DEFINING, MEASURING, AND ANALYZING COMMUNITY REINVESTMENT

C. Theodore Koebel, Ph.D.
Marilyn C. Cavell, M.S.
Center for Housing Research
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061-0451

ABSTRACT

This is a statistical study of changes in residential investment in six cities between 1982 and 1992. This period witnessed increased public attention to residential investment, both in reaction to disinvestment and in promotion of reinvestment. Despite shifts away from federal funding for housing and community development, actual federal expenditures for housing and community development continued to increase and were complemented by increased involvement of local and state governments in housing programs (Stegman and Holden 1987). Additionally, the Community Reinvestment Act spurred numerous partnerships between banks, local government, and housing activists (Squires 1992). Community development corporations increased their housing and economic development activities and matured into a significant force in redevelopment (National Congress for Community Economic Development 1989, 1991, 1995; Davis 1994).

The study includes six central cities reputed to have good records of community development activity: Baltimore and Baltimore County, Boston and Suffolk County, Chicago and Cook County, Cleveland and Cuyahoga County, Oakland and Aladeda County, and Pittsburgh and Allegheny County. These communities come from three of the four major regions of the country: East, Midwest, and West.

The study proceeds from a review of community disinvestment and reinvestment models. Most of the literature on disinvestment and reinvestment is atheoretic, although even descriptive case studies typically imply theoretical perspectives of community change. By placing this research in broader conceptual terms, we hope to identify the expected dimensions of disinvestment and reinvestment, and, then to examine the association of these dimensions with disinvestment and reinvestment. The focus of the study is on change in residential investment

levels and the association of investment change with neighborhood characteristics, measured for the beginning of the period and for change during the period.

RESEARCH GOALS

Two important distinctions are made in this study: the spatial dimension of reinvestment and the explicit focus of the study on reinvestment rather than on static measures of residential investment. Whereas most previous studies have addressed cross-sectional, static levels of residential investment, this study concentrates on the change in residential investment. The study first examines the 1982-92 change in residential investment across census tracts in both the six central cities and their adjacent, county jurisdictions to determine if changes in residential investment are consistent with a "disinvestment" model. The study then explores the relationship between neighborhood characteristics and "reinvestment" in low-income neighborhoods. By defining reinvestment in terms of private residential investment within low-income neighborhoods, this study pushes beyond previous examinations of residential investment that have primarily analyzed the differences between higher-income neighborhoods and lower-income neighborhoods. By focusing on neighborhoods fitting a "reinvestment profile" (based primarily on low to moderate income and age of the housing stock), the research examines the characteristics that are positively associated with reinvestment.

The first research goal is to demonstrate the combined use of decennial census and Home Mortgage Disclosure Act (HMDA) data in classifying the spatial dimensions of reinvestment. Instead of defining reinvestment in programmatic terms (e.g. CRA programs & CDC activities), we define reinvestment as an increase in mortgage flows in an older, low-income neighborhood.

The spatial dimensions (census tract distribution) of reinvestment are the primary focus of this research.

The second research goal is to model reinvestment. Multiple years of HMDA data (1982/3 and 1992/3) were matched with decennial census data for 1980 and 1990 to analyze reinvestment. The data set includes both static and dynamic measure. Based on previous experience with redevelopment and the research literature on CDCs and neighborhood change, reinvestment is expected to be a function of favorable demographics (e.g. proportion of households in the family formation stages of the life-cycle) and economics (e.g. stable or increasing income trends), facilitated by programmatic actions by CDCs, banks, and local government. Negative externalities (e.g. crime, large scale assisted housing sites) are expected to hinder reinvestment.

Beginning of period measures help test the association of investment change as a response to earlier neighborhood conditions that might stimulate disinvestment. Dynamic (change) measures help test the association of changes in residential investment as a response to 'market' related variables, such as income, and to 'non-market' variables such as race and ethnicity. The 'explanatory' variables include income and poverty; household type; race and ethnicity; turnover; concentration of low-rent units; rent burden; change in median rents; house values; proximity to large public housing sites; predominance of single family housing; high-rise housing; and the percentage of homeowners.

BACKGROUND

The success of community development activities in inner-city neighborhoods is ultimately dependent on establishing viable housing markets with the full participation of mainline market institutions (bankers, appraisers, insurers, Realtors, etc.). The Community Reinvestment Act and numerous housing programs have promoted community reinvestment activities by mortgage lenders while community development corporations have received national recognition for their efforts to promote neighborhood quality through residential development and reinvestment in older, deteriorating neighborhoods (Squires 1992; Halpern 1995; NCCED 1989, 1991, 1995). Virtually everybody extols the virtues of public-private partnerships in addressing the problems of inner-city housing markets (Suchman 1990; Koebel 1998).

Research on community reinvestment has been constricted in several ways. First, direct research on reinvestment has been largely (if not exclusively) conducted as case studies. Many of these focus on the politics of neighborhood advocacy and negotiations with lenders over community reinvestment programs (Squires 1992). Few document the impact of such programs on reinvestment in even descriptive terms (Schwartz 1997). To our knowledge, no one has conducted detailed research on the reinvestment dimension of the variation in mortgage flows across neighborhoods.

More detailed statistical analysis of reinvestment has been through program evaluation research (e.g. the impact of urban homesteading on neighborhood change), modeling the home improvement decision, and research on neighborhood change (Varady 1986; Galster 1987). Program evaluation research addresses the impact of a specific program. Several neighborhood redevelopment programs have been evaluated, including urban homesteading, rehabilitation

grants and loans, community development block grants, and the Neighborhood Reinvestment Corporation's programs (Rohe 1998). These programs are targeted to neighborhoods and households qualifying according to income and housing quality criteria. The results, of course, are limited to the particular programs and areas studied.

Research conducted on home maintenance and improvement investments focuses on the expenditure decision of the owner-occupant or landlord. Sophisticated research has been conducted in this arena (Galster and Hesser 1982; Mendlesohn 1977; Apgar 1987; Peng 1992; Galster 1987). As with other reinvestment research, these studies have with a few exceptions focused on surveys of selected housing markets. A few studies have been conducted with national databases (e.g. the American Housing Survey and the Consumer Expenditures Survey), but these provide little spatial context for the reinvestment decision. The unit of analysis is the individual household, not the neighborhood.

Community reinvestment constitutes several dimensions: household, institution, and neighborhood. As noted, the household's (or landlord's) decision to maintain or improve a residence has been studied, although with limited spatial context. Similarly, the institutional decision has been studied from the political perspective noted above and in studies of lending discrimination (i.e. "redlining"). These studies have analyzed the effect of neighborhood characteristics on annual mortgage flows with the primary goal of testing the impact of neighborhood racial composition (Shlay 1988; Shill and Wachter 1993). However, reinvestment within a neighborhood context has not been modeled except for a few case studies.

The contributions of CDCs and bank CRA activities are expected to have a positive, facilitating impact on reinvestment, although the literature on CDCs and nonprofit housing is largely descriptive. An exception is Koebel (1998) which examines nonprofit housing from the

perspective of nonprofit sector theory and urban regime theory. Problems of contract failure and asymmetric information, within a neighborhood real estate economy plagued by negative externalities, virtually necessitates a partnership approach to redevelopment (Monti 1990; Koebel 1998). This is a major advance over mechanistic stage models of neighborhood change (Downs 1981; Grigsby and Rosenburg 1975), micro-economic models which ignore institutional dimensions, and neo-Marxian models of capitalist exploitation (Kantor 1995). Although the current research project is not a fine-grained investigation of nonprofit networks and public-private partnerships, the next phase will examine the impact of the presence of CDCs and public-private partnerships on reinvestment.

Community Reinvestment

Definitions of community reinvestment often proceed from the opposite of reinvestment—that is, disinvestment. Measurement of disinvestment, or the withdrawal of home-owner and landlord investment and of lending from inner-city neighborhoods, preceded advocacy for reinvestment programs and generally has captured greater attention from researchers than has reinvestment. Indeed, research on disinvestment is rather extensive, particularly if redlining research is included. In general, research on disinvestment started with examinations of the census tract distribution of Home Mortgage Disclosure Act data on the number and dollar value of mortgages originated by depository institutions. The early research on redlining and disinvestment was seriously flawed on several counts (Benston 1972). First, the research seldom included an analysis of demand and attributed differences in mortgage originations almost exclusively to differences in racial composition of census tracts. Second, the measurement of loan supply was seriously understated because it excluded loans from nondepository institutions (primarily mortgage banks) specializing in governmentally insured

mortgages. Third, the connection between the distribution of mortgage supply at the census tract level and discrimination against individual loan applicants was difficult to prove when the unit of analysis was the census tract.

The focus of "redlining" research primarily shifted to examinations of discrimination against individual loan applicants with several studies utilizing specially constructed data sets and with the advent of individual loan applicant data when the Loan Applicant Registry System (LARS) was implemented with amendments to the Home Mortgage Disclosure Act (Munnell et al. 1992; Canner and Passmore 1994, 1995). These studies, complemented by paired testing research, have generated a very detailed and thorough review of lending discrimination (Yinger 1996). Although not without its critics, this body of research has generally established continued discrimination in lending, but the magnitude of the neighborhood effect of such discrimination is unclear and compounded by aggregate levels of demand. It appears that eliminating discrimination against minority applicants (other than on justified economic grounds such as credit rating and risk) would increase aggregate lending to minorities by a significant but relatively small percent.

The importance of research into discrimination against individual loan applicants goes without saying. Nevertheless, it also begs the question about disinvestment and reinvestment, which are inherently matters of aggregate neighborhood effects that are influenced but not determined by discrimination in lending. For example, it is entirely possible for a nondiscriminatory market to produce disinvestment, as it is also possible for reinvestment to occur in a discriminatory market. The overwhelming focus on discrimination has resulted in little examination of theoretical or operational definitions of either disinvestment or reinvestment.

To a great extent, the disinvestment and reinvestment literature is dominated by case studies of the experiences of particular neighborhoods, such as Dudley Street in Boston's Roxbury area and a variety of descriptions of reinvestment programs pursued under the Community Reinvestment Act (Medloff and Sklar 1994; Squires 1992). The Community Reinvestment Act requires covered lending institutions to meet the credit needs of their entire service areas. In practice, community reinvestment means community outreach, marketing, and loan production in lower-income and minority neighborhoods, but the concept and regulatory enforcement are fuzzy at best. Legislators and regulators have had to balance inherent conflicts in theories of disinvestment that are seldom clearly articulated.

The residential investment theory implied in most of the disinvestment literature is a combination of ecological and communalism perspectives. The ecological perspective assumes a mechanistic cycle of change and deterioration in neighborhoods, accelerated by racial prejudice and institutional discrimination. Institutional discrimination based on racial prejudice, an aversion to lending in older neighborhoods, and redlining, result in a withdrawal of credit that is unjustified on purely market grounds. The withdrawal of access to credit, however, triggers a chain reaction of disinvestment that produces the physical deterioration and market decline that provide market justification subsequent to the denial of credit. A spiral of continued decline becomes inevitable without government intervention and collective action to reinvestment in the neighborhood. Community development corporations, acting to encourage market-based institutions to re-enter the neighborhood, are thus described as working "against all odds". Not surprisingly, this approach tends to thwart efforts to demonstrate the market viability of residential investment in the neighborhood, efforts made sporadic by the scarcity of government subsidies for community development.

Communalism is implied, but seldom articulated, in this perspective of residential investment. In its less radical form, communalism argues that competitive markets are imperfect arbiters of residential investment and market failures must be corrected by government and non-government communal action. Competitive markets are to be distrusted but not discarded. Investors and lenders might have to be forced to forsake maximizing profits and to cross-subsidize less productive investments. But the under-served markets they are expected to serve are assumed to be marginally profitable or at least not unprofitable. Markets are typically assumed to be supply driven and underlying weaknesses in consumer demand are rarely considered. Corrective action in the form of fair housing, regulatory pressure to address under-served markets, and funding of community development corporations is expected to make competitive markets function properly to meet community credit needs.

In its more radical form, communalism rejects competitive markets to distribute residential investment. The problem of disinvestment and neighborhood decline is viewed as inherent to capitalism. Instead of trying to fix markets, attention should be devoted to community organizing and political action. Market distribution would be replaced or significantly modified by government action and political mobilization.

In apposition and opposition to communalism, neo-classical economic theory argues that competitive markets produce efficient allocation of scarce resources and increase consumer choice and influence. Markets establish competitive equilibria of demand and supply for private goods. Governments should intervene only to provide public goods, to address issues of equity in resource distribution, and to enforce the rules required for competitive markets to function. Without evidence of these conditions, residential investment is assumed to shift in response to changes in consumer demand and to changes in supply (e.g. new construction of housing in the

suburbs). Otherwise, collective action will not create demand where it does not exist, nor will it make the unprofitable profitable, but it can cause inefficiencies in the market. To the extent possible, problems in resource distribution should be addressed through consumer subsidies rather than place-based subsidies.

Administrative/planning theory falls between market theory and communalism. It attributes problems of neighborhood disinvestment to inadequate institutional capacity and knowledge. Market failures are seen as the result of inadequate information and inadequate management, which can be corrected by improved capacity and use of technology.

The primary issues for community residential investment identified in these theories are the roles of race and other non-market dimensions versus the legitimate impacts of supply and demand. Perhaps the most important characteristic in the disinvestment model is race (and ethnicity). Lending discrimination and disinvestment based on race and ethnicity were clearly apparent in the period of legal redlining and were even encouraged by federal loan insurance policy. Racial discrimination in real estate markets has been persistent, although obviously not as rampant as when it was legally condoned and written into deed restrictions. Anecdotal reports of disinvestment often focus on neighborhoods populated by racial and ethnic minorities (Medloff and Sklar 1994). The persistence of racial discrimination in real estate markets has been documented by several studies covering real estate marketing, lending, and insurance (Yinger 1996; Munnell et al. 1992; Squires 1997). Discrimination at the individual home seeker level is likely to also be reflected in negative (or lower) changes in residential capital investment.

Denial of credit to older neighborhoods is another element of the disinvestment model, which assumes that this restricted credit access is independent of investment risk. The effects of income complicate the matter, particularly since the main concern is the restriction of credit and

declines in investment in older, low-income neighborhoods. However, income is also highly influential in the market model and housing quality and credit respond to the ability to pay.

DATA SOURCES AND CONVERSIONS

For each of the six cities (and surrounding counties) we built a census tract level data file combining demographic and socio-economic variables from the decennial censuses of 1980 and 1990, loan amount variables from 1982/1983 and 1992/1993 Home Mortgage Disclosure Act (HMDA) data, and public housing data from HUD's Community 2020 database. Initial data sources from a variety of mediums (magnetic tape, CD Rom, census publications, and downloaded Internet files) were converted into a common format and medium.

Data Sources

We created a master file on a mainframe computer that merged together mortgage flow data, census data, and public housing data. Where possible and cost effective, we obtained census data on tape; otherwise from the internet.

Median gross for 1980 (not available on tape) was obtained from table H-1 from the *Census of Population and Housing (1980), Census Tracts* books to obtain both median gross rent by census tract and also the frequency of gross rent which for use in decile calculations.

In order to maximize agreement between census tract definitions used by the decennial censuses and HMDA reporting, the first two years of HMDA data in each decade that used the 1980 and 1990 census tract designations were used: 1982/3 and 1992/3. In addition to limiting tract boundary changes to the 1980 and 1990 designations, this lagged the loan flow data to the approximate periods when the census data would have been publicly available. Consequently the loan flow periods correspond to when the results of the censuses became available and potentially influential in the market place. Obviously the market adjusts to other evidence of

small area demand and supply changes than the census, but the lag in our loan flow data is arguably beneficial.

Home Mortgage Disclosure Act (HMDA) data tapes were obtained for 1982, 1983 and 1992, with 1993 obtained on CD Rom. We pooled the 1992/3 data and the 1982/3 data to counter any irregularities in the annual data and to provide a more reliable measure of residential investment.

We obtained public housing data from HUD's Community 2020 database on CD Rom. The data were available only for 1990.

Data Transformation

Most variables extracted from the STF3a census data and the HMDA data were manipulated in some manner. For the majority of the demographic and socio-economic variables, we converted numbers to percentages and calculated percent changes from 1980 to 1990. In some cases, we grouped categories within variables (see Appendix A for a variable by variable description of data transformations).

Creating some variables required more extensive manipulation. Using frequency tables of gross rent for each combined area (city/county level, not census tract), we calculated the first and second decile thresholds of gross rent. Using these thresholds, we calculated at the census tract level the percent with gross rent below the area first and second decile of rents. To create a variable to identify a census tract's income status, we compared the 1980 median family income of a tract to 50 percent and 80 percent of the 1980 median family income of the Standard Metropolitan Statistical Area (SMSA) of the tract.

Several categories from the 1992/3 HMDA LARS data had to be created to match the 1982/3 HMDA data aggregations of loan amounts for each type of loan (conventional; FHA,

VA, FmHA; home improvement; multi-family, and non-occupant). For the analysis reported herein, the loan amounts were totaled for all types except refinancing loans.

Aggregating by Census Tract

A crucial step in the project involved aggregating or selecting the data by census tract, the unit of analysis for the study. For the 1980 and 1990 census data, we selected the geographic summary level for census tract. The 1992 and 1993 HMDA data are from the loan applicant registry system (LARS) which is microdata for each loan applicant. We aggregated the data by census tract to match the 1982/3 HMDA data already at the census tract level. Once all the data were aggregated by census tract, we cleaned the data to make sure only "valid" tracts were left (invalid tracts included coding errors and tracts not in the study areas).

A further step was to make sure that the 1980 and 1990 census tracts were equivalent. Many census tract splits, combinations, and boundary changes took place from 1980 to 1990 in our six cities. Since our study involved comparing variable changes within tracts from 1980 to 1990, the tract numbers from 1980 and 1990 had to match.

The process we established for matching 1980 census tracts to 1990 census tracts was twofold. First we used comparison tables provided by the census to reassign tracts in 1990 that exactly matched a different 1980 tract or combination of 1980 tracts. For instance, if one 1980 tract split exactly into two 1990 tracts, we combined the two 1990 tracts back into one comparable 1980 tract. Depending on the situation, sometimes we converted 1980 tracts to match 1990 tracts and sometimes we converted 1990 to match 1980 tracts.

A second process was implemented for tract splits that were only partial. In these instances, achieving an exact match was impossible. Again using the comparison tables provided by the census, we established an "artificial" comparable tract for 1980 and 1990 by combining all 1980 tracts and all 1990 tracts that were involved in a non-exact change. For

instance, part of a 1980 tract (ex. 1980 tract 401) split into the same tract for 1990 (ex. 1990 tract 401) and part into another tract for 1990 (ex. 1990 tract 412) which also was equivalent to its 1980 tract (ex. 1980 tract 412). Both the 1980 tracts involved (ex. 401 and 412), and both the 1990 tracts involved (ex. 401 and 412) were combined into one larger "artificial" tract that was equivalent between the two periods.

Estimating Medians for Combined Tracts

Estimating medians was another process that evolved from the combining of census tracts. Our study included six median variables (median gross rent, median value, median owner costs with a mortgage, median owner costs without a mortgage, median family income, and median household income). Aggregating data is appropriate for interval level data and means, but not for medians. Therefore we established a process to flag combined tracts and outputted the median data for each of the component tracts to a special file. [In addition, 1980 tract data were reported for split tracts separately which sometimes resulted in multiple medians for one tract. Therefore these "duplicate" 1980 tracts were flagged and outputted so that the median variables could be averaged.] We calculated an average median for each group of combined tracts. This average median was imported back into the original file.

Building the Master File

The process of building the master file for each of the six cities involved a number of steps. SAS files were created to manipulate and analyze identified variables from the 1980 and 1990 STF3a tapes. The file included programming to "fix" non-matching census tracts to match 1990 tracts, imported gross rent data (we entered the data manually from the *1980 Census of Housing and Population, Census Tracts* since this variable was not available on the 1980 STF3a tape), numerous data manipulations, and programming for aggregating data to the census tract level. The resulting 1980 output file was imported into the master file. The estimated medians

for merged tracts were subsequently imported into the master file, replacing invalid aggregate medians.

Another SAS file was created for the 1982/3 and 1992/3 HMDA data. We pooled the data from the two years and preformed minor manipulations on the data (1980 HMDA was already aggregated at the census tract level). The resulting output files were cleaned to eliminate any "error" census tracts and imported into the master file (programming to fix non-matching tracts was added to the 1982-3 and 1992-3 HMDA data within the master file).

After all the data files were imported to the SAS master file (the public housing data were also imported and programming was added to fix non-matching tracts), we used programming to sort each data set by census tract. Finally, we merged each data set into one large data set containing all the variables from STF3a 1980, STF3a 1990, HMDA 1982/3, HMDA 1992/3, and public housing. Using the merged data set, we created variables calculating changes between 1980 and 1990.

In addition to the master file for each of the six cities, we created a reinvestment tract master file that contained the low-income tracts from all the cities. This file included all the variables from the master file for the census tracts where median family income in 1980 was less than or equal to 80 percent of the MSA median family income.

DESCRIPTION OF MAJOR VARIABLES

Loan Flows

The HMDA files provide data by type of loan (FHA/VA, Conventional, Home Purchase, Home Improvement), loan purpose (home purchase, refinance, home improvement, multi-family), and occupancy status (owner occupied, non-occupancy loans. The primary measure of loan origination volume used in this study is the sum of all loan values included in the HMDA

data: conventional home purchase, government insured home purchase, home improvement, multi-family, and non-occupant loans. This measure reflects total residential lending by covered institutions and is the broadest coverage of residential investment possible. Refinancing loans were excluded, as these do not reflect new investment or lending decisions by the borrower or the lender.

We measure reinvestment as the change in mortgage flows between 1982/3 and 1992/3. For example, in Boston the change in mortgage flows ranged from a negative $22.1 million to a positive $33.2 million, with a median of $1.2 million. Thirty-five census tracts had negative changes in mortgage flows (20% of the total), with 16 of these experiencing negative shifts of $1 million or more. Obviously, this reflects a broad range of housing markets.

The range of changes in residential investment flows is partly due to differences in sizes of census tracts. Some tracts have relatively few housing units while others have a substantial number of units. (The few tracts with no housing units in 1980 were dropped from the analysis.) In Boston, units in 1980 ranged from 133 to 5418, with a median of 1429. Units in 1990 ranged from 133 to 6290, with a median of 1475. With a few exceptions, these census tracts were "built out" in 1980.

To adjust for differences in the number of units in each tract, the annual value of the flow of all residential loans and the change in residential loan flow were divided by the number of housing units in 1980. Adjusting for the differences in the sizes of tracts reduces the range in the change in loan flows. Again, using Boston as an example, loan amounts per housing unit (total units in tract) in 1982-3 ranged from $31 to $16,207 with a median of $1,274; the same items for 1992-3 were $45 to $27,842, and a median of $2,290. The change in loan amounts per housing unit ranged from a negative $9,682 to a positive $22,246, with a median of $970.

The minimum and maximum values in Boston were both outliers, with values about twice the nearest other values in the series. Extreme outliers were eliminated from the statistical analysis, resulting in a minor reduction in the number of census tracts in each community.

Housing Unit Characteristics

A variety of demand and supply characteristics were included in the study. For the most part, all measures from the decennial census were calculated for 1980 and 1990 so that the "stock" level of the variable could be included for 1980 and the "flow" level for 1980 to 1990.

Housing unit (supply) characteristics include measures of the concentration of the stock in particular submarkets (e.g. small units with less than 2 bedrooms; units in low-rise structures; units in high-rise structures; single family units). The size of the census tract was measured by the number of year-round housing units.

Utilization of the housing stock was measured by the vacancy rate. Although the overall vacancy rate is the primary measure, vacancy rates for single-family and for multi-family units were also calculated.

The quality of housing was measured by the percent of units using coal, coke, wood or no fuel for a heating source; the percent lacking complete kitchens; and the percent lacking complete plumbing. Median gross rent and median value measured housing costs (also a reflection of quality).

Household Characteristics

Measures of household characteristics include the percent of low income families (<$5,000 in 1980; <$10,000 in 1990) and high income families ($30k+ in 1980; $50k+ in 1990); the percent of low income households (<$5k in 1980; <$10k in 1990) and high income households (($30k+ in 1980; $50k+ in 1990); the percent of families (out of all households); the percent of married-couple families; the percent of home owners; the ownership rate for single

family units; the percent of renters paying greater than 35% of income for rent; the percent of owners paying greater than 35% of income for ownership costs; the percent white; the percent Hispanic; the percent of households who moved within the 15 months prior to the census and the percent who hadn't moved in 20 or more years; the percent of adults (25+) without a high school diploma or GED; and, the percent of drop outs among young adults.

Potential Reinvestment Tracts

One of the goals of the study is to identify potential reinvestment tracts in 1980. Various designations of distressed tracts exist that primarily reflect low income households and an older housing stock. Often these designations also include race or ethnicity, but for the purposes of this study, race and ethnicity are of interest on their own in terms of their potential impact on changes in mortgage flows. They are consequently included separately in the analysis as independent variables.

The percent of units 40 or more years old measured the age of the housing stock (built prior to 1940 in the 1980 Census or built prior to 1950 in the 1990 Census). Combined with an income measure, the concentration of older units was evaluated as one classification of "reinvestment" candidate tracts in 1980. Census tracts were classified into nine categories combining three classifications of age (75% or more of units built prior to 1940; 50-74% pre-40; <50% pre-40) and three classifications of income corresponding to very low income, low income, and moderate or high income tracts (tract median family income less than 50% of the MSA median; tract median between 50-80% of MSA median; or tract median >80% of MSA median). However, the age of the stock had little impact on the change in residential investment and we decided to classify census tracts in a 'reinvestment' pool solely on the basis of the classification of the census tract as low-income (less than 80% of the MSA median).

Average Levels of Residential Investment

Table 1 provides the median, mean, and standard deviation for three measures of private residential investment for the six cities and for the pooled file of census tracts with median family incomes less than 80% of the area median (i.e. low-income tracts). LNAMTHU8 is the total 1982/3 loan amount of all residential loans reported by census tract under the HMDA divided by the total number of housing units in the tract in 1980. (Taking the ratio of total loan amount per housing unit adjusts for the differences in the number of residences in each tract.) LNAMTHU9 is the total 1992/3 loan amount for all HMDA reported loans divided by the total number of housing units in 1990. CLAMTHU8 is the change in the 1982/3 to 1992/3 loan amounts divided by the total number of housing units in 1980. (The change measure was taken as a ratio of 1980 housing units to reflect initial differences in housing units between tracts rather than differences in the 1980-90 change in units, which is an independent variable in the analysis.)

Table 1. Loan Amounts per Housing Unit, 1982/3, 1992/3, and 1982/3 to 1992/3 Change

	Baltimore	Boston	Chicago	Cleveland	Oakland	Pittsburgh	Low-Income CTs
lnamthu8							
median	$620	$1275	$855	$642	$2424	$789	$430
mean	1096	1818	3254	1480	4004	1477	2317
st.dev.	1483	2026	50723	2366	9093	2043	51410
lnamthu9							
median	3539	2498	5328	2343	9657	2142	1510
mean	5550	3296	17189	4219	12376	3706	11725
st.dev.	5187	3274	254420	5950	13912	4964	259487
clamthu8							
median	2986	1257	4163	3332	7608	1234	962
mean	5600	1636	5624	6428	11357	2551	2685
st.dev.	10430	2923	7886	1600	15045	4350	8473
N	375	173	1180	337	280	390	1113

LNAMTHU8 was below $1,000 at the median for all but Boston and Oakland. Mean values are approximately twice the median and standard deviations exceeded the mean by about

50% or more. The distribution is heavily skewed and is non-normal. The median LNAMTHU8 for low-income tracts was $430, several hundred dollars below the medians for all census tracts in the respective cities and their surrounding counties. By 1992/3, loan amounts per housing unit in the tract tripled in most of the cities and more than doubled in all. Median values in 1992/3 ranged from a low of $2,142 (Pittsburgh) to a high of $9,657 (Oakland), which had the largest increase. The median for low-income tracts was $1,510, an increase of 251%, which was comparable to or higher than the increases in four of the cities. Again, the distributions are skewed.

The dependent variable in the statistical models is CLAMTHU8, the 1982-3 to 1992-3 change in total loan amount divided by 1980 housing. The smallest median change in loan amount per housing unit was in Pittsburgh with $1,234, followed by Boston with $1,257. The highest change in loan amount per 1980 housing unit was in Oakland with $7,908. The median change in loan amount per 1980 housing unit for the low-income tracts was $962. The latter distribution was also more highly skewed than for the full set of tracts for each city, indicating greater variability in the change in loan amount per housing unit in low-income tracts than elsewhere.

Table 2 provides the mean values for the change in loan amount per 1980 housing unit (CLAMTHU8) for several income, age of housing, and gross rent categories. CLAMTHU8 increases in most cities as median income increases, with the largest jump for medians at or above 80% of the area median family income (since this top end category covers a larger range than the other two categories, it is not surprising that it has the largest increase in CLAMTHU8). The mean change in loan amount per 1980 unit for tracts with median incomes below 50% of the area median ranged from $118 in Pittsburgh to $5,091in Oakland. Chicago was the only other

city where the mean change in loan amount exceeded $1,000. These very-low-income areas clearly had smaller increases in residential investment than higher income areas.

Table 2. Change in Loan Amounts per Housing Unit, 1982/3 to 1992/3 Change, by Census Tract Characteristics

	Baltimore	Boston	Chicago	Cleveland	Oakland	Pittsburgh	Low-Income CTs
MFI							
<50%	$396	$982	$1765	$215	$5091	$118	$1574
50-79%	1752	983	3617	683	5894	443	2641
80%+	7191	2898	7268	5349	15551	3224	na
Pre-40							
75%+	1978	1739	6524	1693	7914	861	3225
50-74%	2219	1630	4044	1305	6022	1842	1658
<50%	6417	1494	6344	5104	12747	3556	3001
%rent brdn							
<10%	5782	1552	6363	3869	11913	2853	2698
10-29%	3068	1661	3604	1427	3414	1089	1977
30%+	1799	2281	3859	432	1609	446	1986

One potential reason for the differences in loan amounts per housing unit between census tracts at different income levels is the greater proportion of rental housing in lower-income tracts. A greater proportion of rent burdened households in a tract generally, but not uniformly, is accompanied by a lower change in residential investment (the pattern is reversed in Boston).

A higher proportion of older housing (pre-1940) in a tract, however, had no apparent association with changes in residential investment.

Bi-variate examinations of associations between neighborhood characteristics and changes in residential investment are tiresome and inconclusive because the pattern identified might be confounded by other associations which cannot be controlled in simple cross-tabulations. Consequently, multivariate models were developed and tested to help determine if evidence supported a disinvestment model associated with non-market characteristics of neighborhoods.

MULTIVARIATE ANALYSIS

The full model tests mortgage flows (shifts in capital investment) as a function of household and housing stock characteristics in the census tract. Household characteristics include income, household type, education, race and ethnicity, turnover, home-ownership, and rent burden. Housing stock characteristics include the presence of public housing, high rise housing, increase in units, concentration of low-rent units, change in gross rents, house values, units lacking kitchens, old housing, and vacant housing.

The general expectation consistent with institutional disinvestment is that low-income, minority areas—most often older, inner-city neighborhoods—are denied access to credit over time despite the credit worthiness of home buyers and owners in the neighborhood. Without mortgage credit, these areas deteriorate because existing owners cannot sell their houses unless they provide their own financing (e.g. through a contract for deed), provide deep price discounts, or sell to absentee landlords. Even the latter provide only minimum investment as they treat their properties as “cash cows” with no future asset value. As these systematic processes of disinvestment overcome the neighborhood, physical deterioration is inevitable.

It is important, however, to separate cross-sectional effects distinguishing the greater likelihood of higher income and higher education households to consume more housing and higher mortgage levels from shifts over time in capital investment in neighborhoods. It is rather obvious that lower-income areas would receive lower capital investments at any point in time when compared with higher-income areas, unless government subsidies are significantly overruling market dynamics. The concern about disinvestment (by its very nature a dynamic

rather than a static characteristic) is that lower-income, minority areas lose ground over time in capital investment.

At the individual borrower level, income and household type have well established positive impacts on homeownership and on mortgage lending. The impact of income is so well established and obvious as to not need further explication. Household type also has a well established, if not as obvious relationship with home-ownership (Clark and Dieleman 1996). Family households, particularly husband-wife households, are much more likely to be home-owners than non-family households. The impact of family household type goes beyond the effect of higher incomes and probably reflects differences in expected household stability and housing norms. Higher education, both as a correlate of current income and as a proxy for permanent income, should also have positive impacts on mortgage lending. Consistent with a disinvestment model, areas with higher initial incomes and with higher levels of education attainment would be expected to receive larger increases in residential capital investment if the market is biased by such externalities.

Real estate investment has always been noted for its sensitivity to externalities, or neighborhood effects. The value and use of properties affect the value of nearby properties. The notion of “broken windows”—whereby the failure to fix visible property damage is taken as the symbol of neighborhood deterioration—has recently popularized the sensitivity to neighborhood conditions of real estate investment.

For example, a high level of high school drop outs not only indicates a low likelihood of increases in residential capital investment because of its reflection of poor credit risk, but it also identifies a potential negative neighborhood effect discouraging homebuyer and lender interest in investment. Areas with high drop out rates are likely to be troubled by numerous other social

problems that discourage individual and institutional investment (i.e. the “broken windows” problem).

Other negative externalities potentially include high vacancy rates, conversion of single family houses to rental units, proximity to high rise residential buildings, low building quality, a concentration of public housing, and a concentration of low cost rental housing. High vacancy rates, unless in an area of significant levels of new construction, identify areas where housing supply exceeds demand. Even if prices and rents adjust downward, the new equilibrium level is likely to include abandoned residential buildings, or houses converted to other uses.

The negative impacts of high concentrations of poverty and of public housing have been documented in several studies (Schill and Wachter 1995; Massey and Kanaiaupuni 1993). These areas are the most likely to experience extreme disinvestment. However, these areas also present interesting opportunities for reinvestment. Some very distressed neighborhoods have been the targets of government subsidies for redevelopment and have stimulated the creation of community development corporations to further their redevelopment. Except in instances where location and structural housing quality lead to gentrification, these subsidized redevelopment efforts have not stimulated much market-based reinvestment.

Changes in residential capital investment are stimulated by turnover in properties. Without residential mobility, investment would be fixed except for improvement expenditures by homeowners and landlords. Although improvement expenditures by long-term occupants can be an important element of residential investment, older homeowners are likely to undermaintain their properties (Galster 1987). Consequently, neighborhoods dominated by low turnover due to a high degree of short-term occupancy are not likely to show much increase in residential investment. While we anticipate that a low level of turnover will dampen investment, a high

level of turnover is not necessarily an indication of reinvestment. Neighborhoods experiencing high levels of turnover are likely to be dominated by low-income renters, whose life circumstances generate residential instability and churning. Consequently, both a high degree of long-term and a high degree of short-term occupancy are expected to be associated with low levels of residential reinvestment.

Measures of race and ethnicity, age of housing, and low-income are primary indicators of the disinvestment model, although it is difficult to distinguish the legitimate market impact of income from an undesirable, non-market effect.

Several different measures of demand and supply characteristics were examined in this study. After reviewing a preliminary model that evaluated multiple specifications of the independent variables, the model presented in Table 3 was selected. As discussed earlier, the model consists of measures of both 1980 characteristics and the change in characteristics between 1980 and 1990. The 1980 measures reflect the response of changes in residential investment to static neighborhood characteristics. In one sense, the 1980 measures reflect a community disinvestment model.

The overall model is statistical significant for each of the six communities, with R^2 values ranging from .47 (Boston) to .75 (Oakland). The models leave a significant portion of "unexplained" variance and the root mean square error exceeds the dependent mean in three cities and is very close to it in the other three. Although the R^2 measures are tolerable, the model only roughly fits the census tract variation in changes in residential investment. From a modelling perspective, one would hope for better. From a community reinvestment perspective, this is good news. While changes in residential investment are by no means random, they are only partially a function of the income, race, and housing stock characteristics of neighborhoods.

Most encouraging, associations of neighborhood characteristics with investment do not conform to a disinvestment model.

Table 3. Full Residential Investment Model for Six Cities

	Baltimore	Boston	Chicago	Cleveland	Oakland	Pittsburgh
AdjR-sq	0.6952****	0.4700****	.6043****	.6531****	.7471****	.4943****
Root MSE	4305	2001	3977	3798	6195	3213
Dep.Mean	5019	1461	5257	3284	9494	2622
Intercept	-25532****	-5998	-9783****	-4269	-26449**	420
Families,80	34.23	24.65	-10.95	-110.83***	46.31	-35.38
^families	161.56***	32.11	-64.93***	54.25	253.43**	-0.12
Hsdrop,80	23.26	-24.54	14.95	-7.25	-7.88	-2.25
<hgsch,80	136.68*	19.57	-25.51	-101.52*	-58.09	50.71
^<hghsch	93.43	-30.12	25.29	25.70	98.68	44.57
College,80	117.33*	-9.72	-74.04***	-156.21***	-74.36	-51.93
^college	89.93	-32.39	41.86	-28.60	28.03	-74.65
MovedA,80	155.21***	3.87	173.52****	137.16**	355.61****	100.33*
^movedA	124.53***	19.17	179.03****	138.77***	350.77****	125.46***
MovedB,80	-2.90	-15.32	58.24**	56.67	133.90	-12.21
^movedB	-22.14	-40.24	11.51	12.70	140.68	-31.87
Lnwhite,80	-361.90	4.42	-71.89	-244.88	-1012	-141
^white	63.91*	-10.43	20.32	-13.99	86.22	36.74
^hispanic	-105.23	-52.73	0.71	-31.66	-178.38	-0.50
Own,80	150.23****	22.03	70.62****	146.82****	146.85**	81.79
^own	-18.24	-83.34*	204.15****	172.53***	132.59	118.09**
^sfown	22.90	-9.93	3.95	-9.40	-131.48***	-37.02
Poverty,80	42.91	48.07	64.81**	-38.10	18.85	-95.40*
^poverty	101.82	14.22	56.91**	52.07	11.05	-90.78*
mfi,80	-0.197	0.14	-0.036	-0.456****	-0.119	-0.45***
^MFI	-10.99	2.82	-10.57***	18.92**	-9.04	-24.38**
Hghinc,80	138.42	56.97	251.17****	228.76****	260.65***	177.63***
^hghinc	130.84**	66.35	299.95****	180.15***	116.17	256.78****
PubHousing	1811	-769.9	1720	-2513	-8056	35
Hrise,80	-62.58	-11.17	-42.88***	-44.73	-271.73**	11.59
^units	137.47****	46.47****	119.60****	146.00****	247.09****	70.18****
Lowrent,80	-34.19	39.93	-7.41	63.32*	226.33**	21.57
^lowrent	49.82	-2.47	1.91	22.17	84.61	-13.68
^MGRent	19.31***	15.37***	-5.11	-3.89	-15.28	-5.25
MdValue,80	0.1012***	0.027*	0.0002	0.1282****	0.054**	0.134****
^mdvalue	0.379	2.62**	1.87*	43.12****	35.52****	9.41
<kitchen,80	1376	226	-420	603.47	883.16	2034***
^<kitchen	389	595	-311	-58	370	1049**
Rntbrdn,80	-24.01	-98.84**	-13.73	104.25***	-12.13	5.22
^rntbrdn	-33.04	-81.14***	-20.00	33.01	-100.21*	6.23
Oldhous,80	-10.89	-6.49	15.12*	34.35**	50.09*	-2.75
Vacancy,80	5.03	-47.38	109.92**	203.95**	-605.53**	91.59
^vacancy	58.92	-94.06	27.15	-21.26	-457.12**	112.40*

Statistical significance at the .10*, .05**, .01***, and .001**** levels.

The full model includes several income characteristics. Median family income in 1980 is statistically significant in only two of the six cities and its association with changes in investment is opposite what would be expected by a disinvestment model. For five of the six cities, the coefficient for 1980 MFI is negative. Changes in investment between 1982/3 and 1992/3 were either unrelated to 1980 MFI levels or inversely related.

Two other 1980 income measures were included: the percent of persons below poverty and the percent of 'high income' households (with incomes above 100% of the metropolitan median family income). The percent of persons below poverty in 1980 was significant in only two cities (Chicago and Pittsburgh), but with opposite directions. Four of the six coefficients were positive rather than negative, providing additional support for rejecting a disinvestment model. For Chicago, the coefficient supports a reinvestment model. Only in Pittsburgh is the relationship consistent with disinvestment.

The percentage of high-income households in 1980 has the expected positive relationship with changes in residential investment and the coefficient is significant in four of the city cities. Additionally, with the exception of Boston, the coefficients are sizeable: a 10 point shift in the 1980 percent of high income households is associated with $1400 to $2600 increase in investment per housing unit. Investment is clearly influenced by the presence of high-income households. (We are currently testing the impact of colinearity problems among the income measures.)

Changes in MFI, poverty, and the percent of high-income households are also included in the model. Residential investment was expected to be positively associated with positive changes in income (and negatively associated with increases in poverty) reflecting the sensitivity

of housing demand and lending to income. Only changes in the percent of high-income households have the anticipated positive association with changes in investment. Areas with greater increases in high-income households witnessed a greater increase in investment, which is not surprising. (It might also suggest a pattern of investment shifts associated with gentrification.) Changes in MFI and poverty, however, have insignificant or opposite than expected associations with changes in investment in several of the cities.

In four of the cities, areas with higher percentages of households with high rent burdens in 1980, a condition primarily reflective of low income renters, had lower increases in residential investment. This result was only statistically significant in Boston and the opposite result occurred in Cleveland. However, increases in rent burden more often were associated with reduced levels of investment change, although this result is only statistically significant in two cities (Boston and Oakland). It would appear that increases in the percentage of renters with high rent burdens possibly identify where incomes are not keeping up with housing costs, a condition reasonably expected to result in lower levels of residential investment.

These relationships are not consistent or strong enough to support a reinvestment conclusion across census tracts in the six cities and surrounding counties; however, they clearly counter a disinvestment model.

Household characteristics other than income expected to influence changes in residential investment are the percent of families (1980 and percent change); the 1980 high school drop out rate; adults without a high school education (1980 and percent change); adults with some college education (1980 and percent change); short-term mobility (1980 and percent change); long-term mobility (1980 and percent change); the percent white (1980 and percentage point change); and changes in the percent Hispanic. The 1980 percent families was only significant in Cleveland

and had the opposite than expected relationship with change in investment. Otherwise the association was small and statistically insignificant. An increase in the percent of families had a positive association with investment change in four of the cities, with relatively large and significant impacts in Baltimore and Oakland. A smaller, but significant negative effect was found in Chicago. Except for Chicago, where a positive change in the percent of families was associated with a decrease in residential investment, increases in families tended to spur investment. The pattern, however, is weak.

The effect of education levels was mixed. The 1980 high school drop out rate, which we used as a proxy for several social problems, was statistically insignificant in all six cities. The percent of adults in 1980 with less than a high school education had opposite effects across the cities, with three negative coefficients (one significant) and three positive coefficients (one significant). The change in the percent of adults with less than a high school education was insignificant in all six cities. The percent of adults with some college in 1980 had the opposite (negative) effect than expected in five cities (two with significant coefficients) and the anticipated effect (significant) in only one city (Baltimore). The change in the percent with some college was insignificant in all six cities.

The effects of race and ethnicity were uniformly insignificant and the effect of race was opposite to what would be expected through disinvestment. Although the effect of an increase in the percent Hispanic was negative in five of the six cities, it was statistically insignificant in all six cities.

These results do not indicate any systematic impact of race or ethnicity on changes in residential investment. The effects of education are similarly insignificant and often in the opposite direction than expected under a disinvestment model.

Several housing stock characteristics were expected to influence changes in residential investment, either favorably or negatively. Areas with higher percentages of homeowners, where ownership is increasing, and where units are being added to the housing stock should experience higher levels of increased investment, mainly as a result of favorable demand characteristics. Similarly areas with higher house values and increasing values should fare better than other areas. Additionally, areas with low vacancy rates and increases in housing units are expected to have higher increases in investment.

As anticipated, higher ownership rates and increasing rates are positively associated with increased residential investment. The 1980 ownership rate has a positive coefficient in all six cities and is statistically significant in four of the cities. Increase in ownership is positively associated with increased investment in four cities and statistically significant in three. However, in Boston the relationship is negative and marginally significant (at the .10 level), but this is probably of little practical significance given the pattern elsewhere and the low level of statistical significance of the contrary result in Boston.

The impact of increases in housing units is uniformly positive and statistically significant in all six cities. New construction (and possibly rehabilitation of units that would otherwise be lost to the market) reflects areas where demand is positive. Since new units are likely to be more expensive than existing units, it is logical that the change in residential investment per unit would increase. This probably also reflects positive neighborhood effects generated by new construction.

Areas with higher median house values in 1980 and with higher increases in median values experienced larger increases in residential investment. (Larger increases in median gross rents were positively and significantly associated with increased investment in only two cities,

suggesting that owner occupied housing is a much more important influence on residential investment than renter housing.) This is consistent with market expectations. By themselves this result does not suggest disinvestment in areas with lower house values and with less increase in values.

Higher initial vacancy rates and increasing vacancy rates have less clear cut results. The coefficients for the 1980 vacancy rate are mixed, with two significant positive coefficients and one significant negative coefficient. Vacancy rates are difficult to interpret because so much depends on other characteristics (areas with a high level of new construction often have high vacancy rates reflective of the new units put onto the market, while other areas with high vacancy rates could reflect more permanent excess supply). The 1980-90 change in the vacancy rate also has mixed results, but is only statistically significant in two cities (Oakland and Pittsburgh).

Both public housing and high rise housing were expected to act as negative externalities relative to residential investment. High concentrations of public housing had the expected negative impact in three of the cities, but not in the other three; additionally none of the coefficients were significant. The percentage of high rise housing had negative effects in five of the cities and reached significance in two. The effects were relatively small except for Oakland.

The housing stock characteristics most clearly associated with the disinvestment model are older units and lower quality units. The 1980 percentage of units built before 1940 (i.e. pre-WWII housing) and the percentage of units lacking kitchens were expected to negatively impact changes in residential investment, if the disinvestment model is correct. The coefficient for old housing, however, is positive and statistically significant in three cities and negative but statistically insignificant in the others. Higher percentages of units lacking complete kitchens in

1980 and increases in this percent between 1980 and 1990 were most often in the direction contrary to disinvestment, particularly in Pittsburgh where the coefficients were positive and significant.

A simplified, eleven variable model is presented in Table 4. The variables include 1980 and 1980-90 change for short-term mobility, home-ownership, high income, median value, and rent burden, as well as 1980-90 change in residential units. The R-square values decrease, as expected, but the shortened model has approximately the same fit as the full model, particularly for Baltimore, Cleveland, Oakland, and Pittsburgh. The shortened models for Boston and Chicago had greater reductions in fit compared to the full model. The instability of the coefficients indicates significant colinarity problems in the full model.

Table 4. Abbreviated 1982-92 Mortgage Flow Model for Six Cities and Combined Reinvestment Tracts

	Baltimore	Boston	Chicago	Cleveland	Oakland	Pittsburgh
AdjR-sq	.6601****	.3480****	.5068****	.5920****	.7133****	.4411
Root MSE	4531	2387	4462	4123	6576	3185
Dep.Mean	5084	1694	5209	3345	10470	2467
Intercept	-8890**	-264	-5417****	-10779****	-21207****	-273
MovedA,80	75.74**	34.69	104.63****	95.41***	177.14***	39.26
^movedA	59.88*	32.72	140.72****	128.77****	201.52***	67.14**
Own,80	62.77***	2.13	46.52****	55.43**	58.28	-0.88
^own	-33.123	--131.78***	91.15****	150.47****	83.52	78.47**
Hghinc,80	132.08***	76.92	142.69****	92.81**	311.72****	70.30***
^hghinc	190.47****	121.34***	216.62****	227.41***	208.40****	191.83****
^units	161.36****	28.45**	105.02****	125.30****	219.49***	79.55****
MdValue,80	0.0439*	0.0120	-0.005	0.021	0.015	0.015
^mdvalue	-0.865	2.829***	2.127**	34.00****	20.57****	-7.01
Rntbrdn,80	21.11	-103.95****	10.37	97.08****	94.81	6.91
^rntbrdn	6.689	-90.42***	-14.13	30.43	-13.46	1.23

Statistical significance at the .10*, .05**, .01***, and .001**** levels.

The shortened model basically represents market influences of higher income households, turnover in units, addition of units, ownership, and house values. Rent burden was included from the full model as the best indicator of demand problems and externalities associated with lower income renters. Except for 1980 median value and rent burden, the

variables were generally significant. Rent burden was significant in Boston and Cleveland, but with opposite effects. That 1980 median value was insignificant in all but one city (and then only marginally) suggests that increases in residential investment are not limited to neighborhoods with higher house values. Change in residential investment was positively influenced by changes in values (i.e. appreciation), which can be logically expected to influence home buyers and lenders.

The next question is whether the same patterns exist in low-income neighborhoods, which represents our reinvestment case. Census tracts with incomes below 80 percent of the area median family income were selected. This, of course, reduced the number of tracts in each city and therefore the data sets were pooled. Dummy variables representing five of the cities (Chicago was the suppressed case) were included in the models.

The dependent variable, 1982/3 to 1992/3 change in residential investment per 1980 dwelling unit, had a mean value of $2,054 for the low-income tracts. Although this was lower than in all but one of the full city-county areas (Boston), it is not unreasonable to expect that the change in investment in low-income areas would be lower than in other areas. Investment per unit did in fact increase in the lower income tracts and by a rather substantial amount. If systematic disinvestment was occurring, one might expect that race, housing quality, and negative neighborhood effects (e.g. higher drop out rates and poverty) would be even more influential among low-income tracts.

The full model for these “reinvestment tracts” is presented in Table 5. The R-square of .51 is comparable to those found for the full city-county areas.

Again, poverty has the opposite than expected effect—census tracts with higher poverty levels had larger, positive changes in residential investment. Change in poverty had a similar

effect but was only marginally significant. Median Family Income (1980) and MFI change were both insignificant. The percent of households (1980 and 1980-90 change) with above average incomes had the strongest effect on investment. Positive effects from both poverty and high income are seemingly inconsistent, but might suggest that reinvestment is highest when it occurs in mixed income neighborhoods which are attracting higher income newcomers.

The effects of education are consistent with previous observations: high drop out rates and low levels of education among adults in 1980 did not act as a deterrent to increases in residential investment and higher levels of education did not spur investment.

Race and ethnicity were again insignificant. A higher percent of families in 1980 and change in the percent of families were both significant and negative. This might reflect the shift in the composition of families away from married couples to single parent families, which warrants further investigation.

Public housing did not negatively impact investment, although a higher concentration of high rise housing did. A concentration of low-rent units in 1980 and an increase in this percent both negatively affected investment, but only the 1980 level was significant. Similarly, high (and increasing) percentages of rent burdened households were associated with lower levels of investment.

Change in the number of dwelling units was insignificant among the lower-income tracts in the full model but was significant in the shortened model; the latter result is consistent with the findings for the larger set of census tracts. The weaker impact of increases of units in lower-income areas was probably due to low levels of new construction in these areas, and possibly other increases in units that were less than positive (e.g. the subdivision of single family units into several rental units). Additionally, the 1980 ownership rate was insignificant (although

with the expected positive sign) in the full model but significant in the shortened model. Change in ownership was positively associated with investment (significant at the .05 level), but change in single family ownership had an opposite but weaker effect. A logical explanation of the single family ownership pattern escapes us.

As with the analysis of the entire city and surrounding county, the variables (in addition to race) reflecting a disinvestment model were insignificant: 1980 median value, percent of units lacking kitchens, the percent of older housing, and vacancy rates were uniformly insignificant and often with the opposite than expected sign.

Table 5. Reinvestment Model for Combined Reinvestment Tracts		
	Full Model	Short Model
AdjR-sq	.5125****	.4243
Root MSE	2418	2642
Dep.Mean	2054	2046
Intercept	887	-1217*
Families,80	-30.94***	
^families	-56.50****	
Hsdrop,80	17.36**	
<hgsch,80	-12.11	
^<hghsch	-25.43	
College,80	-38.60**	
^college	2.815	
MovedA,80	35.91**	52.06****
^movedA	39.08****	65.09****
MovedB,80	17.19	
^movedB	7.70	
Lnwhite,80	58.87	
^white	-7.01	
^hispanic	1.60	
Own,80	17.55	28.67***
^own	35.62**	42.95****
^sfown	-8.16**	
Poverty,80	50.74***	
^poverty	24.72*	
mfi,80	-0.04	
^MFI	-1.48	
Hghinc,80	169.37****	79.62***
^hghinc	177.73****	109.57****
PubHousing	446	
Hrise,80	-29.13**	
^units	9.98	22.68****
Lowrent,80	-29.13**	
^lowrent	-4.05	
^MGRent	2.12	
MdValue,80	0.02	0.016***
^mdvalue	6.07	5.85****
<kitchen,80	23.95	
^<kitchen	-139.71	
Rntbrdn,80	-64.19****	-37.81****
^rntbrdn	-25.44***	-19.86***
Oldhous,80	-4.44	
Vacancy,80	13.73	
^vacancy	3.96	
Baltimore	-1722****	-1913****
Boston	-5038****	-5284****
Cleveland	-622**	-858***
Oakland	-236	-573*
Pittsburgh	-1070**	-1162**

Statistical significance at the .10*, .05**, .01***, and .001**** levels.

POLICY RECOMMENDATIONS

The results of the analysis of changes in residential investment between 1982/3 and 1992/3 across these six cities and their surrounding counties run counter to any systematic disinvestment related to age of housing, race, or income. Market variables do affect residential investment; it would be foolish to expect otherwise. Changes in residential investment are positively associated with short-term turnover, ownership, increases (or lower decreases) in ownership (with the exception of Boston), higher incomes and increasing percentage of higher incomes, and appreciation.

Private residential investment in inner city neighborhoods was widespread during this period. This investment was independent of important neighborhood characteristics such as race, ethnicity, poverty, public housing, and education. Concentrations of low rent units and high rise units discouraged investment, as did higher and increasing percentages of rent burdened households. Investment was positively associated with higher levels of ownership and increases in ownership, the percent of higher income households, increases in higher income households, and increases in units.

Home ownership and mixed income strategies for redevelopment, particularly those targeted attracting middle-income households, are consistent with the effects found in this analysis. Appreciation in house values is similarly important. Such strategies might lead to gentrification and maintaining a mixed income, mixed owner and renter occupancy neighborhood is a challenge. But redevelopment strategies that focus exclusively on low-income renters are not likely to be productive in attracting private residential investment and may well

serve as impediments to such development, particularly when low-rent units are concentrated in particular neighborhoods.

Although the evidence presented in this study is inadequate to fully explain residential investment, it is encouraging that reinvestment in inner city and lower income tracts occurred. It is also encouraging that the analysis failed to support a disinvestment model. The next steps are to map the geographic patterns of residential investment and to delve more deeply into the local circumstances, such as the activities of community development corporations, which would help understand these patterns. In understanding the positive patterns of private residential investment in our cities, we can promote better strategies for increasing and widening reinvestment.

FUTURE RESEARCH

The next phase of research will involve further investigation of the colinearity problems in the statistical models and refinements in the modeling, mapping changes in investment, and conducting field work in each of the six cities. The analysis will also be expanded to include changes in neighborhood retail and service establishments.

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Appendix A
Reinvestment Study
List of Variables

NOTE: All variables wereaggregated to the census tract level, the unit of analysis of the study.

VARIABLES USED IN THE REGRESSION MODELS

Dependent Variable

The dependent variable is the change (pooled 1992,93 – pooled 1982,83) in loan amount per number of 1980 housing units*. Loan amount, reported by banks to comply with the Home Mortgage Disclosure Act, includes owner occupied conventional, FHA, VA, and FmHA home purchase loans; owner occupied home improvement loans; owner occupied multi-family loans; and non-occupant loans. (Values less than -$20,000 and greater than $300,000 are thrown out as outliers.)

Independent Variables

Demand Characteristics:

pmv5y8 Percent of households who moved within the 5 year period prior to the 1980 Census

cpmv5y The 1990-1980 change in the percent of households who moved within the 5 year period prior to the 1980 and 1990 Census

Pscol8 Percent in 1980 of persons 25 years and older with some or more college education

Phsdo8 Percent in 1980 of persons 16 to 19 years of age who are not enrolled and not graduates of high school

Ppov8 Percent in 1980 of persons below poverty

Cppov The 1990-1980 change in the percent of persons below poverty (values less than or equal to –25 are combined and values greater than or equal to 25 are combined)

Pfam8 Percent in 1980 of households who are families

Cpfam The 1990-1980 change in the percent of households who are families

Phihh8 Percent in 1980 of households with “high” incomes ($30,000 or more)

Chihh The 1990-1980 change in the percent of households with “high” incomes (1980, $30,000 or more and 1990, $50,000 or more)

Pmv20y8 Percent of households who moved within the 20 year period prior to the 1980 Census (values greater than or equal to 50 are combined)

Cpmv20 The 1990-1980 change in the percent of households who moved within the 20 year period prior to the 1980 and 1990 Census (values less than or equal to –25 are combined and values greater than or equal to 25 are combined)

Cphisp The 1990-1980 change in the percent of persons who are of Spanish origin

Plths8 Percent in 1980 of persons 25 years of age or older with who are not high school graduates

Pcmfi Percent change from 1980 to 1990 in median family income

Cpgrnt1 The 1990-1980 change in percent of specified-renter-occupied housing units with gross rent below the area (county level) first decile gross rent threshold

Pcmgr Percent change from 1980 to 1990 in median gross rent
Lpwt8 Logarithm of percent in 1980 of persons who are white
Rcpwt The 1990-1980 change in percent of persons who are white (values of 20 or greater are combined)
Mfi8 1980 median family income
Cpscol The 1990-1980 change in percent of persons 25 years of age or older with some or more college education
Cplths The 1990-1980 change in percent of persons 25 years of age or older with who are not high school graduates
Prntbn8 Percent in 1980 of specified renter-occupied housing units with gross rent 35 percent or more of household income
Cprntbn The 1990-1980 change in the percent of specified renter-occupied housing units with gross rent 35 percent or more of household income

Supply Characteristics:
Rpcunits Percent change from 1980 to 1990 in number of housing units* (values less than or equal to –100 and values greater than or equal to 1000 are thrown out; remaining values –50 or less are combined and remaining values greater than or equal to 100 are combined)
Pu40y8 Percent in 1980 of housing units* 40 or more years old
Plkit8c Dummy variable for percent housing units* lacking complete kitchens (value of 1 is assigned if percent is greater than 3)
Cplkitb Dummy variable for 1990-1980 change in percent housing units* lacking complete kitchens (value of 1 is assigned if percent is greater than 0)
Phrise8 Percent in 1980 of housing units* in structures with 13 or more stories
Phc Dummy variable for number of public housing units in 1990 (value of 1 is assigned if number of public housing units is greater than 500)
Pown8 Percent in 1980 of occupied housing units that are occupied by owners
Cpown The 1990-1980 change in the percent of occupied housing units that are occupied by owners
Cpsfown The 1990-1980 change in percent of single family occupied units that are single family owner units (includes attached and detached)
Vacrt8 Vacancy rate in 1980 (vacant units/housing units*)
Chvacrt The 1990-1980 change in vacancy rate (vacant units/housing units*)
Mval8 The 1980 median value of specified owner-occupied housing units
Pcmval Percent change from 1980 to 1990 in median value of specified owner-occupied housing units
Pgrnt81 Percent in 1980 of specified-renter-occupied housing units with gross rent below the area (county level) first decile gross rent threshold

OTHER VARIABLES

Mfimsa Categories of 1980 median family income as a percent of the 1980 SMSA median family income (assigned a value of 1 if the median family income is less than 50 percent of the area median family income, a value of 2 if the median family income is between 50 percent and 80 percent of the area median family income, and a value of 3 if the median family income is greater than or equal to 80 percent of area median family income)

Xpgrnt81 Categories of percent in 1980 of specified-renter-occupied housing units with gross rent below the area (county level) first decile gross rent threshold (assigned a value of 1 if the percent units with gross rent below the area first decile gross rent threshold is less than 10 percent, a value of 2 if the percent units with gross rent below the area first decile gross rent threshold is between 10 percent and 30 percent, and a value of 3 if the percent units with gross rent below the area first decile gross rent threshold is greater than or equal to 30 percent)

Agehsg Categories of percent in 1980 of housing units* 40 or more years old (assigned a value of 1 if the percent of housing units 40 or more years old is greater than 75 percent, a value of 2 if the percent of housing units 40 or more years old is between 50 percent and 75 percent, and a value of 3 if the percent of housing units 40 or more years old is less than 50 percent)

Loanamt8 The pooled 1982,83 loan amount, reported by banks to comply with the Home Mortgage Disclosure Act, includes owner occupied conventional, FHA, VA, and FmHA home purchase loans; owner occupied home improvement loans; owner occupied multi-family loans; and non-occupant loans.

Loanamt9 The pooled 1992,93 loan amount, reported by banks to comply with the Home Mortgage Disclosure Act, includes owner occupied conventional, FHA, VA, and FmHA home purchase loans; owner occupied home improvement loans; owner occupied multi-family loans; and non-occupant loans.

Cloanamt The change (pooled 1992,93 - the pooled 1982,83) in loan amount. Loan amount, reported by banks to comply with the Home Mortgage Disclosure Act, includes owner occupied conventional, FHA, VA, and FmHA home purchase loans; owner occupied home improvement loans; owner occupied multi-family loans; and non-occupant loans.

Lnamthu8 The pooled 1982,83 loan amount per number of 1980 housing units. Loan amount, reported by banks to comply with the Home Mortgage Disclosure Act, includes owner occupied conventional, FHA, VA, and FmHA home purchase loans; owner occupied home improvement loans; owner occupied multi-family loans; and non-occupant loans.

Lnamthu9 The pooled 1992,93 loan amount per number of 1990 housing units. Loan amount, reported by banks to comply with the Home Mortgage Disclosure Act, includes owner occupied conventional, FHA, VA, and FmHA home purchase loans; owner occupied home improvement loans; owner occupied multi-family loans; and non-occupant loans.

*In 1980, housing units is year round housing units.