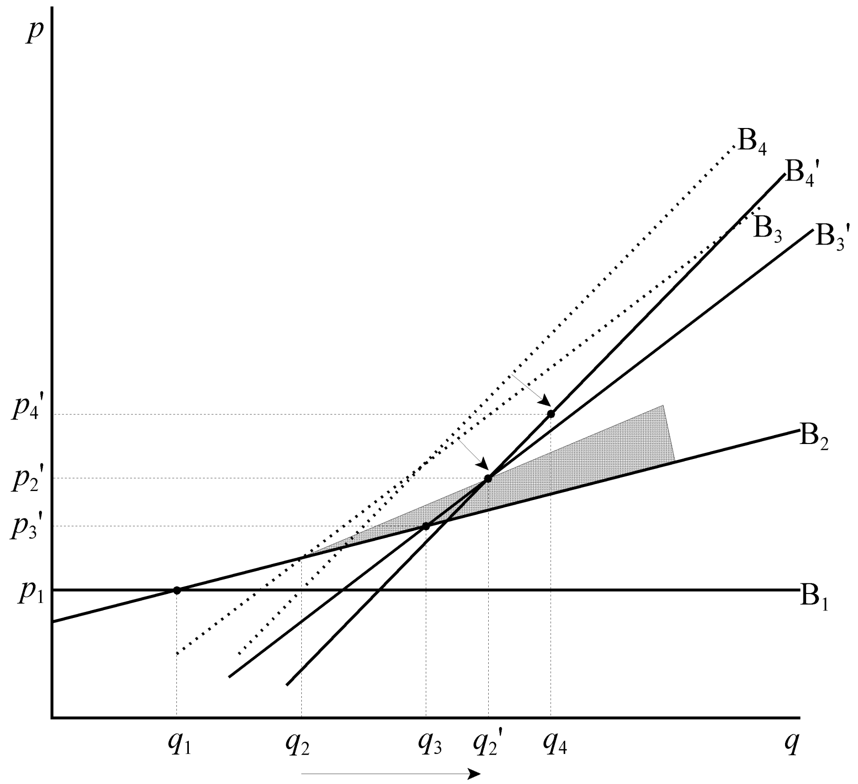

Figure 3: Transition to new equilibrium when neighborhood 2 “leapfrogs” neighborhood 3. Households with indifference curves initially falling in the shaded region are at risk for utility declines in the presence of mobility costs.