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URBAN GENTRIFICATION: EVALUATING ALTERNATIVE INDICATORS

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ABSTRACT. The study seeks to ascertain whether the operational definition of "gentrification" has an impact on the apparent extent, location and causal factors associated with the phenomenon. Four alternative definitional criteria are specified, based on areal changes in: proportion black, proportion college-educated, real incomes and real property values. The stringency of the given change needed to qualify as gentrification is also varied. Census tract changes from 1970–80 in Philadelphia are analyzed. Results indicate great sensitivity in the number and location of "gentrified" tracts to the definition chosen and stringency applied. Even more importantly, the 1970 characteristics of tracts which statistically explain their subsequent gentrification vary dramatically across these definitions.

Few phenomena in the past decade have captured the attention of academics, planners and the general public alike as that which has been variously labelled: "the back-to-the-city movement", "urban renaissance", "neighborhood revitalization" or what we will term it, "gentrification". As a result, everyone seems to understand the generic term "gentrification", but no one seems to agree on a precise, operational definition.

A review of the literature in the field reveals, first, that few researchers provide a definition of "gentrification" and, second, those who do differ widely in their definition.[1] The basic definitional dichotomy is distinguished by a focus either on property or on people. Some define it in terms of unusually high rates of real estate transactions or property value appreciation (Laska *et al.*, 1982; Lang, 1982, p. 8). Others see it in terms of a substantial replacement of a neighborhood's residents who are of lower incomes by those of higher incomes (Holcomb and Beauregard, 1981, p. 38; Henig, 1980; Gale, 1984, p. 52). A few try to integrate both dimensions (Joint Economic Committee, 1979, p. 32).

Given such ambiguity surrounding a phenomenon of such widespread interest and importance, this paper addresses the question, "Does it matter how one empirically defines gentrification?" More specifically, we investigate whether the precise indicator chosen significantly affects: (a) *which* and

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how many areas in a city appear to be gentrifying and (b) which *characteristics* of areas explain whether they gentrify or not.

In overview, our empirical procedure for investigating these questions is as follows. For a sample of tracts in Philadelphia "eligible" for gentrification during the 1970s decade, we specify four general *criteria* which serve as alternative indicators of whether a tract did so, in fact. These four definitional criteria are decadal changes in: (a) percentage black, (b) percentage college educated, (c) real median income, (d) real median property values. For each of these four criteria we then vary the *stringency* of the criterion, i.e. the minimum change required which qualifies a tract as having gentrified. Given these various operational definitions, we then proceed to examine for each: (a) which and how many tracts gentrified and (b) which 1970 characteristics of the tracts explain whether they gentrify during the ensuing decade. The latter is estimated using a multivariate probability model. In sum, our goal is to conduct a series of "sensitivity tests", assessing the empirical consequences of both varying stringency within a definitional criterion and across criteria of gentrification as well.

DATA BASE AND SAMPLE

Data employed in these sensitivity tests were gathered primarily from 1970 and 1980 U.S. Census statistics describing tracts in the city of Philadelphia, PA.[2] Philadelphia was chosen both because tract boundaries remained unchanged over the decade and because conventional wisdom suggested it had undergone substantial gentrification (Cybriwsky, 1978; Levy, 1978; DeGiovanni, 1983).

From the universe of Philadelphia tracts a subset needed to be chosen which consisted only of those tracts which reasonably could be construed as "eligible" for gentrification under any definition. Clearly, tracts which were already of high value and occupied by predominantly higher-income whites in 1970 would not be candidates for the phenomenon in question. For our analysis we specified that to be "eligible" for gentrification during 1970–80, a tract in 1970 had to meet four conditions:

(a) median value of single family homes is less than corresponding city-wide median ($10 600);

(b) median income is less than 80% of corresponding city-wide median ($7493);

(c) percentage college-educated is less than the corresponding city-wide median (12%); and

(d) percentage white is less than 90% of tract population.

The four conditions were specified so that a meaningful number of tracts could be analyzed regardless of which of the four definitional criteria were being employed. Application of the above conditions resulted in a sample of 65 tracts to be analyzed.[3]

AN EXPLANATORY MODEL OF GENTRIFICATION

Given the 65 Philadelphia tracts which potentially could have gentrified during the 1970s, the question of central interest is which ones, in fact, did so? We model this occurrence in probabilistic terms: the dependent variable (GENTRY *i*) takes the value 1 if the given tract gentrified according to criterion *i*, 0 if it did not. The four alternative criteria employed for defining this dependent variable[4] are:

(a) GENTRY 1 = % Black in 1970 – % Black in 1980

(b) GENTRY 2 = % Attending 1+ years college in 1980 – corresponding % in 1970

(c) GENTRY 3 = real median income in 1980[5] – real median income in 1970

(d) GENTRY 4 = real median value of single family homes in 1980[6] – corresponding median in 1970.

We realize that the above specification implies a simplistic, dichotomous image of gentrification: it either "happens" or it doesn't. Undoubtedly there are degrees and intertemporal stages to the phenomenon, and during the arbitrary period 1970–80 some tracts may have only begun gentrification, whereas others may have completed their transformation but to varying ultimate extents. Nevertheless, we would defend our specification since we varied widely the stringency of the four above criteria. In this fashion we effectively considered the sensitivity of results to a more or less continuously varying set of tracts which differed in their degree and/or stage of gentrification.

The characteristics of tracts which might influence the probability of their subsequently gentrifying have been widely discussed in the literature, and

will not be repeated in this brief paper.[7] Most empirical studies have considered the characteristics of individual neighborhoods which have already gentrified, using a case-study approach (Cybriwsky, 1978; Levy, 1978; Bradley, 1978; O'Loughlin and Munski, 1979; Laska and Spain, 1979; 1980, Section II; Schill and Nathan, 1983, Ch. 1; DeGiovanni, 1983; Lee and Mergenhagen, 1984). To our knowledge, only Laska *et al.* (1982) have used multivariate statistical techniques in such an investigation. Our model selects as independent variables those factors which have been alleged to be important, and employs the multivariate approach in the spirit of the latter work. A brief description and justification for each of the thirteen explanatory variables tested follows.[8]

(1) INCOME – The median income of families and unrelated individuals in the tract in 1970, measured in thousands of dollars. This variable proxies for the socioeconomic status of the tract. The expected sign is positive because, as Laska *et al.* (1982) proposed, gentrifiers tend to avoid areas of extreme poverty.

(2) ELDERLY – The proportion of the tract's population who are age 65 and over in 1970. Dwelling turnover rates may be lower in areas with higher elderly proportions (due to the elderly's lower moving propensity), thereby decreasing chances for altered home ownership and investment strategies. On the other hand, the elderly may be viewed by potential gentrifiers as "less threatening neighbors". Thus, the sign of the ELDERLY coefficient cannot be predicted.

(3) BLACK – The proportion of the tract's residents who are black in 1970. The expected sign of this variable is negative because white households (of which most gentrifiers are) generally associate negative externalities with living near blacks.

(4) FOREIGN – The proportion of the tract's population in 1970 who were born outside of the U.S. On the one hand, it's possible that potential gentrifiers view the "ethnic flavor/identity" of a neighborhood as an attractive attribute. On the other, a tightly-knit ethnic enclave may have unusually low mobility rates, thereby reducing the market options for incoming gentrifiers. Thus, no coefficient sign can be predicted.

(5) OWNER – The proportion of the housing units owner occupied in 1970. As in the case of other variables describing household characteristics,

owner-occupancy plays a dual role: a neighborhood attribute plus a proxy for dwelling turnover rates. Insofar as the former predominates, a positive coefficient would be expected. Insofar as the latter predominates, the opposite would be the case.

(6) AGE – The proportion of the structures in the tract in 1970 built before 1939. This variable proxies for the age and architectural character of the area's housing. Bradley (1978) and Schill and Nathan (1983, p. 28) argue that gentrifiers have a strong preference for older, distinctive housing. Thus, the expected sign of AGE is positive.

(7) UNIT – The proportion of the housing structures which contain only one unit in 1970. UNIT proxies for the type of housing structures found in the tract. It was implied by Bradley (1978) that the housing in gentrified areas was attractive to the new homeowners not only because it was relatively old, but because most of the homes were single family. The expected sign of this variable thus is positive.

(8) CBD – Dummy variable for proximity to the central business district; 1 = within a two mile radius, 0 = otherwise.[9] The expected sign of CBD is positive because of the gentrifier's expressed preference to live near the employment, cultural, entertainment, and recreational opportunities found in the center city (Bradley, 1978; Clay, 1979; Schill and Nathan, 1983, p. 28; Lee and Mergenhagen, 1984; Gale, 1980, Ch. 2).

(9) HIGHINC – Dummy variable for proximity to a high income tract; 1 = adjacent, 0 = otherwise. A high income tract was defined as one having a median income over the median income of the city as a whole. The expected sign of HIGHINC in positive because, if possible, gentrifiers prefer to locate near other high income people (Laska and Spain, 1979).

(10) UNIV – Dummy variable for proximity to a university or college; 1 = within a one mile radius of the tract, 0 = otherwise.[10] The expected sign of UNIV is positive due to the positive externalities gentrifiers associate with accessibility to the cultural opportunities offered at such institutions.

(11) HIST 1 – Dummy variable for proximity to any one of six historic districts in Philadelphia: Rittenhouse Square, Franklin Square, Washington Square, Society Hill, Independence Mall, and Logan Circle; 1 = within a half mile radius, 0 = otherwise. These areas were so designated on the basis of their historic significance as noted in Wurman and Gallery (1972). The expected sign of HIST 1 is positive given the importance researchers (Laska,

et al., 1982; Schill and Nathan, 1983, p. 28; Gale, 1984, Ch. 2; Lee and Mergenhagen, 1984) place on this proximity as a positive predictor of gentrification.

(12) HIST 2 – The same as HIST 1 but 1 = within a one mile radius, 0 = otherwise.

(13) PARK – Dummy variable for proximity to a large park (as opposed to a playground); 1 = containing or adjacent to a park, 0 = otherwise. The expected sign of PARK is positive due to the recreational facilities and other positive externalities offered by parks (Schill and Nathan, 1983, p. 28).

How the foregoing independent variables affect the probability of gentrification is subject to alternative interpretations. Two conventional assumptions are the LOGIT model and the linear model of probabilities. Due to ease of interpretation, in this paper we report findings for the latter, as estimated via ordinary least – squares regression techniques.[11]

EMPIRICAL RESULTS

How Many Tracts Gentrified?

Table I shows how the number of tracts defined as "gentrified" during the 1970 decade (out of the 65 possible) varied with the stringency of changes in the given definitional criterion and across criteria.[12] For each criterion we first defined the "lowest stringency" as the city-wide mean change in that criterion during the decade, on the logic that a gentrified tract must minimally perform better than the city as a whole. We next defined "medium stringency" as that level generating approximately one-half the number of gentrified tracts as that generated with low stringency. Finally, "high stringency" was defined as that level generating four gentrified tracts, the minimum number we thought reasonable for estimating our linear probability model. Table I also shows several other representative stringency levels, including that which ultimately eliminates all 65 of the tracts from consideration.

These data clearly indicate how the number of tracts which appear to have "gentrified" varied dramatically, depending on the particular definition chosen. Using, e.g., the medium stringency condition, there could be as few as 7–8 gentrified tracts (using the criteria of changes in value or percent college-educated) or as many as 24–26 gentrified tracts (using the criteria

TABLE I

The number of tracts gentrified given varying stringencies of definition and four definitional criteria

Definitional Criterion	*# of Tracts Gentrified*
A. GENTRY 1 = (% Black '70 – % Black '80)	
1. > –4.2 (L)	53
2. > –2	45
3. > –0.5 (M)	26
4. > 4	15
5. > 12 (H)	4
6. > 26.9	0
B. GENTRY 2 = (% College '80 – % College '70)	
1. > 8 (L)	17
2. > 10	11
3. > 12 (M)	8
4. > 14	5
5. > 20 (H)	4
6. > 50.4	0
C. GENTRY 3 = ($ Real Y '80 – $ Real Y '70)	
1. > –2300 (L)	49
2. > –2050	35
3. > –1700 (M)	24
4. > –800	8
5. > 0 (H)	4
6. > 3279	0
D. GENTRY 4 = ($ Real Value '80 – $ Real Value '70)	
1. > 540 (L)	13
2. > 2000	10
3. > 4000 (M)	7
4. > 4500	5
5. > 5000 (H)	4
6. > 20 505	0

(H) = high stringency ($N = 4$)
(M) = medium stringency (= 0.5 (L))
(L) = low stringency (= the city mean)

of income or racial changes). Similarly, varying the stringency condition produced many different results, depending on the criterion. Using value change as the criterion, moving from high to low stringency altered the number of gentrified tracts by 325% (4 to 13). Using racial change as the criterion, the corresponding variation was 1,325% (4 to 53).

Which Tracts Gentrified?

Obviously, if the number of tracts defined as "gentrified" varied across criteria, there would not be a perfect correspondence in the particular tracts so denoted. But even beyond this reason, there appeared to be a remarkably small overlap in the sets of gentrified tracts defined by alternative criteria.

The easiest way to see this is through an examination of correlation matrices of the four alternative GENTRY-variables. Such matrices for variables using both medium and high stringency conditions are presented in Table II. Using the medium stringency level, the correlations between the four alternatively-defined sets of gentrified tracts averaged 0.29. The corresponding figure for the high stringency definitions ... where the number of gentrified tracts was the same under all four definitions ... was only 0.40. Only one tract was identified as gentrified by all four criteria using the

TABLE II

Simple correlation coefficients for alternative gentrification variables

	Using Medium Stringency				
	1	2	3	4	*N*
1. GENTRY 1	–				26
2. GENTRY 2	0.17	–			8
3. GENTRY 3	0.22	0.39	–		24
4. GENTRY 4	0.12	0.47	0.35	–	7
	Using High Stringency				
	1	2	3	4	*N*
1. GENTRY 1	–				4
2. GENTRY 2	0.41	–			4
3. GENTRY 3	0.17	0.47	–		4
4. GENTRY 4	0.41	0.47	0.47	–	4

N = # tracts designated as gentrified using criterion. Total *N* = 65 always.

highest stringency.[13] Thus, there was substantial disparity about which tracts "gentrified" during the last decade, depending on the criterion chosen, with the disparity being inversely related to the degree of stringency applied.

Do Gentrified Tracts Have any 1970 Characteristics in Common?

Even if there was disparity in which tracts gentrified, there still might be some underlying dimensions of similarity between all of them, as specified by their 1970, pre-gentrification characteristics. To test whether this was the case, we estimated our linear probability model as outlined above. The ordinary least-squares results for three levels of stringency (low, medium, high; see Table I) for each of the four criteria are presented in Tables III–VI, respectively.

Space does not permit a detailed discussion of all results for all equations, so only the most important ones are noted here. The main finding: there was precious little consistency in the factors appearing as determinants of gentrification in Philadelphia. Comparing first across the four definitional criteria, only one variable, HIST 1, proved statistically significant at even the 10% level or better in all four (in any of the stringency levels of each). Only two, FOREIGN and UNIV, proved so in three of four. Four variables were significant in only two; four in only one. Most dramatically, HIGHINC proved significantly positive using one definition, and significantly negative using another! Therefore, it is abundantly clear that the general criterion one selects for defining gentrification influences which characteristics of tracts will predict such a subsequent phenomenon.

Next comparing across stringency levels within a given criterion, further sensitivity is revealed. In only three cases[14] was any given variable statistically significant in all three of the low, medium, and high stringency levels (out of 52 possible such instances). Conversely, in four cases[15] it was observed that the same variable coefficient assumed different signs across the stringency levels, with both signs having t-statistics greater than unity. Hence, even if one settles on a definitional criterion, the stringency with which that criterion is applied dramatically shapes the results.

What if Dual Definitional Criteria Are Applied?

Our sensitivity analysis continued by examining how the results were in-

TABLE III

Coefficients of linear probability model using GENTRY 1 (*t*-statistics in parentheses)

Independent Variables	*Stringency Level* Low	Medium	High
BLACK	0.21	0.12	0.19
	(0.53)	(0.27)	(0.72)
INCOME	0.01	−0.09	0.05
	(0.08)	(0.87)	(0.87)
AGE	−0.02	−0.09	0.02
	(0.04)	(0.15)	(0.05)
UNIT	0.85	0.69	0.37
	(1.67)[c]	(1.17)	(1.06)
OWNER	−1.21	−0.89	−0.99
	(1.35)*	(0.88)	(1.64)*
CBD	−0.03	−0.62	0.07
	(0.21)	(3.42)[a]*	(0.60)
HIGHINC	−0.40	−0.49	0.11
	(1.96)[c]*	(2.13)[b]*	(0.79)
UNIV	0.22	0.52	−0.03
	(1.52)[c]	(3.09)[a]	(0.23)
PARK	−0.15	−0.14	0.02
	(1.41)*	(1.19)	(0.30)
HIST 1	0.20	0.79	0.26
	(0.94)	(3.32)[a]	(1.86)[b]
HIST 2	0.20	0.16	−0.16
	(0.99)	(0.73)	(1.19)
ELDERLY	1.05	0.89	−1.83
	(0.67)	(0.49)	(1.69)[c]*
FOREIGN	−0.35	2.01	1.11
	(0.28)	(1.41)*	(1.30)
Intercept	0.47	0.67	−0.21
	(0.78)	(0.99)	(0.52)
R^2	0.28	0.42	0.30

[a], [b], [c] = coefficient statistically significant at 1%, 5%, 10% levels, respectively (one-tail test).
* Two-tail test if opposite expected sign or no expected sign.

fluenced when one chose dual definitional criteria; i.e. when gentrified tracts were specified by their meeting two of the four previous criteria. Here both were defined at their medium stringency levels.

As can be seen in Table VII, such a specification reduced the cross-definitional variance in the number of gentrified tracts (mean of 6.7 with a range from 4 to 13), and improved the correlation between the sets of such tracts

TABLE IV

Coefficients of linear probability model using GENTRY 2 (*t*-statistics in parentheses)

Independent Variables	*Stringency Level* Low	Medium	High
BLACK	0.49	0.25	0.28
	(1.18)	(0.75)	(1.25)
INCOME	0.05	0.08	0.08
	(0.54)	(1.02)	(0.15)
AGE	0.08	0.30	0.28
	(0.14)	(0.66)	(0.91)
UNIT	−0.60	0.22	0.29
	(1.09)	(0.50)	(0.97)
OWNER	0.46	−0.82	−0.21
	(0.49)	(1.11)	(0.41)
CBD	−0.14	0.03	−0.10
	(0.84)	(0.20)	(1.06)
HIGHINC	−0.13	0.29	0.09
	(0.63)	(1.75)[b]	(0.75)
UNIV	0.32	0.09	0.20
	(2.07)[b]	(0.72)	(2.38)[b]
PARK	−0.12	0.04	0.07
	(1.07)	(0.41)	(1.21)
HIST 1	0.19	0.01	0.19
	(0.87)	(0.03)	(1.59)[c]
HIST 2	0.15	0.08	0.11
	(0.69)	(0.46)	(0.95)
ELDERLY	−0.13	−1.41	−0.73
	(0.08)	(1.05)	(0.80)
FOREIGN	3.06	1.05	1.47
	(2.27)[b*]	(0.99)	(2.03)[c*]
Intercept	−0.57	−0.69	−0.70
	(0.90)	(1.38)*	(2.04)[b*]
R^2	0.38	0.31	0.40

a, b, c = coefficient statistically significant at 1%, 5%, 10% levels, respectively (one-tail test).
* Two-tail test if opposite expected sign or no expected sign.

to an average of 0.60. This improvement in consistency was not, however, sufficient to alter the conclusions about which factors explained gentrification. The linear probability model estimated for all six permutations of the dual criteria continued to show marked instability of coefficient magnitude and statistical significance.[16] Only FOREIGN proved to have a statistically significant (positive) coefficient in even four of six models. The coefficient

TABLE V

Coefficients of linear probability model using GENTRY 3 (*t*-statistics in parentheses)

Independent Variables	*Stringency Level* Low	Medium	High
BLACK	0.36	0.49	0.18
	(0.91)	(1.16)	(0.86)
INCOME	−0.41	−0.45	−0.13
	(4.45)[a*]	(−4.58)[a*]	(2.72)[a*]
AGE	0.58	1.22	0.94
	(1.04)	(2.06)[b]	(3.17)[a]
UNIT	0.27	−0.55	0.11
	(0.51)	(0.98)	(0.39)
OWNER	1.70	2.26	−0.04
	(1.88)[c*]	(2.36)[b*]	(0.08)
CBD	−0.07	0.01	−0.15
	(0.40)	(0.04)	(1.73)[c*]
HIGHINC	0.22	0.19	0.29
	(1.08)	(0.87)	(2.73)[a]
UNIV	−0.09	−0.06	−0.01
	(0.58)	(0.35)	(0.03)
PARK	0.01	0.03	0.02
	(0.03)	(0.22)	(0.38)
HIST 1	0.16	0.40	−0.05
	(0.73)	(1.77)[b]	(0.44)
HIST 2	0.15	0.06	−0.04
	(0.76)	(0.30)	(0.42)
ELDERLY	−3.51	−2.45	−0.51
	(2.16)[b*]	(1.43)*	(0.58)
FOREIGN	2.03	2.27	2.02
	(1.57)*	(1.66)*	(2.96)[a*]
Intercept	1.90	1.16	−0.22
	(3.16)[a*]	(1.80)[c*]	(0.67)
R^2	0.40	0.47	0.47

a, b, c = coefficient statistically significant at 1%, 5%, 10% levels, respectively (one-tail test).
* Two-tail test if opposite expected sign or no expected sign.

of HIST 1 was significantly positive in three models; those for UNIV and AGE were so for two. All remaining variables were significant in only one of the six models. As before, then, which explanatory variables appear salient depends crucially on definitional criteria.

TABLE VI

Coefficients of linear probability model using GENTRY 4
(*t*-statistics in parentheses)

Independent Variables	*Stringency Level* Low	Medium	High
BLACK	−0.26	0.10	0.46
	(1.18)	(0.33)	(2.41)[b]*
INCOME	−0.02	−0.02	0.02
	(0.32)	(0.25)	(0.50)
AGE	−0.15	−0.10	0.12
	(0.49)	(0.26)	(0.45)
UNIT	−0.44	0.19	0.63
	(1.49)*	(0.50)	(2.46)[a]
OWNER	0.31	−0.61	−1.36
	(0.60)	(0.93)	(3.10)[a]*
CBD	−0.14	1.13	−0.06
	(1.52)*	(1.11)	(0.72)
HIGHINC	−0.16	−0.04	0.32
	(1.37)*	(0.29)	(3.22)[a]
UNIV	0.13	0.05	−0.05
	(1.53)[c]	(0.47)	(0.74)
PARK	0.13	0.15	0.11
	(2.15)[b]	(1.94)[b]	(2.12)[b]
HIST 1	0.19	0.17	0.01
	(1.62)[c]	(1.12)	(0.03)
HIST 2	0.46	0.16	−0.09
	(4.05)	(1.10)	(0.88)
ELDERLY	−0.34	0.40	1.02
	(0.38)	(0.34)	(1.30)
FOREIGN	1.94	1.61	1.96
	(2.68)[a]*	(1.71)[c]*	(3.14)[a]*
Intercept	0.49	0.06	−0.75
	(1.43)*	(0.13)	(2.53)[b]*
R^2	0.78	0.38	0.55

a, b, c = coefficient statistically significant at 1%, 5%, 10% levels, respectively (one-tail test).
* Two-tail test if opposite expected sign or no expected sign.

CONCLUSIONS AND IMPLICATIONS

This study sought to ascertain whether the operational definition given to "urban gentrification" had an impact on the extent, location, and causal factors associated with the phenomenon. Our empirical analysis of Philadelphia showed unambiguously that how one defines gentrification crucially affects

TABLE VII

Simple correlation coefficients for dual gentrification criteria variables

	Using Medium Stringency for Both						
	1	2	3	4	5	6	*N*
1. GENTRY 1 + 2	–						5
2. GENTRY 1 + 3	0.58	–					13
3. GENTRY 1 + 4	0.65	0.51	–				4
4. GENTRY 2 + 3	0.83	0.45	0.53	–			7
5. GENTRY 2 + 4	0.65	0.35	0.73	0.74	–		5
6. GENTRY 3 + 4	0.51	0.37	0.80	0.56	0.80	–	6

N = # tracts designated as gentrified using dual criteria.

which and how many tracts are identified as having undergone gentrification, and which initial characteristics of those tracts appear to hold the greatest explanatory power for such changes. The sensitivity of these important conclusions to both the definitional criterion used and the stringency with which it is applies is apparent.

As illustrations of these conclusions, if one defines gentrification in terms of real (median) property value increases of $4000 or more in Philadelphia (i.e. medium stringency), it appears that 7 tracts gentrified, and the key explanatory factors for these 7 are proximity to a park and proportion of foreign stock. By contrast, a medium stringency level using real (median) income changes as the defining characteristic implies that 24 tracts gentrified, with their key explanatory variables being initial median income, dwelling ages, owner occupancy rates, and proximity to a historical district.

One implication of this result is that the findings of prior analyses attempting to uncover where and why gentrification occurs (e.g. Laska *et al.*, 1982) are much more circumscribed that previously imagined. In this sense the study adds another voice to the recent rising chorus claimed that there is little generality in the phenomenon, specifically in the stages through which gentrifying neighborhoods pass or in the ultimate consequences which transpire in them (DeGiovanni, 1983; Lee and Mergenhagen, 1984).

Obviously, there is no theory to indicate what the "best" operational definition of gentrification should be. Perhaps most analysts would choose to employ multiple definitional criteria, some of which may not have been considered in this study. Indeed, the particular purposes of an academic researcher or the municipal needs pursued by a professional planner may

likely guide different analysts to select very different criteria.

We have no quarrel with this. Rather, it is our point that, if our results from Philadelphia concerning sensitivity may be generalized, the criteria chosen by analysts will have a significant impact on the answers forthcoming. If one wants to better understand, predict and even alter changes in urban neighborhoods, one thus must be exceedingly careful in operationally specifying the exact dynamic in question, and must recognize that such a specification may, in itself, influence the outcome of the analysis.

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NOTES

[1] This earlier has been noted by London (1980) and Palen and London (1984).

[2] There is a debate in the literature about the appropriate size of a revitalizing "neighborhood". Spain (1981), Schill and Maurice (1981), DeGiovanni (1983), Lee and Mergenhagen (1984) argue that census tracts are too large; Cybriwsky (1978) and Levy (1978) suggest the opposite. Given this conflict and the ready availability of statistical data for tracts, this operational specification has been employed conventionally (Laska *et al.*, 1982; Gale, 1984).

[3] The area encompassing these 65 tracts is bordered by the following: Interstate 76 on the south, U.S. Route 3 on the southwest, Carroll Park and Fairmount Park on the west, U.S. Route 13 on the northwest, Hunting Park on the north, West Kensington on the northeast, Kensington and the Delaware River on the east.

[4] These categories are typically considered in the literature; see e.g. DeGiovanni, 1983; Gale, 1984; Lee and Mergenhagen, 1984.

[5] Real 1980 income is estimated using the CPI deflator for Philadelphia.

[6] Real 1980 value is estimated using the housing component of the CPI for Philadelphia as deflator.

[7] For fuller descriptions, see Laska and Spain, 1980; Schill and Nathan, 1983; Gale, 1984; Palen and London, 1984; Galster and Peacock, 1984.

[8] All data are taken from the 1970 and 1980 *Censuses of Population and Housing*, unless otherwise noted.

[9] The location of the central business district was designated by the Census. The radius was measured to scale on a map of the city. In the few cases where the whole of a tract did not fall within the radius, those tracts with the majority of their area within the radius were assigned a 1. This also is true for the other proximity measures.

[10] The institutions relevant to this variable are Temple University, The University of Pennsylvania, Drexel University, Girard College, and Philadelphia Community College. Distance was measured to scale on a city map.

[11] The LOGIT results are available from the first author. They do not appreciably

differ from those estimated via OLS. For a comparative evaluation of the two approaches see Pindyck and Rubinfeld (1981, Ch. 10).

[12] Note the negative values for low stringencies of GENTRY 1 and GENTRY 3 reflect the growing overall proportions of blacks and the decline in real incomes, respectively, in Philadelphia during the decade.

[13] This is tract 0016, located adjacent to the prestigious Society Hill district, adjacent to the CBD on the southeast. The specific tracts denoted as "gentrified" under each indicator were:

GENTRY 1: 15, 16, 129, 145
GENTRY 2: 15, 16, 126, 135
GENTRY 3: 16, 126, 130, 154
GENTRY 4: 15, 16, 127, 130

[14] INCOME IN GENTRY 3; FOREIGN and PARK in GENTRY 4.

[15] PARK in GENTRY 2; BLACK, UNIT and HIGHINC in GENTRY 4.

[16] It is also noteworthy that the R^2 improved only marginally in models employing dual criteria: an average of 0.44 vs. 0.40 for models using a single criterion (medium stringency). Results are available from the first author.

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