Impact of Targeted Redevelopment of Central Business District on Housing Prices in the Surrounding Neighborhoods: Evidence from Oakland, California

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Abstract: Using a longitudinal data set that inventories single-family home sale transactions within 3.2 km (2 mi) of the Central District redevelopment area of Oakland, CA, this paper finds that the targeted efforts to redevelop the Central District have partially mitigated the District’s negative impact on surrounding neighborhoods. The paper examined the Central District from 1992 to 2006, a period during which the District changed in character from a business district to a mixed-use vibrant area. During the period 1992 through 2000, proximity to the Central District negatively impacted housing prices up to 1.6 km (1 mi) from the District boundary. However, the magnitude of the impact reduced in the 2001–2006 period and dissipated after 0.8 km (0.5 mi) from the District boundary, indicating that the redevelopment efforts had a positive spill-over effect on surrounding property values. DOI: 10.1061/(ASCE)UP.1943-5444.0000112. © 2012 American Society of Civil Engineers.

CE Database subject headings: Housing; Pricing; California; Residential location; Business districts.

Author keywords: Redevelopment; Housing prices.

Introduction

Several major cities throughout the United States—for example, New York, Philadelphia, Los Angeles, and San Jose—have been actively redeveloping their inner core areas for the last three decades. In California, the redevelopment activities are allowed under the California Community Development Act of 1945. Under this Act, cities and counties can establish a redevelopment agency to fight blight (Dardia 1998). The law further notes that “the benefits which will result from . . . redevelopment of blighted areas will accrue to all the inhabitants and property owners of the communities in which they exist” (Health and Safety Code sections 33000 et seq.), construing an intention for the neighboring property owners to experience an increase in their home values as a result of the act of public intervention. The Act was amended in 1952 to allow the use of tax increment financing (TIF) to fund redevelopment activities (Dardia 1998).

California cities have made considerable use of TIF districts. In 2005, 80% of the cities and 45% of the counties in California had redevelopment agencies with nearly 800 active redevelopment project areas. Overall, TIF revenues generated approximately $3 billion for funding redevelopment activities in 2005 (California Redevelopment Association 2006). Over the years since California started using TIF, several other states in the US have used TIF as a redevelopment and/or economic development tool (Dardia 1998).

As per the US Census Bureau, Oakland, the third largest city in the San Francisco Bay Area, had an estimated population of almost 400,000 in 2006. The city is the transportation and industrial hub of the nine-county San Francisco Bay Area, a role it has played throughout the twentieth century. Using federally supported urban renewal policies of the 1950s and 1960s, and later guided by its own redevelopment plan of 1969—Central District Urban Renewal Plan—Oakland focused its energies on redeveloping its central core. Oakland had 10 redevelopment project areas delineated as of 2006.

This study examines the spill-over effects, in the form of home value appreciation, that redevelopment activities of the oldest project area—the Central District redevelopment area (hereafter called Central District)—a redevelopment encompassing the area in and around Oakland’s central business district (CBD), had on surrounding neighborhoods during the period 1992–2006. The Central District redevelopment plan specifically includes positive spill-over effects as one of the objectives of the city’s redevelopment activities when it notes that the redevelopment should accrue “economic benefits to disadvantaged persons living within or near the Project Area” (Redevelopment Agency of the City of Oakland 1969).

Research Question

The specific research question raised by this study is: Did the redevelopment investments in the Central District lead to positive spill-over effects as evidenced by an increase in single-family housing prices in the surrounding neighborhoods?

Theoretical Framework

Under the hedonic analysis framework pioneered by Rosen (1974), the price of a house is the sum of the implicit prices of the components of the bundle of services provided by that house. Therefore, among others, the following impact housing prices:
After action such (1) redevelopment efforts in the Central District of Oakland, CA, (2) mixed-use projects developed under the federal HOPE VI program (see Castells 2010 for an overview of studies estimating the spill-over benefits of the HOPE VI programs), or (3) projects developed in the TIF districts in Chicago, IL (see Webber et al. 2007 for details) improve the quality of a neighborhood or part of a city, they are likely to increase surrounding home prices.

**Literature Review**

Local governments have usually chosen between two redevelopment strategies in the US. The first strategy calls for distributing redevelopment investments as equitably as possible over the blighted areas. Byrne (2006), Ellen et al. (2001), and Weber et al. (2007) have examined the impact of this strategy on the surrounding community. Because public funding is not infinite, distributed redevelopment often results in small-scale investments sprinkled throughout the redevelopment area. The effectiveness of this strategy has been questioned by some redevelopment agencies, prompting them to adopt an alternate-targeted investment strategy.

Examining the spill-over effect of various types of redevelopment distributed over 79 districts in Chicago, Weber et al. (2007) found that while proximity to commercial and industrial TIF districts reduced prices of the surrounding homes, a mixed-use TIF district increased home prices. Ellen et al. (2001), examining the impacts of a new residential development-focused redevelopment strategy on blighted parcels distributed throughout New York City, found that the redevelopment activities had a positive spill-over effect on residential properties up to 2,000 ft (approximately 0.5 mi) from the site. The study also found the sale-price-increase rate declined over time, and the properties tended to be in low-income neighborhoods.

In contrast with the distributed development strategy studied by Ellen et al. (2001), Galster et al. (2006) examined the impact of a targeted investment strategy used by Richmond, VA. The study examined the city redevelopment program termed Neighborhoods in Bloom (NiB). Launched in 1998, the NiB program focused public and non-profit redevelopment investments “on a small number of blocks in each of seven neighborhoods [out of 49 neighborhoods originally considered for investments].” The explicit goal was to achieve a critical mass that stimulated self-sustaining private market activity (Galster et al. 2006). The study found that the $21.33 million public and non-profit funds invested in the NiB areas from 1998–2004 “increased the aggregate value of single-family homes in NiB target areas by $44.98 million more than if they had increased at the same rate as the rest of Richmond” (Galster et al. 2006).

Similarly, Ding and Knapp (2002) found that targeted investment in neighborhood housing increased values of surrounding homes. Dokmeci et al. (2007) found a similar property value impact of main street revitalization in Istanbul, Turkey.

In summary, the existing literature provides strong support for targeted redevelopment approach—a strategy adopted by Oakland, CA, to revitalize its Central District.

**Redevelopment Strategy Adopted by Oakland, California**

Oakland, CA, along with many other large, aging cities in the US has struggled to find a successful recipe to improve its image and the quality of life for its residents. Oakland has chosen to take extensive advantage of California’s redevelopment laws to further economic growth, improve public safety, and become an attractive destination for visitors and new residents. While Oakland had 10 redevelopment areas delineated in 2006, a review of the City’s Redevelopment Agency budgets shows that the Central District received the lion’s share of investment. This targeted redevelopment strategy implies that the City recognizes the availability of office jobs and retail services provided by a traditional CBD to be key to a viable city, but begs the question whether the focused efforts have actually improved the surrounding neighborhoods’ quality of life.

Of the 10 redevelopment project areas during the period 1990–2006, only six were reported to have ongoing, public-driven physical development activity during this period. However, despite the designation of multiple project areas within the City of Oakland, extensive efforts were made to redevelop the Central District while the other areas received relatively minimal investments. In fact the only area that received comparable public investment on a per-acre basis is the Acorn Redevelopment Project Area, or Acorn, which focused on substantial rehabilitation of the Acorn public housing project and the addition of new affordable housing units to the site. While the Acorn project did receive comparable per-acre investment during the study period, the actual expenditures during this period were minuscule compared to the investments in the Central District. Based on the aforementioned observations, it can be safely concluded that Oakland’s redevelopment strategy is Central-District-focused.

Empirical estimation of the spill-over effects associated with the utilization of a targeted redevelopment strategy on a mixed-use CBD is this study’s primary objective. This study builds on two key findings. First, a targeted redevelopment strategy is very effective within the redevelopment neighborhood (Galster et al. 2006); and
second, positive spill-over effects are associated with distributed, mixed-use redevelopment (Weber et al. 2007).

The remainder of the paper is divided into three sections. The first section reviews the redevelopment history of Oakland’s Central District. The second section describes the empirical study. Specifically, it describes the study hypothesis, model structure, the basis for choosing the hedonic regression method for analysis, data, and study findings. The last section provides the conclusions and discusses policy implications.

**History of Central District Redevelopment**

**Central District through the 1940s**

Mapped and parceled off starting in 1850, Central District was the site of the first planned town settlement in Oakland (Bagwell 1982). An elaborate system of steam trains and electric streetcars ran throughout the region by the 1890s. Up until the 1950s, downtown Oakland was a bustling street car hub (Bagwell 1982; Modern Transit Society 2007).

However, as was happening in inner city areas throughout the US following World War II, Oakland’s minority residents were abandoned in a deteriorating and economically floundering city by their White counterparts who quickly moved out to the newly developing suburbs. While the CBD in downtown Oakland was declining in the 1950s due to the outflow of residents and redistribution of industry, retail, and services to the suburbs, local businesses made decisions that ultimately intensified the problems. Many retail stores moved just north of the existing CBD to escape increasing blight; while this move may have made sense to the individual stores, the effect of physical clustering that creates an agglomeration economy for retail shopping was lost (Abrew 1973). Additionally, the City decided to permit Kaiser Industries, a large Oakland-based company, to build their new headquarters several blocks from the existing CBD. This decision paved the way for long-term decentralization of office development, creating the “bi-nodal office-financial center” that exists in the Central District today (Abrew 1973).

**Early Renewal Efforts in the Central District: 1950s and 1960s**

Federally-supported urban renewal policies were implemented to maintain commercial and business activities in the Central District during this period. Many vacated parcels were used to build new Alameda County agency offices and other county services, creating the Civic Center neighborhood. Significant community resources, such as a museum and a college, were added during this period.

Despite the urban renewal efforts aimed to improve the Central District and render it more accessible through an updated transportation network, private interest in the Central District did not rebound. Because none of these actions resuscitated the deteriorating area, in 1969 the Oakland Redevelopment Agency approved a new urban renewal plan that designated the majority of the Central District as a redevelopment project area.


The City of Oakland approved the Central District Urban Renewal Plan in 1969 and the Plan was most recently updated in 2006.

Apart from the willingness of the Oakland Redevelopment Agency to acquire the necessary land to enable large-parcel and block-level redevelopment, the speculative nature of real estate investments during the 1980s supported large-scale development (Lowy 1991) that took place in the Oakland Central District. By 1989 the cumulative redevelopment in the Central District had created a supportive environment for daytime activity, but the district had lost much of its traditional appeal as a vibrant urban area. Finally, much of the housing stock within the Central District was older and in deteriorating condition. It was unable to support a heterogeneous mix of population. Despite redevelopment efforts, the Central District did not revive to its former self or bring in development projects that would attract people to the district outside of work-hours.

**Redevelopment: 1990–2006**

Central District redevelopment activities have continued through the present, struggling through minimal private development in the 1990s, followed by extensive private development in the first six years of the 21st century.

Redevelopment during this period was heavily influenced by two distinctive sub-periods in the real estate market: 1990–2000, and 2001–2006. The first sub-period was driven by the need to redevelop properties damaged by the 1989 Loma Prieta earthquake (Bascom and Heymen 1993) at the same time that the private development market was reeling from the fall-out of the Savings and Loan and banking scandals of the late 1980s. The tightened lending market significantly decreased the number of new, privately-funded development projects in the Central District through the 1990s and required that public agencies again become significant developers to continue to improve the area. The second sub-period saw a rebounding real estate market that enabled a strategic City policy shift toward adding new housing units to the Central District, a plan termed the “10 K Housing Initiative.” This strategy was announced in 1999 with the goal to bring 10,000 new residents to the Central District in mostly market-rate housing. Private developers greeted the plan with interest as they were finally in a position to take risks in the California housing market again (Gabriel et al. 1999).

**Central District of 2007**

The Oakland Central District of 2007 is still not comparable to the lively picture painted by stories of the area before the 1950s. However, it is substantially more attractive than it was in 1989. The shift in the redevelopment strategy that came with the 10 K Initiative is perhaps one of the key catalysts in improving outsiders’ perception of the area. A notable sub-strategy within the 10 K Initiative was to disperse projects throughout the Central District by targeting vacant or underutilized parcels (Greenwood and Lane 2002).

When compared to the previous period, the redevelopment efforts undertaken during the period 2001–2006 have made observable progress in shifting the Central District from a business district to a more vibrant urban area that provides employment opportunities, a substantial number of renovated historic amenities, as well as several new amenities. These changes have been implemented by providing housing and amenities that support residents of varied income levels while also returning to developing mixed-use residential projects that provide space for ground-floor commercial-retail services.

**Empirical Study**

**Study Hypothesis and Model Structure**

which there was a significant change in the number and types of
development projects completed in the Central District.

Private development activity slowed significantly after 1991, as
projects that had started during the 1980s real estate boom were
completed. With the private real estate market suffering during
the 1990s, the Redevelopment Agency invested in capital projects
in the Central District. As redevelopment activities were reliant
on public-sector-driven projects, the projects were focused on adding
or renovating public-sector offices and affordable housing units,
and public parking garages. When private development began to
rebound by end of the 1990s, Redevelopment Agency investments
in capital projects decreased. The shift to private-market-led prop-
erty development in the first half of the 2000–2010 decade allowed
redevelopment efforts to focus on adding or renovating private-
sector offices and market-rate housing.

To estimate the redevelopment activities’ impact on the sur-
rounding neighborhoods, the analysis of single-family home sales
was initially divided into the previously identified three periods:
official Central District redevelopment area boundary did not
change during the study period, the locations of parcel-level
redevelopment activity did vary and justified that a different boun-
dary be identified for each period for analysis purposes. Fig. 1
shows the District boundaries, the redeveloped parcels within the
District, and the location of the homes included in the study
data set.

After the data set was divided into the three study periods and
distance to redevelopment activity was measured, only 44 sales
transactions were identified within 1.6 km (1 mi) of the redevelop-
and locational distribution was deemed too small to produce un-
biased results. Therefore, the remainder of this study will focus on

The 1992–2000 period is a close approximation of the base line
for estimating the impact of redevelopment efforts on surrounding
residential property values. The redevelopment efforts continued
during this period, albeit with limited success. The 2001–2006
period built upon the redevelopment work of the previous three
decades. Neighboring properties sold during this period are more
likely to benefit from the Central District redevelopment compared
to the properties sold during the earlier, 1992–2000, period. The
study hypothesizes that, during the period 1992–2000, controlling
for other factors, the homes sold in 0–0.8 km (0–0.5 mi), 0.8–1.6 km
(0.5–1 mi) and 1.6–2.4 km (1–1.5 mi) distance bands from the
Central District are likely to be lower priced relative to the
homes sold in the 2.4–3.2 km (1.5–2 mi) band (referent), indicating
that proximity to Central District negatively impacted home prices.
The homes sold in the 2.4–3.2 km (1.5–2 mi) distance band serve as
the control group because this band’s social, economic and housing
characteristics are very similar to those of the Alameda County
(Table 1). Oakland is located in Alameda County.

For the period 2001–2006, we expect to see one or a combina-
tion of the following three scenarios. In the first scenario, the prox-
imity to the Central District would still have a net negative impact
on housing price; however, the magnitude of the effect would be
smaller relative to the 1992–2000 period. This scenario would
indicate that the redevelopment efforts have had a positive impact
on the surrounding residential neighborhoods during the period
2001–2006 relative to the 1992–2000 period, although the overall
impact of the Central District is still negative. In the second sce-
nario, the proximity to the Central District would have no impact
on housing prices during the 2001–2006 period, indicating that
redevelopment efforts have had a considerable positive impact
on housing prices, to the extent that the previous negative impacts

Choosing a Property Value Analysis Method

Two popular research methods are often used to perform property
value analyses: hedonic regression and repeat-sales regression. The
hedonic regression method is criticized as difficult to correctly im-
plement and as being subject to the researcher’s “ignorance of both
the functional form of the relation and of the appropriate set of
house characteristics to include in the analysis . . . result[ing] in
inconsistent estimates of the implicit prices of the attributes”
(Meese and Wallace 1997).

In contrast, “the repeat-sales methodology . . . control[s] for
hedonic characteristics by examining only those properties that
have sold more than once during the sample [period], without any
change in house characteristics between sales” (Meese and Wallace
1997). Despite the relative simplicity of correctly implementing
the repeat-sales technique, a study on the reliability of the repeat-sales
results by Meese and Wallace (1997) found that repeat-sales results
“suffer from sample selection bias and non-constancy of implicit
housing characteristic prices, and they are quite sensitive to small
sample problems” (Meese and Wallace 1997).

The literature review conducted for this study examined 16 re-
search studies that performed property value analyses to measure
the influence of a particular policy or externality on housing prices.
Of these, 11 studies used the hedonic regression method, three used
the repeat-sales regression method, one used an adjusted inter-
rupted time series analysis method, and one employed a modified
Muth model.

After weighing the pros and cons of the hedonic and repeat-sales
regression methods, this study decided to use the hedonic method.
The key reasons for this decision are: (1) The study area is rela-
tively small, thus resulting in a small data set; (2) The resulting
data set is expected to have a high likelihood of producing biased
results if repeat-sales regression method is used. As the neighbor-
hoods around the Central District are older and many suffer from
varying levels of blight, renovations are common when property
changes ownership. The data limitations do not allow capturing
these changes. Additionally, the speculative nature of the urban real
estate market during the study period may have introduced further
bias into the results, as older single-family properties near the
Central District may be located on parcels that are zoned for higher
density development. Therefore, the change in sale prices may not
be representative of neighborhood quality changes; (3) Extensive
housing characteristics data are available.

Hedonic Regression Model Specification

The general form of the hedonic model is:

$$ P_i = f(S_i, L_i, N_i, T, J) $$

where $P_i$ = sale price of the $i$th house in the sample; $S_i$ = structural
attributes of the $i$th house; $L_i$ = locational attributes of the $i$th
house; $N_i$ = neighborhood, jurisdictional, or regional attributes
impacting the $i$th house; $T$ = vector of time dummies that include
the year and season of the sale; and $J$ = vector of jurisdiction dummies.
The log of sale price of the house is the dependent variable.
Various transformations of the dependent and the independent

Fig. 1. Area in and around the Central District
Table 1. Selected Social-Economic and Housing Characteristics for Alameda County and for 2.4–3.2 km (1.5–2 Mi) Distance Band

<table>
<thead>
<tr>
<th>Variable</th>
<th>Alameda County</th>
<th>2.4–3.2 km (1.5–2 mi) distance band&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median income ($ 2006 constant)</td>
<td>$55,946</td>
<td>$63,264</td>
</tr>
<tr>
<td>% Black population</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>% Owner-occupied housing</td>
<td>55</td>
<td>51</td>
</tr>
<tr>
<td>Median housing price ($ 2006)</td>
<td>$348,565</td>
<td>$289,598</td>
</tr>
</tbody>
</table>

<sup>a</sup>As per U.S. Census, 2000.

Summary of Data

The relevant property data was provided by a private vendor—CD-DATA. The CD-DATA dataset includes all available Alameda County property tax assessor data at the parcel-level that had been recorded through mid-year 2007. The data set includes the property sale price. It also includes a geographic information system (GIS) shapefile at the parcel-level that enabled spatial analysis on the properties of interest. ArcGIS software was used to create a data set of the single-family homes that were located within 3.2 km (2 mi) of the Central District, and had sold during the study period. GIS was then used to append the median income, owner occupancy rates, and racial characteristics at the 2000 census block-group level to the identified properties. In absence of more fine-grained annual data, and because the study period spanned both sides of year 2000, the year 2000 census data was used for consistency sake. The census data tables and the corresponding GIS files were obtained from the Census Bureau website.

Many properties in the data set had missing or questionably-accurate characteristics. Therefore, data was filtered to identify a suitable data set for further analysis. First, properties with “0” recorded in the bedroom, bathroom, building size, lot size, or sale price were removed. Additionally, the properties with more than six bedrooms or more than five bathrooms, as well as with building sizes or lot sizes in the top and bottom one-percentile were removed from the dataset to reduce the effect of outliers and data entry errors in the property characteristics fields. Finally, the sale prices of the homes in the data set were adjusted to 2006-constant-dollars using the Non-Housing Consumer Price Index for the San Francisco-Oakland-San Jose, CA region obtained from the U.S. Department of Labor, Bureau of Labor Statistics.

The sale price of the sample varied widely even after the previously-listed filters were applied. For example, after the data set was sorted by half-mile proximity areas and separated into the two study periods, the range of sale prices still indicated that the lower prices were unlikely to be representative of market-rate sales during the respective periods. In addition, on the higher side, sale prices were well over $1 million (in all but one instance), while the means were in the range of $200,000 to $600,000, depending on period and location.

Ultimately, to ensure that the study was reflective of average, market-rate transactions during the study period, the final sample-set excluded sales that were more than one SD from the mean sale price in each model. In all cases, the mean sale price stayed relatively consistent within each model regardless of which filtering process was used, indicating that the sample-set had not been skewed toward the upper-or lower-end of the market by excluding samples with a sale price more than one SD from the mean.

If the one SD filter is not applied, several houses in the data set have sale prices as low as $6,000, even when the assessed values for these houses are much higher. We suspect that these sale prices are either a result of non-arms length sales transactions or other extraneous factors. Most of these properties on the higher-end of the sale price spectrum ($1 million and above) are in the neighboring high-income desirable city of Piedmont (more than 2.4 km away).

Inclusion of properties on the very low and the very high end of the price spectrum would have skewed the model results. Hence the one standard deviation filter was applied.

Further, homes built after 1997 were excluded from the 1992–2000 data set, and homes built after 2000 were excluded from the 2001–2006 period data set to ensure that the desire to live in the general area was measured over the desire for a newly built home. The majority of these homes were located in Alameda. Tables 2 and 3 provide descriptive statistics for the continuous variables in the data sets for Models 1 and 2, respectively.

Finally, data were collected for a variety of urban amenities and disamenities in and around the study area, including neighborhood commercial and office corridors, bus and rail transit, busy streets and freeways, as well as freight and elevated rail tracks and industrial operations. The locations of the commercial, office, and industrial parcels were extracted from the original CD-DATA data set using ArcGIS software. GIS data identifying the locations of city boundaries, freeways, rail right-of-way, major streets, commuter rail stations, and bus stops were obtained from the Metropolitan Transportation Commission. The locations of neighborhood-level disamenities in and around the study area, including neighborhood commercial and office corridors, bus and rail transit, busy streets and freeways, as well as freight and elevated rail tracks and industrial operations.
the type of spatial dependence exhibited by the models (1988), Lagrange Multiplier (LM) tests were conducted to examine
suffers from spatial autocorrelation. Next, following Anselin
to test for spatial autocorrelation. The test indicates that Model 1
the presence of error dependence (Bivand and Bernat n.d.). The
variable, and RLMlag for a missing lagged dependent variable in
dependence in the possible presence of a missing lagged dependent
value (roads and freeways) is negatively correlated with property
values. Similarly, close proximity to major transportation infrastruc-
ture (for example, see Mathur 2008; Ding and Knapp 2002).
impact of adjoining land uses, the models find that proximity to retail uses depresses property
values—indicative of the noise—and traffic-related disamenity associated with commercial land use, a finding consistent with liter-
are several of these variables had to be dropped from
the final models due to multicollinearity problems.

Regression Results

Using the appropriate subset of dependent variables, ordinary least squares (OLS) linear fixed effects regression was used for the
following two models:

Model 1—Single-family homes sold during 1992–2000

The Chow F-test conducted to test the possibility of estimating a
poled regression was significant at \( p = 0.001 \) level. Hence, the
data was not pooled. Next, the basic OLS assumptions of normality, homoscedasticity and autocorrelation were tested. Both the models
display heteroscedasticity and first-order autocorrelation. Hence,
White’s estimator was used to estimate heteroscedasticity-
consistent (HC) standard errors. Additionally, the Newey-West
heteroscedasticity and autocorrelation consistent (HAC) estimator
was used to control for both heteroscedasticity and autocorrelation.
Results for both estimates are reported in Table 4.

Finally, spatial autocorrelation was suspected due to the data’s
spatial-temporal nature. First, Global Moran’s I test was conducted
to test for spatial autocorrelation. The test indicates that Model 1
suffers from spatial autocorrelation. Next, following Anselin
(1988), Lagrange Multiplier (LM) tests were conducted to examine
the type of spatial dependence exhibited by the models—spatial lag
or spatial error, or both. The LM tests are: the simple LM test for
error dependence (LMerr), the simple LM test for a missing spa-
tially lagged dependent variable (LMlag), RLMerr test for error
dependence in the possible presence of a missing lagged dependent
variable, and RLMlag for a missing lagged dependent variable in
the presence of error dependence (Bivand and Bernat n.d.). The
data were weighted to take into account both the physical and
the temporal proximity of the sale transactions prior to running
the LM tests. Four nearest sale transactions were included in the
spatial weights calculation. Further, the transactions were weighted
by the sale year. The transactions in the same year were given a
weight of one; two years apart, 0.5; three years apart, 0.33, and
so on. The LM tests indicate that both models suffer from spatial lag autocorrelation.

Table 4 provides regression results, along with the Global
Moran’s I and LM test results. To economize on table length,
the coefficients and standard errors for the dummy variables
representing the season of sale (winter, fall, spring, with summer
as referent), the year of sale and jurisdictions are not included.

Model Findings

Model 1 includes 2,594 observations with an adjusted-\( R^2 \) of 0.718,
and Model 2 includes 2,577 observations with an adjusted-\( R^2 \) of
0.653. Natural log of sale price (adjusted for the year 2006) is
the dependent variable. Dummy variables capturing the year
and season of sale are used to control for the real estate cycles. Further,
jurisdiction dummies control for the jurisdiction-specific effects not
controlled by the other independent variables. Because both models
suffer from spatial lag autocorrelation, further discussion will focus
on the spatial lag model results.

All variables statistically significant at \( p = 0.10 \) featured the
expected signs. For example, models show that the lot size and
the building area increase housing prices. Further, homes sold in
the cities of Alameda, Piedmont and Emeryville are higher priced
relative to homes sold in Oakland—indicative of the three cities’
relatively attractive public infrastructure service-expenditure package.

The negative coefficients for the year dummies indicate that the
housing market peaked in the year 2006—accurately capturing the
broader housing market forces at play during the study period.
Estimating the impact of demographic characteristics, the models find
that an increase in the concentration of racial (Black and Asian) and
ethnic (Hispanic) minorities is negatively correlated with property
values. Similarly, close proximity to major transportation infrastruc-
tructure (roads and freeways) is negatively correlated with property
values—perhaps indicating that once the households are ensured
accessibility benefits provided by the transportation infrastructure,
any further proximity to these infrastructure perhaps leads to the
noise-, traffic, and pollution-associated disamenities outweighing
the accessibility benefit. Finally, estimating the impact of adjoining
land uses, the models find that proximity to retail uses depresses property
values—indicative of the noise—and traffic-related disamenity
associated with commercial land use, a finding consistent with liter-
are (for example, see Mathur 2008; Ding and Knapp 2002).

Impact of Proximity to Central District on Property Values

Both models indicate that the Central District decreases homes
prices closer to the District. However, the magnitude of the price
decrease reduced during the 2001–2006 period. For example, dur-
ing the period 1992–2000, housing prices within the 0–0.8 km
(0–0.5 mi) distance band from the Central District were 12.1% lower relative to prices in the 2.4–3.2 km (1.5–2 mi) distance band.
However, during the period 2001–2006 the magnitude reduced

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sale price of the house in 2006 constant dollars</td>
<td>2,577</td>
<td>$301,111</td>
<td>$866,992</td>
<td>$547,372</td>
<td>$1462,820</td>
</tr>
<tr>
<td>Number of bathrooms</td>
<td>2,577</td>
<td>1</td>
<td>5</td>
<td>1.30</td>
<td>0.61</td>
</tr>
<tr>
<td>Lot area ( (m^2) )</td>
<td>2,577</td>
<td>156</td>
<td>1,132</td>
<td>392</td>
<td>133</td>
</tr>
<tr>
<td>Building area ( (m^2) )</td>
<td>2,577</td>
<td>60</td>
<td>356</td>
<td>132</td>
<td>41</td>
</tr>
<tr>
<td>Distance to the nearest arterial street (m)</td>
<td>2,577</td>
<td>15</td>
<td>1,993</td>
<td>438</td>
<td>322</td>
</tr>
<tr>
<td>Distance to the nearest collector street (m)</td>
<td>2,577</td>
<td>13</td>
<td>776</td>
<td>183</td>
<td>130</td>
</tr>
<tr>
<td>Distance to the nearest commercial use (m)</td>
<td>2,577</td>
<td>4</td>
<td>1,173</td>
<td>172</td>
<td>178</td>
</tr>
<tr>
<td>% Black population in the census block-group</td>
<td>2,577</td>
<td>89</td>
<td>37</td>
<td>27</td>
<td>25</td>
</tr>
<tr>
<td>% Asian population in the census block-group</td>
<td>2,577</td>
<td>0</td>
<td>71</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>% Hispanic population in the census block-group</td>
<td>2,577</td>
<td>0</td>
<td>73</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Distance to the nearest rail line (m)</td>
<td>2,577</td>
<td>137</td>
<td>4,878</td>
<td>2,181</td>
<td>927</td>
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</tbody>
</table>
### Table 4. Regression Results

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Dummy for house sold in the 0 km–0.8 km (0.5 mi)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radius from the Central District</td>
<td>−0.121</td>
<td>−0.073</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.030)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.032)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.038)</td>
<td>(0.018)</td>
</tr>
<tr>
<td>Dummy for house sold in the 0.8 km (0.5 mi)–1.6 km (1 mi)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radius from the Central District</td>
<td>−0.030</td>
<td>−0.008</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.015)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.015)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.020)</td>
<td>(0.012)</td>
</tr>
<tr>
<td>Dummy for house sold in the 1.6 km (1 mi)–2.4 km (1.5 mi)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radius from the Central District</td>
<td>−0.009</td>
<td>0.002</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.009)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.009)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.012)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>Number of bathrooms</td>
<td>0.029</td>
<td>0.005</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.007)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.007)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.008)</td>
<td>(0.008)</td>
</tr>
<tr>
<td>Natural log of lot area</td>
<td>0.067</td>
<td>0.080</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.014)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.015)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.019)</td>
<td>(0.012)</td>
</tr>
<tr>
<td>Natural log of building area</td>
<td>0.391</td>
<td>0.320</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.018)</td>
<td>(0.013)</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.018)</td>
<td>(0.013)</td>
</tr>
<tr>
<td>% Black population in the census block-group</td>
<td>−0.627</td>
<td>−0.474</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.029)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.030)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.047)</td>
<td>(0.025)</td>
</tr>
<tr>
<td>% Asian population in the census block-group</td>
<td>−0.600</td>
<td>−0.385</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.035)</td>
<td>(0.027)</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.035)</td>
<td>(0.027)</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.052)</td>
<td>(0.033)</td>
</tr>
<tr>
<td>% Hispanic population in the census block-group</td>
<td>−0.714</td>
<td>−0.423</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.073)</td>
<td>(0.048)</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.074)</td>
<td>(0.048)</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.095)</td>
<td>(0.049)</td>
</tr>
<tr>
<td>Natural log of distance to the nearest Collector Street</td>
<td>0.012</td>
<td>0.021</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.005)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.005)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.006)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>Natural log of distance to the nearest Arterial Street</td>
<td>−0.013</td>
<td>NA</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.006)</td>
<td>NA</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.006)</td>
<td>NA</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.008)</td>
<td>NA</td>
</tr>
<tr>
<td>Natural log of distance to I-580</td>
<td>0.056</td>
<td>0.015</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.008)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.009)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.012)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Natural log of distance to nearest Rail line</td>
<td>0.140</td>
<td>0.084</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.016)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.017)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.023)</td>
<td>(0.012)</td>
</tr>
<tr>
<td>Natural log of distance to Lake Shore Avenue</td>
<td>−0.110</td>
<td>NA</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.009)</td>
<td>NA</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.009)</td>
<td>NA</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.012)</td>
<td>NA</td>
</tr>
<tr>
<td>Natural log of distance to nearest commercial use</td>
<td>0.039</td>
<td>0.022</td>
</tr>
<tr>
<td>OLS</td>
<td>(0.005)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>White HC</td>
<td>(0.005)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>Newey-West HAC</td>
<td>(0.006)</td>
<td>(0.004)</td>
</tr>
</tbody>
</table>

Dependent variable: Natural log of sale price of the house in constant 2006 dollars

| N     | 2,594 | 2,594 | 2,594 | 2,577 | 2,577 | 2,577 |
almost 40% to 7.3%. Similarly, for the period 1992–2000, housing prices in the 0.8–1.6 km (0.5–1 mi) distance band were 3.1% lower relative to prices in the 2.4–3.2 km (1.5–2 mi) distance band. However, during the period 2001–2006 the negative impact of the Central District dissipated after 0.8 km (0.5 mi), as shown in the statistically insignificant coefficient values for the 0.8–1.6 km (0.5–1 mi) and the 1.6–2.4 km (1–1.5 mi) distance dummies for Model 2. The statistical insignificance of these two distance dummies could be attributable to a combination of two factors. The redevelopment efforts might have reduced the intensity of the negative impact of the Central District, which, coupled with an overall strengthening of the San Francisco Bay Area’s housing market during the first half of the decade, rendered hitherto less desirable residential neighborhoods experience greater housing demand.

Conclusions

The model findings suggest that while the overall impact of proximity to the Central District on housing prices in the surrounding neighborhoods is still negative, evidence suggests that the redevelopment efforts are making a positive impact.

As discussed earlier, the Oakland Central District experienced extensive redevelopment during the 1990–2006 period. Projects during the 1990s were often driven by public-sector investment. Many projects involved construction or renovation of public agency offices and affordable housing. As the private development market improved at the turn of the century there was a shift in redevelopment strategy toward subsidizing residential-commercial mixed-use developments in the District.

As part of a larger redevelopment strategy, the Oakland Redevelopment Agency focused public resources on redevelopment of the Central District at the expense of a more distributed redevelopment strategy. As indicated previously, Galster et al. (2006) find that a targeted investment strategy is very successful for properties within the redevelopment area. However, as the targeted redevelopment is likely to serve a smaller area relative to the distributed redevelopment, it is likely to benefit a smaller population too. This limitation of the targeted strategy can be mitigated to some extent if this strategy can be shown to benefit surrounding neighborhoods.

This study finds that in the case of Oakland, CA, the Central District targeted redevelopment investments are spilling over to the surrounding neighborhoods. From a policy perspective, this finding, coupled with those from the existing literature that show that a targeted redevelopment strategy is very effective within the redevelopment neighborhood (Galster et al. 2006), and that positive spill-over effects are associated with distributed, mixed-use redevelopment (Weber et al. 2007), provide support for the effectiveness of targeted mixed-use redevelopment in rejuvenating urban areas. The study findings should be useful to the redevelopment agencies and local-, regional-, and state-level policy makers in refining redevelopment and economic development strategies.

References


