

**EFFECTS OF PUBLIC SECTOR INTERVENTIONS
ON
ADJACENT LAND VALUES:
WATERFRONT PARK IN LOUISVILLE, KENTUCKY**

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Abstract

Using available property valuation authority information, this case study of the economic effects of Waterfront Park's development on adjacent land in Louisville, Kentucky shows that a significant improvement can be shown on adjacent land values due to public sector interventions. It is also found that these effects are not limited to immediately adjacent properties but extend to off-site properties as well although the change in improvement diminishes with distance to the park amenity.

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Table of Contents

Introduction	6
The Background: Riverfront Redevelopment in Louisville, Kentucky	10
Downtown and Riverfront Revitalization Efforts	12
Map 1 - Waterfront Park Value Assessment Study Area - Overview	15
The Study Area and Data Employed	17
Map 2 - Waterfront Park Value Assessment Study Area	18
Table 1 – Reliance on Local Property & Individual Income Taxes for Revenue, 2004-5	21
Table 2 – Assessment Distribution for 1988, 1998, and 2007 (in 2007 dollars)	22
Table 3 – Public and Private Investment WDC Reports Summary	25
Analysis and Findings	26
Table 4 – Property Value Assessment Change, Urban County & Study Area, 1997-2007	26
Table 5 – Population and Housing Data for the Study Area (Census 2000)	28
Table 6 – Selected Exploratory Regression Results	29
Table 7 – Quadratic Regression of Change in Investment Assessment versus Distance	30
Conclusion	31
References	32
Appendix A: GIS Analysis of the Property Valuation Assessment Data	34

Introduction

This paper is an investigation of the effects of public sector interventions on adjacent real-estate property values in Louisville, Kentucky. The area of Louisville being investigated is the area adjacent to the southern edge of Waterfront Park. In *Waterfront Revitalization in Postindustrial Port Cities of North America* (City & Society, 5(2) 120-136) R. Timothy Sieber writes that “Major themes in revitalized waterfronts—environmentalism, history and heritage, and tourism and festival—serve to connect newcomer elite groups to a changing urban environment, by reconceptualizing the relationship of the city toward nature, the past, and work.” (p 120). In the same article he writes:

While in North America this pattern is most visible in showpiece seaport cities, such as Boston, Baltimore, Toronto, Seattle, Vancouver, and San Francisco, these development strategies are evident in cities of all sizes and at all levels in the urban hierarchy, including those located on inland waterways as well as on the sea. In the United States alone, fully "Seventy percent of the 415 cities . . . with a population over 50,000 . . . are located on the edge of a river, lake, bay, or ocean" (Heritage Conservation and Recreation Service 1980:1), and, as Hoyle notes, "Virtually every North American city possessed of an urban waterfront. . . has taken some steps towards the rediscovery and redevelopment of the [port-city or waterfront] interface zone" (Hoyle 1988:15).

Breen and Rigby echo Sieber’s rationale for waterfront development and present descriptions and appraisals of 75 award winning waterfront developments (14 of which are international) but present no empirical analysis of subsequent economic impact. As the title of their article suggests, Clark, et al., argue that “amenities drive urban growth” and while not specifically focused on waterfront developments, urban parks constitute one such amenity. Gordon’s case

studies of New York's Battery Park, the London Docklands, Toronto's Harbourfront and the Charlestown Navy Yard in Boston present the financial, political and urban planning and design issues that confront cities who undertake large scale, long time-horizon waterfront development projects. These policy oriented writings help us understand the difficulty of successful waterfront development and identify some successful projects but do not undertake empirical analysis of the economic benefit of any specific waterfront development or park.

There have been several residential housing price hedonic models of open space/parkland but they generally apply to regions or areas that include several open spaces or parks and are not specifically targeted to waterfront development (Geoghegan, Wainger and Bockstael; Irwin; Irwin and Bockstael; Li and Brown; Song and Knaap; Tyrvaainen; Tyrvaainen and Miettinen). Each study is focused on different aspects of land value but, in general, the nearness to a park, or non-developable open space, positively affects housing prices. Tajima's study of Boston's Big Dig is focused on a specific project but studies condominium pricing in nine zip codes to accomplish a focus on the associated Boston housing market.

Our study of the economic effects of Louisville's Waterfront Park is smaller in its geographic scale—73 census blocks. For the period of our study there was little residential land use in the study area. The small size of the area and lack of residential properties make a residential housing price hedonic model impractical. The Louisville Waterfront Development Corporation has published studies of the economic impact of the park but these studies only include the Waterfront Development District – a geographic area smaller than our study area – based on self-reported data from entities in the District. Our intent was to study an area somewhat larger than

the Waterfront District, using available property valuation data, to determine if assessed values were increasing in the District as well as areas close to, but not adjacent to, the park, and whether distance to the park affected those values. We also looked at employment in the study area because it was included in the Corporation's studies as an indicator of economic "success" and because Louisville's reliance on occupational taxes rather than property taxes may drive development more toward employers rather than residents in which case the park may have diminished "amenity" value. The rationale for the selection of this relatively small study area was based on the natural boundaries that separate developable land near the park from the rest of the city. The northern boundary of the study area is the park itself. The eastern edge of the park extends to Clay Street and Clay Street was used as the eastern boundary of the study area. The western boundary of the study area is 2nd Street which forms the eastern boundary of the Central Business District, is the beginning of the Historic Main Street Preservation District and near the western edge of the park. The southern boundary is formed by Interstate 65 and Muhammad Ali Boulevard which forms the northern edge of the city's hospital complex. New hospital area development was not expected to reach north of this boundary.

Louisville is typical of industrial and manufacturing focused river-cities common along the major rivers of the United States. Pittsburgh, PA, Cincinnati, OH, and St. Louis, MO, among others were settled along the banks of the Ohio River as was Louisville, Kentucky. All grew with western expansion and development and the increased transportation along the river.

Louisville's site at the Falls of the Ohio helped it grow as a trading town as well as a place for manufacturing. Iron used for ballast on the barges traveling the Ohio was off-loaded at the falls giving Louisville a large inventory of iron which was subsequently used to build mercantile

buildings along the primary street adjacent to the river, appropriately named Main Street. Other industrial materials were stored in warehouses along the river and the railroads completed the transportation basis of Louisville's downtown area by contributing to the amount of goods and materials stored in the warehouses and subsequently shipped to other locales.

As the economies of cities changed and industrial and manufacturing concerns closed their businesses or relocated to more economically beneficial locations, the downtown riverfront began to emerge as a no-man's land of abandoned warehouses, industrial buildings in much disrepair and parking lots for the businesses still located along Main Street. Eventually cities began to look to their waterfronts as impetus to the regeneration of life in the largely abandoned downtown areas. Louisville was no exception.

Waterfront Park was the manner in which Louisville chose to develop its waterfront properties in the attempt to salvage its downtown. This paper will examine the effects of the development of Waterfront Park on the economics of downtown Louisville as expressed by the increase in real-estate property values as well as the increase in employment generated by the establishment of more business entities in the new, rehabilitated and renovated riverfront area buildings.

Section I is an introduction to Louisville and Section II is a brief description of its riverfront history. Research methods and rationale are presented in Section III. Section IV presents findings on investment by private and public entities, employment changes, property value impacts, and other evidence of the impacts of public infrastructure investments on land uses and

private property values. We conclude in Section V with some caveats and implications of our findings for other cities.

The Background: Riverfront Redevelopment in Louisville, Kentucky

Louisville, Kentucky, like many waterfront cities larger and smaller, turned its back on its waterfront after World War II. What residential uses existed were generally tenements and low-income, mostly substandard housing. The downtown areas which developed along the waterfronts suffered increasingly rapid declines throughout the next four decades. These downtowns became the locations of pawn shops, pornography parlors, parking lots, vacant buildings (commercial, industrial and residential), tenements and substandard single-family housing.

‘Main Street’ consisted of many intact late-nineteenth century commercial buildings that were underutilized and in increasing states of deterioration. New modern high rise buildings were built to house financial institutions and occasionally other concerns such as law firms, accounting firms and other businesses, usually the large industrial companies whose corporations were based in the cities. Even so, the commercial and retail content of the downtown slowly deteriorated. A number of cities in the sixties and early seventies constructed open air shopping malls consisting of a closed thoroughfare, landscaped and accessible by pedestrians only in the hope of retaining a viable retail presence in their downtowns. Louisville employed this strategy

as well but in Louisville as elsewhere even the anchor department stores and specialty stores eventually closed and the deterioration continued. Downtown became a large vacant area after rush hour and at night, a no-man's land. This led to a perception that the area was host to criminal elements, a damaging perception that was often correct.

Historically, the area along the river was primarily industrial in nature with uses such as lumber yards, coal and coke yards, and cast iron pipe manufacturing. The area was also the location of a convergence of several railroad lines. By the turn of the century, Main and Market streets were lined with small manufacturing sites, commercial businesses and scattered housing (1905 Sandborn Map). Development was not dense from Main Street north to the Ohio River due to the area being prone to periodic flooding. After a major flood in 1937, flood walls were built along the river to protect the city from future floods but this had the deleterious residual effect of making the areas between downtown and the river even more inaccessible and blighted. By the time the Waterfront Development Corporation was incorporated in 1986, the land along the Ohio River shoreline was home to such businesses as scrap metal yards, sand and gravel companies and petroleum storage tanks. Railroad lines had virtually been abandoned. The I-64 freeway hovered loudly overhead along the shoreline blocking access and light and what buildings remained were largely abandoned.

The land use was largely non-residential and generally included larger parcels, usually making the parcels economically and politically easier to acquire for the construction of these large public construction projects. Many cities, Louisville included, welcomed the construction of freeways through their downtowns. Much of this attitude was due to the thinking that freeways

meant progress and, after many years of rationing and sacrifice, the populations were interested in automobiles, a major sign of progress. Many downtown freeways followed the shores of the waterways blocking the waterfronts from the rest of the downtown areas and substantially hiding the waterways as well as the unattractive junk lots, sand and gravel companies and other industrial and storage buildings from view. As a result, the waterfronts increasingly became the locales of abandoned warehouses, refuse storage facilities, parking facilities for downtown high-rises and the “no-man’s lands” underneath the freeways. The waterfronts were not considered prime property and also carried with them a feeling of depravity, coarse sub-cultures and danger. Very few people would consider the waterfront docks after dark and then only under considerable cloud of the danger and seediness that was, indeed, part of the atmosphere. As a result, property values languished and even those who might have desired to make money from increasing real estate values could not do so because the entire environment was non-conducive to increasing property value.

Downtown and Riverfront Revitalization Efforts

There were two attempts to create interest in Louisville’s downtown area in the 70’s. After completion of the portion of the I-64 freeway through the downtown area along the waterfront, an urban ‘park’, called “the Belvedere” was constructed (dedicated in 1973) on the roof of a multi-story parking facility and a portion of the park extends over the I-64 freeway to the river’s edge. In the same general timeframe a portion of West Main Street was named as an Historic Neighborhood. Numerous, primarily city-sponsored, events were conducted to draw visitors

downtown. While these events did draw varying numbers of visitors to the downtown area for these special events, businesses did not rapidly follow. In the West Main Historic District, even the intervention of a science museum housed in one of the fine old cast-iron buildings, did not immediately create a boon for downtown development. Still, the waterfront had emerged as something of a draw with the “Belvedere” development showing people how attractive the river could be without the barriers of freeway, deserted and underutilized buildings, storage facilities and parking lots, and industrial buildings to block the views.

In 1985, the Humana Corporation completed a signature high-rise and that, along with the publicly-funded Kentucky Center for the Arts began to create an arts district in the West Main Street neighborhood. However, downtown east of these developments remained largely as it had, still deteriorating, underutilized and underappreciated.

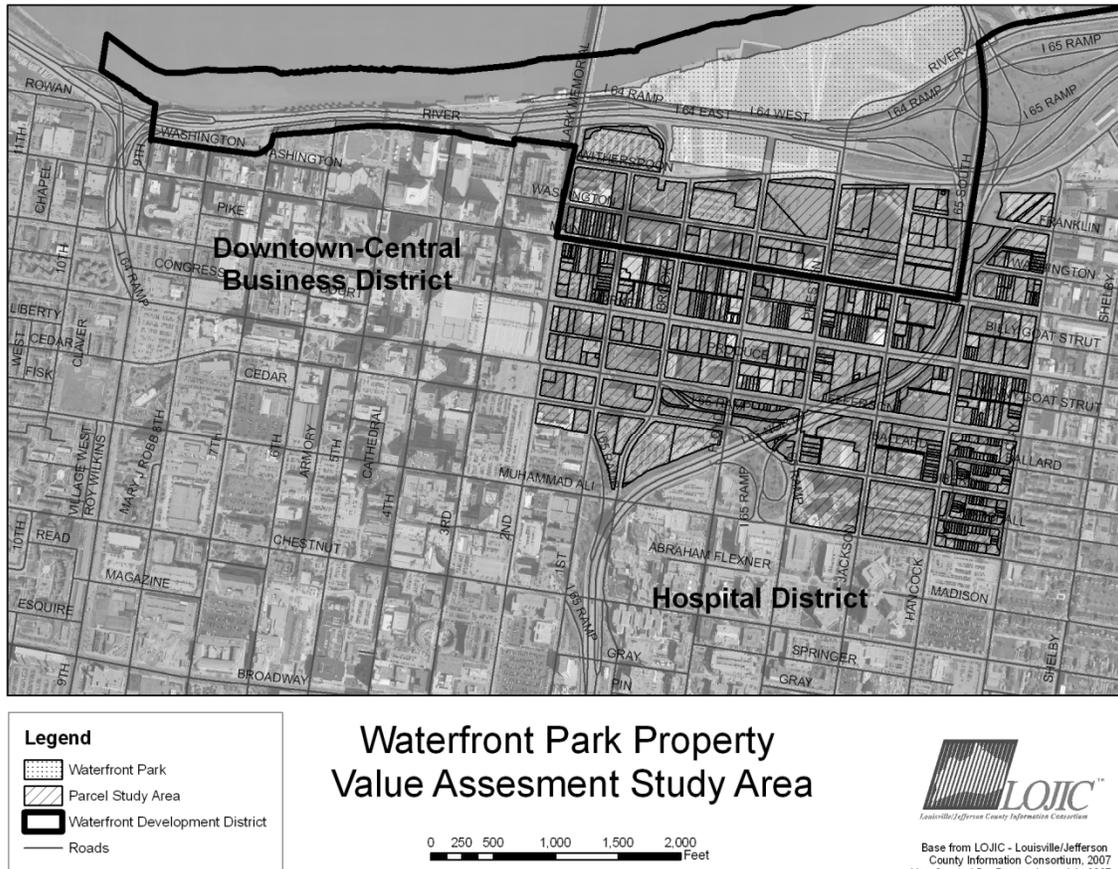
In other cities, reclamation of waterfront acreage began to be addressed by elected officials and financial investors, sometimes by conscious proactive efforts such as the elimination of the Harbor Drive Freeway in Portland, Oregon, and sometimes in response to natural occurrences such as the Loma Prieta earthquake in San Francisco which eventually led to a major redevelopment of San Francisco’s ground level Embarcadero Freeway (Cervero, Fader). In both cases, waterfront reclamation and redevelopment was a major impetus in the plans for change. Waterfronts were slowly being seen as assets to their communities rather than the undesirable wastelands they had become.

In general, waterfront development became desirable for two major reasons. One was the desire to ‘clean up’ the downtown areas along the waterfronts to elevate the image of the urban areas both for tourism and to draw people back into the downtown area for employment and habitation. Creating a place where the population did not disappear after five o’clock on weekdays and all weekends was of particular interest for safety and security reasons as well as to increase customers for anticipated retail operations. Another was to increase the economic value of real estate for the owners and the resulting increase in tax revenues for the municipality. Recruiting new businesses with a subsequent increase in employment figures was seen to be a positive result of redevelopment.

In 1986, three government bodies (the city of Louisville, Jefferson County and the Commonwealth of Kentucky) combined efforts to address the decline and urban blight of an area that was east of the downtown and that ran parallel to the banks of the Ohio River. For years prior to 1986, business and political leaders in Louisville had expressed desires to do something about the unattractive and stagnant industrial areas and brownfields along the riverfront. Political pressures and economic interests changed regularly resulting in changing ideas about how to accomplish this task. As a result, the Waterfront Development Corporation (WDC) was founded to play a major role in the revitalization of this urban stretch of Louisville’s waterfront. The corporation’s mission was to provide oversight of the design and construction of Waterfront Park, to operate the park’s facilities, and to provide maintenance of the park and to coordinate events to be held within the park boundaries.

Phase I of Waterfront Park included approximately 55 acres of land adjacent to the Ohio River on the eastern edge of Louisville's downtown area. (See Map 1) The primary connector to the downtown grid is the Great Lawn, a large expanse of open grassy space which helps to break the barrier created by interstate I-64 and provides a natural and beautiful transition from architecture to waterway. It was dedicated on July 4, 1999. The Park has hosted hundreds of events and,

Map 1



according to WDC information, plays host to over 1.5 million visitors each year (see <http://louisvillewaterfront.com/about%20us.htm>). Phase I included gardens, a festival plaza, water features, a linear park with paths for walking and jogging, free parking areas and a harbor with transient boat docks.

Phase II opened in 2004 and added approximately 17 acres to the park which includes restaurant spaces, an esplanade along the river's edge, an amphitheatre, temporary docking facilities for boaters, and facilities for the University of Louisville and local rowing groups. These facilities were in addition to the placement of sculpture in various locations, Children's Play areas and other, unstructured, areas for ad-hoc recreation, meditation, relaxation and art appreciation.

In 2005, Phase III fundraising began to add an additional 13 acres to include more lawn areas, picnic areas, walking/jogging paths, groves of trees and a pedestrian walkway/bikeway across the river utilizing a long-abandoned railroad bridge across the river to Jeffersonville, Indiana. Anticipation of future economic growth along Waterfront Park, an aspect of the general excitement created initially by Phase I of the park, has continued to increase interest in the expansion of the park in the eyes of public officials, developers and other financial interests and the public at large which has spurred the WDC to begin Phase III fund-raising efforts.

The redevelopment of the Ohio River waterfront areas in downtown Louisville, Kentucky was designed to be part of contiguous park system extending far beyond the river's boundaries with downtown Louisville. As such, the expected economic benefits of the redevelopment itself and

the land upon which the project was located (in other words the park areas created by the redevelopment) were not expected to generate economic benefit from the redeveloped riverfront sites, per se. However, the waterfront development was not conceived merely to facilitate activities along the river frontage, according to the WDC. A major focus of the renovation was to spur redevelopment and renovation of much of downtown Louisville using the newly created park system as a draw to economic re-development.

The Study Area and Data Employed

The area under examination consists of the area often referred to as the ‘Waterfront District’ and other properties beyond that are in proximity to the portion of Waterfront Park in Louisville, Kentucky that is situated along the Ohio River shoreline between two bridges – the Clark Memorial (Second Street) and the Kennedy (I-65) and one block to the east of the Kennedy Bridge approaching the Butchertown neighborhood as well as three blocks to the south. The area between the bridges and north of Main Street is the area often referred to as the ‘Waterfront District’. The study area is approximately seven blocks, east to west, and six blocks, north to south, and is east of the main downtown business district and the Historic West Main Street District. The area under consideration is north of the Hospital Zone. Some of the area is occupied by interstate highways and their access/egress ramps and adjacent plantings. (See Map 2)

This area includes most of what the Waterfront Development Commission considers the Waterfront Development District, designated by the dark outline on Map 2, but extends away from the riverfront, the park and the elevated highway, to permit examination of the off-site

Map 2



Legend

- Waterfront Park
- Parcel Study Area
- Waterfront Development District
- Roads



Waterfront Park Property Value Assessment Study Area



Base from LOJIC - Louisville/Jefferson County Information Consortium, 2007
Map Created By: Preston Lacy, July 2007

impacts of the infrastructure investments in the park. The Waterfront District was the object of a 2005 study by the WDC on the economic impact of the park, a study which reflects an all-too-common tendency not to examine off-site or more distant impacts of provision of amenity values. This study was updated in 2007 but was still limited to the Waterfront District.

Data collection began with documents and materials obtained from the WDC and other local sources, including the economic impact studies mentioned above, that provided useful comparative information. Detailed data collection for the study area, however, relied predominantly on the site-specific data available from the Louisville, Kentucky, Property Valuation Administrator (PVA) website (www.pvalouky.org). Reliance on the computerized files limited the extent to which property value impacts could be traced historically¹, since the earliest, and incomplete, data in the files was dated 1994 while the riverfront park entered public discourse in 1986. That reliance was necessitated by the limited funds and time available for this study, but it implies an underestimate of the impacts of the development of the park, since some of the expected benefits of the new amenity (and the benefits of those portions of the infrastructure already completed) were already incorporated into neighborhood property values by 1998, the beginning of the nine year period of change that was studied.

The PVA data for the study area for the nine years under study allowed separation of land and improvement assessment value changes for most sites in the study area although much of the historical assessment data does not provide this information. The data were processed using Geographic Information System software to integrate parcels and site maps and to assign

¹ An earlier study effort involving manual recording from PVA paper files provided historical data on a subset of the parcels in the study area.

distance measures (see Appendix A). Additional aggregate assessment data for the county as a whole were employed for relative property value expansion impact measures. While a comparison of property value changes between the city of Louisville and its riverfront study area might initially appear to be more appropriate, the county has virtually no non-urbanized land remaining. In addition, the city of Louisville and Jefferson county merged local government in 2003 and had a pre-merger tax sharing arrangement based on a common assessment base (Savitch and Vogel). The comparison of the waterfront area to the county as a whole thus provides a more conservative appraisal of different rates of property value increase: the county contained a large number of platted sites in 1998 on which new housing and other suburban development had been built by 2007. The waterfront thus was not compared to an otherwise stagnant or declining city, but a growing county. This methodology, while relatively simple, is not without precedent. Frederick Law Olmstead used a similar methodology to evaluate the economic impact of Central Park in New York City (Leinberger and Berens).

The creation of the park took a substantial amount of land out of private use, which would have skewed our 1998-2007 comparisons, had not the prior designation of the park area and work on Phase I of park (that opened in 1999) meant that, by 1998, the parcels comprising the park were already publicly held and thus not assessed. Missing assessment data for some parcels in 1998 (25 of 273), however, remained a problem, apparently attributable to publicly held, abandoned, and tax delinquent sites (see Appendix A for details).

All sites designated as tax exempt in the PVA dataset in 2007 were excluded from this analysis, since the assessor's data did not permit examination of land use changes for property held by

public or tax-exempt entities and the reasons for the exemption classification were not coded in the dataset. The result of these exclusions, however, may have further skewed the quantitative results by excluding properties that went from virtual abandonment to active utilization.

Much of the typical local government concern for underutilized and abandoned properties in the nation’s cities has its roots in municipalities’ reliance on property taxation as a primary revenue source. As Table 1 demonstrates, most local governments nationwide draw almost 46 percent of their own revenues from taxation of property (overwhelmingly real estate) within their boundaries. The table does not address the complex mix of fees and other sources of internally generated funds that typify local public revenue mixes. Isolating our focus on property and income taxation demonstrates that Kentucky in general, and Louisville in particular, deviate substantially from this national pattern. Redevelopment incentives thus also vary substantially.

Table 1
Reliance on Local Property and Individual Income Taxes for Revenue, 2004-5

Description	USA		Kentucky		Louisville	
	\$ Millions	Percent	\$ Millions	Percent	\$'s	Percent
General Revenue from own sources	708,901,221	100.00%	5,398,750	100.00%	409,607,700	100.00%
Taxes						
Property	324,328,967	45.75%	1,771,373	32.81%	117,926,100	28.79%
Individual income	20,675,556	2.92%	756,000	14.00%	259,000,000	63.23%

* USA and Kentucky data from the 2004-05 US Bureau of the Census' annual *Survey of State and Local Government Revenues*, from <<http://www.census.gov/govs/www/estimate.html>>; Louisville data from the 2004-05 budget, from <<http://www.louisvilleky.gov/Finance/Budget/FY0405Budget.htm>>.

Incomes, including payrolls and profits from businesses, contribute more revenue than housing, so there is some incentive for local government efforts to promote business re-uses over

residential ones, even when high end housing, typical of new waterfront developments in other settings, might add more to the property rolls. Moreover, with respect to housing, there is less incentive to promote luxury or market rate development relative to subsidized or low/moderate income housing since the revenue gains from the more expensive housing are less important to the city's coffers. It is not surprising, therefore, that the earliest waterfront development efforts produced more new workplaces and business than might otherwise have been expected. The fact that the Interstate highway abuts the new park and remains a housing disamenity (Li and Brown) may be seen as an additional contributing factor to this pattern. Additionally, the willingness to reinvest in a riverfront amenity without removing the disamenity of the raised highway reflects a preference for workplaces over residences in the area. However, as Table 2 indicates, this pattern seems to be undergoing change as Louisville attempts to increase the downtown residential population.

Table 2

Assessment Distribution for 1988, 1998, and 2007 (in 2007 dollars)

Land Use	1988 Assessment	% Dist.	1998 Assessment	% Dist.	% chg 88-98	2007 Assessment	% Dist.	% chg 98-07
Total Assessment	24,155,871		102,739,644		325%	165,240,780		60.8%
Industrial-vacant land	113,896	0.5%	139,327	0.1%	22%	58,980	0.0%	-57.7%
Manufacturing	884,044	3.7%	1,553,141	1.5%	76%	2,877,180	1.7%	85.2%
Industrial Warehouse	1,505,293	6.2%	3,795,659	3.7%	152%	4,165,680	2.5%	9.7%
Com Vacant Land	302,390	1.3%	522,993	0.5%	73%	571,890	0.3%	9.3%
Apartments	625,995	2.6%	1,251,291	1.2%	100%	3,843,350	2.3%	207.2%
Com Motels / Hotels	0	0.0%	6,631,150	6.5%		16,360,930	9.9%	146.7%
Com Retail	3,319,444	13.7%	12,900,188	12.6%	289%	17,471,750	10.6%	35.4%
Com Restaurant	3,714,639	15.4%	5,040,918	4.9%	36%	7,415,230	4.5%	47.1%
Com Office	6,480,129	26.8%	38,757,002	37.7%	498%	40,075,840	24.3%	3.4%
Condo Land & Amenities	0	0.0%	2,924,551	2.8%		44,981,500	27.2%	1438.1%
Com Parking Facilities	3,067,081	12.7%	19,615,729	19.1%	540%	18,183,800	11.0%	-7.3%
Com Non-Exempt Schools	0	0.0%	141,977	0.1%		141,250	0.1%	-0.5%
Com Warehouse	3,705,196	15.3%	6,494,246	6.3%	75%	7,379,880	4.5%	13.6%
Com Pav, Fencing, Yrd Item	437,762	1.8%	836,516	0.8%	91%	707,430	0.4%	-15.4%
Res Vacant Land	0	0.0%	1,997,144	1.9%		662,850	0.4%	-66.8%
Res 1 family dwelling	0	0.0%	88,594	0.1%		278,490	0.2%	214.3%
Res Multi-family	0	0.0%	49,219	0.0%		64,750	0.0%	31.6%

CPI-U from www.bls.gov for 1988, 1998 and the first half of 2007 were used to adjust to 2007 dollars.

Table 2 was derived from only 119 of the 248 records in the dataset for which historical assessment data was available. It is also affected by the manner in which condominium assessments were computed (see Appendix A). Nevertheless, it does reflect the predominance of commercial investment from 1988 to 1998, and a shift in investment to condominium property from 1998 to 2007, although commercial investment continues to grow.

The initial emphasis on jobs rather than residents and the subsequent reversal of this focus is further substantiated by the 2005 and 2007 studies released by the Waterfront Development Corporation, “Exploration of the Economic Impact of Louisville’s Waterfront Park, Winter 2005” and “Exploration of the Economic Impact of Louisville’s Waterfront Park, Fall 2007”. Both studies contain tables depicting “Waterfront Neighborhood Businesses Existing in 1986” and “Current Waterfront District Businesses” that permit comparison of employment levels and some clues as to payroll differences. The 1986 data indicate a total of approximately 400 employees in the area. That figure came from 15 listed businesses (including an aggregates [sand and gravel] facility and a metals scrap yard, both using waterfront access for transportation, as well as warehouse and wholesaling operations) plus miscellaneous other small businesses. The table on more recent businesses and employment tallied approximately 5300 employees in over 31 listed business and miscellaneous small firms. The tables in the 2007 report show an increase in the number of current businesses from 31 to 52 but virtually no change in employment (5305). The current employers include a national religious denomination, a major healthcare firm, and other office/corporate entities, complemented by restaurants, recreational and hospitality endeavors. The implication of the reported shifts in the area’s industry mix is that payrolls, and thus associated local income tax revenue from those payrolls, will have risen far more than just

in proportion to the increased number of total jobs: the corporate white collar incomes may be expected to be above the wages of the prior blue collar workers, even if those of the majority of the hospitality industry workers may be no higher on average. In any event, it is clear that a strong focus on commercial development is present.

The city's focus on job creation downtown, reflected in the WDC Report, is underscored by municipal urban design and building requirements. A "Downtown Form District" imposing architectural, setback and design requirements for downtown Louisville, requires a minimum of three stories in any new building and a zero ground floor setback from sidewalks. This requirement effectively dictates that ground floor spaces be used for business and/or retail activity, generating employment.

Nevertheless, as shown in Table 3, the investment data provided in the WDC reports shows an increasing focus on residential properties primarily in the form of condominium development. In the 2005 report some 45 percent of the private investment was in residential development. In the 2007 report this percentage has grown to 85 percent. The WDC reports do not separate investment into public or private categories, however, given the description of the projects it was a relatively simple matter to make the distinction, although many of the announced/underway projects are intended as combined commercial/residential developments. In these cases the full assessment was assigned as private residential development and therefore the residential percentages are somewhat overstated. Likewise, the new basketball arena proposed for downtown is a public/private partnership but the degree of private investment is unknown. This investment was assigned as an announced public investment in Table 3.

Table 3
Public and Private Investment WDC Reports Summary

2005 Report Summary	Private	Public	Leverage Ratio
Completed	66.9	138.3	0.48
Underway/Announced	83.0	75.7	1.10
Total	149.9	214.0	0.70
Percent Residential	45.1%		
2007 Report Summary	Private	Public	Leverage Ratio
Completed	149.6	140.8	1.06
Underway/Announced	611.0	428.0	1.43
Total	760.6	568.8	1.34
Percent Residential	85.1%		

The WDC reports on which Table 3 is based indicate that Phase I of the Waterfront Park, publicly dedicated in 1999, amounted to \$58 million of the public projects. (It should be noted that this report included a disclaimer for any inaccuracies and stated that data was compiled from interviews only.) Such a level of infrastructure investment in process would have affected nearby property values by attracting new development capital well before the park opening. Relocation of the viable businesses creating local disamenities, notably the scrap yard and aggregate distribution facility, would certainly have been well underway by 1998. Area property values as of the 1998 start date of the real estate value impact comparison using the PVA data thus should have been skewed upward, relative to the prices that would have been expected absent the park investments.

Despite this upward shift in 1998 property values, the transformation of the 50 acres of the waterfront area from industrial and warehouse uses to a public park appears to have been overwhelmingly successful in terms of attracting investment and raising property values. The study area examined goes well beyond the very limited range of the Waterfront District

considered by the WDC in light of prior studies of the disamenity value of highways and positive external effects of new park and recreational facilities (Boarnet & Chalermpong, Li, Tajima).

Analysis and Findings

As Table 4 demonstrates, while Jefferson County as a whole experienced an 81 percent expansion in its property valuations over the nine years from 1998 to 2007, the study area, the depressed zone east of Louisville’s CBD, experienced a rate of property value increase that was substantially above that of the county, 103 percent. The off-site land use transformations, with literally hundreds of new river-view condominium units completed or in process as of this writing, reflect the revaluation of the area as the result of the infrastructure investment in the park.

Table 4
Property Value Assessment Change, Urban County and Study Area, 1998-2007

Area and Assessment	1998	2007	Change
Jefferson County Total Assessed Value	\$26,678,966,416	\$48,243,095,405	81%
Balance of County Excluding Study Area	\$26,597,557,426	\$48,077,854,625	81%
Study Area Total Assessed Value	\$81,408,990	\$165,240,780	103%
Study Area Total Land Assessment	\$22,059,380	\$41,829,680	90%
Study Area Total Improvements Assessment	\$59,349,610	\$123,411,100	108%

* N = 248 sites in Study Area, a subset of total sites, including non-tax-exempt properties for which full site assessments were available for both study years. Properties redeveloped with real estate tax incentives are excluded since full market value has not been determined. Assessed valuation data from computerized Jefferson County Property Valuation Office at http://www.pvalouky.org/en/assess_jc_stats.php

The Total Improvements in the Study Area between 1998 and 2007 as shown in Table 4 amounts to only \$64.1 million in new assessed value, substantially less than the \$149.6 million in private investment recorded in Table 3 for the much narrower Waterfront District. While the \$149.6

million may be overstated due to self-reporting, we believe that two other factors are more likely and more significant. First, the 1998 assessments already incorporate some of the improvements in the area made prior to 1998. This underscores the extent of understatement of off-site land value impact generated by the park infrastructure and suggests that the value of land in the Study Area actually grew at a greater rate (higher than 103%), relative to the county as a whole, between the period prior to the initiation of the Waterfront Development Corporation in 1986 and the current period.

Second, the Study Area actually contains 579 parcels, according to the PVA data, with 193 sites exempt or carrying partial exemptions or exclusions in one or both of the end points of the study period, and 108 for individual condominiums which were consolidated to establish a single record for the condominium building site . So the 248 sites for which clear readings on improvements can be taken from the PVA data represent only a subset of the land affected by the infrastructure developments. Moreover, the percentage increase, and a total assessed value of \$165 million for the whole Study Area in 2007, represents an understatement of the new assessed values created to the extent of the tax exemptions and write-downs accompanying the new investment that may result in lower assessments than would otherwise be the case and the infrequency with which commercial properties are assessed.

As shown in Table 5 there are 73 Census 2000 census blocks in the study area. These blocks are in 6 census block groups but no full block group is included. Population and housing data at the block level reveal a concentration of population in the southeast portion of the area and is problematic. This area contains a high-rise retirement facility that accounts for a significant

percentage of the population. The remaining area was a 1960's vintage housing project which has been demolished and rebuilt with Hope VI grant funds (although not fully completed). The Census 2000 data reflects the pre-demolition population and the new parcels are all shown as exempt and therefore excluded from the dataset. In short, this paucity of population led to a series of regressions using the data in the PVA database--namely Total Assessment, Investment Assessment, Land Assessment, acreage—and distance from the park amenity calculated using GIS (see appendix A) without additional demographic or housing characteristics data.

Table 5
Population and Housing Data for the Study Area (Census 2000)

Census Block Group	Total Census Blocks	Census Blocks in Study Area	Population in Study Area Blocks	Households in Study Area Blocks	Comments
49-1	126	56	49	20	
49-2	24	0	0	0	
49-3	25	0	0	0	
59-1	70	9	142	76	
59-2	21	2	748	668	Retirement Community
59-3	19	6	1084	425	Ckarksdale/Liberty Green

Source: Census 2000, Tables P001 and P0015 at <http://factfinder.census.gov>

The linear models tested in Table 6 have the following variables: **TA07** is the total assessment in 2007; **TA98** is the total assessment in 1998; **LotSize** is the parcel acreage; **98Impr** and **07Impr** are the assessed value for on-site improvements for 1998 and 2007, respectively; and **ImpChg** is the change in investment from 1998 to 2007. Models 1 through 3 simply tell us that the linear relationship between the total assessment in 2007 and the total assessment in 1998 is improved if parcels with missing data and exempt parcels are excluded from the data set.

Models 4 and 5 tested the extent to which investment was dependent on lot size in 1998 and 2007 and larger lots received larger investment assessments in both years. Finally, Model 6

tested whether the change in investment was dependent on lot size, the coefficient of lot size is positive and significant, larger lots had larger changes in investment but lot size explains only 3.7% of the variation in investment change.

**Table 6
Selected Exploratory Regression Results**

Model	DV	IV	R-sq	N	Constant	TA 98	Lot Size
1	TA07	TA98 for All Parcels in Area	0.176	466	* 376950	* 0.74	
2	TA07	Parcels w/ TA98>0	0.184	298	* 451679	* 0.73	
3	TA07	Non-Exempt Sites	0.355	248	* 284278	* 1.16	
4	98Impr	Lot Size	0.158	249	-138142		* 1331398
5	07Impr	Lot Size	0.158	272	-204474		* 2524501
6	ImpChg	Lot Size	0.037	248	-55021		*1104534

Theoretically the value of the park amenity would be reflected in the land assessment and/or the improvements assessment and would diminish as parcels are more distant from the park. This diminished effect may be, but is not likely to be, linear. Nevertheless, using the 248 parcels for which data was available in both years, we ran linear, and quadratic models² (Cervero) to determine if the change in land assessment, or improvement assessment, was a function of distance. Separate models were run using the distance from the parcel centroid to park centroid, and distance from parcel centroid to the nearest edge of the park (see Appendix A for a description of GIS procedures used to calculate these distances). Both the linear and quadratic models using the change in improvements assessment³ as the dependent variable and distance from parcel centroid to park centroid⁴ as the independent variable were statistically significant.

² We also compared exponential and multiplicative modes but the both the linear and quadratic models substantially outperformed these models.

³ None of the models based on changes in land assessment were statistically significant.

⁴ The only statistically significant model using distance from parcel centroid to park edge was a quadratic model. The model reported in Table 7 had a higher R² with similar signs and magnitudes for the coefficients.

Based on adjusted R^2 values the quadratic model is the best fitting model and is summarized in Table 7.

Table 7
Quadratic Regression of Change in Investment Assessment versus Distance

DV	N	R^2	F	Constant	Distance	Distance Squared
ImpChg	248	.133	*19.9	17152003	* -14651	*3.057
Significance			.000	.000	.000	.000

While the adjusted R^2 for this model is smaller than we would have hoped, it does reflect that investment tends to decline with distance. Given the fact that it is likely that much of the early investment resulting from the park amenity may have been included in the 1998 assessments, the change in investment is understated. If historical improvement assessments data were available, we suspect the model would have been even stronger. There may be other confounding variables that affect the explanatory power of this model. Because the area until recently was predominantly commercial and industrial, the park may not have been as strong as an amenity as it would be for residential properties. Also, while the park is at the north end of the study area, a medical complex is being developed to the south of the area. Initially, it was not anticipated that development associated with the hospital complex would occur north of the southern boundary of the study area and distance measures to the medical complex were not computed. However, some recent investment in the area may be due to the medical complex thus diminishing the distance effect of the park. Additional analysis of the impact of the medical complex is left for further research. Nevertheless, the model does indicate that distance from the park has a negative effect on the land value in the study area.

IN CONCLUSION

WDC reports on investment in the area around Waterfront Park are understated. Our more positive finding on the impacts of the infrastructure improvements along the Ohio River in Louisville, KY, is attributable above all to the utilization of an appropriate off-site frame of reference. External effects are not limited to immediately adjacent properties, and new amenities and other public investment can have positive externalities although the effect of those externalities may diminish with distance. Property values and investment dollars respond to new infrastructure even in contexts in which the local political fiscal policy practices offer more incentives for job creation activities than for new real estate development. Louisville seems to have recognized this as recent investments are shifting to residential developments. Continued public investment in the park should prove economically beneficial to a larger geographic area than that considered by the WDC and actions that would stall park development or diminish the existing park should be avoided.

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Appendix A: Data Notes and GIS Analysis of the Property Valuation Assessment Data

The PVA website provides several entry fields in order to obtain a specific property's information. Using the parcel ID field, data on all properties in the study area were obtained. In order to obtain all current parcel ID's, ArcMap and a connection to LOJIC (Louisville/Jefferson County Information Consortium), a GIS information database for all of Jefferson County was utilized. The current parcel polygon shapefile was entered and loaded onto the map. The attribute table of this shapefile contains a variety of variables for each parcel, including parcel IDs. A new polygon shapefile was then created around the study area and all parcels within those boundaries were selected. This enabled us to compile a list of all parcel IDs in the study area in Excel and proceed to enter them into the PVA website.

The PVA website provided several variables that were then compiled into the Excel spreadsheet. Using the parcel ID number one can access the parcel database and record its actual street address. All assessment information provided on the website dated back to 1994. There is also a column for assessments prior to 1994 but was seldom used on the website and only one year could be placed in this field. Each total assessment also includes a code which describes the reason for the assessment. The website also breaks down the total assessment between both land assessment and improvement assessment which was also recorded for all available years.

The property class code, identifying the use of the property as well as whether the property was exempt from taxation and for what reason, was recorded. Lot sizes were recorded (in acres) and owners were listed only if the property was exempt from taxation or in abnormal cases. The name of the neighborhood was rarely listed but when it was we recorded that information as

well. The default for this field was “Commercial” which we felt no need to record as it served no purpose for classifying the parcel into a particular neighborhood.

The main structure, as well as other structures on the parcel, had recorded build years as well as function. If there were no buildings on the site at all and only parking lot information (including number of spaces) then that information was provided to clearly show that the sites had no buildings. Square feet and number of stories for all structures on a parcel were also available and recorded into the Excel spreadsheet.

In a few cases current construction presently underway was documented. These occurrences were documented under new construction as well as units being built, number of stories and percentage complete when available.

There were a few problems encountered on the PVA website when dealing with such a large set of data. As properties change hands and either subdivide or are amassed into larger parcels for development, the LOJIC parcel map and the PVA website do not always accurately stay current. Some properties are now much larger but still include many different historic parcels. In a few cases addresses have not been updated. Also some new developments that are not yet changed on the parcel map are not even found through GIS and must be acquired through address recognition only, because LOJIC has yet to assign the parcel ID to a physical location. In-depth analysis has found ways around these problems for the most part, but some error is to be expected because of constant fluctuations in developments, addresses, and parcel lines.

Our initial intent was to analyze the change in assessment from 1997 to 2007, however, as described in the following, we decided to use 1998 as the starting year in order to include more parcels in the analysis. There were 759 parcel IDs in the initial data set. In a number of instances the same parcel ID was used for different but adjacent addresses and the PVA database has only one assessment for the parcel ID. This resulted in the elimination of 174 records with no loss of assessment related data. There were 5 parcel IDs that were no longer in the PVA database. There were several instances in which an address was duplicated with different parcel IDs. Reconciliation of this situation resulted in the deletion of 6 records. This left 574 records. For condominiums properties there were initial parcel IDs for the land and structure and separate parcel IDs for each of the in-use condominiums. The individual in-use condominium assessments were summed and added to the initial parcel ID assessment resulting record consolidation. This resulted in a reduction of 108 records, leaving 466 parcel IDs in the data set. Of these 193 were shown as exempt for 2007 leaving 273 records for analysis. Of these 273 records 63 were missing a 1997 assessment, while only 25 were missing a 1998 assessment. Using 1998 as the starting year, the dataset consists of 248 non-exempt parcels.

ArcGIS was employed to find location and distance data from individual parcels to the Waterfront Park. Distances were based upon three criteria. First the centroid of each parcel was located--the central point at the intersection of diagonal and orthogonal cross-axes. These were compared individually to the Waterfront Park centroid. All parcels that are within Waterfront Park were collated into a single polygon shapefile in order to find the selected study area of the park's centroid. Then the 'Feature to Point' tool and the park polygon were used as the input information in order to find the centroid. This step was duplicated for the entire study area in

order to find the centroid for each individual parcel. In order to find the distances between centroids, the 'Near (Analysis) tool' was chosen and using the study area parcels as the input feature and the Waterfront Park centroid as the near feature distance was calculated in feet as well as angle fields in the attribute table.

The second method of distance measurement was from the parcel centroids to the nearest edge of Waterfront Park. This was done by creating a new polyline shapefile along the southern boundary of Waterfront Park. The Near (Analysis) tool was used once again in order to determine the distance from the entire study area parcels' centroids to the nearest point along the boundary of Waterfront Park. The output provided the distance in feet and the angle providing the closest distance between the parcel centroid and the nearest point along Waterfront Park's boundary.

The final distance criterion was a tiered approach. Blocks were divided geographically into half blocks and assigned a tier number to each. Manipulation of the city grid system due to historic projects such as Interstate systems and interchanges have obscured some of these boundaries and in those cases we attempted to follow roads and alley ways to create an even "slice" for each tier factoring in a balanced total parcel population for each tier avoiding outliers. A new layer for each tier was then created. The parcel IDs were then extracted from the attribute table of each tier and entered into an Excel spreadsheet in order to match the data found on the PVA website with individual sites within each tier.