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**Green Investment Strategies: How They  
Matter for Urban Neighborhoods**

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***Green Investment Strategies: How They Matter for Urban Neighborhoods***

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Urban greening is an important component of the broader category of “place-based investments.” The mobility of global capital has transformed the rules for local economic growth, increasing the role of place based investments and local quality of life. These have joined traditional business location factors--such as the availability of raw materials or port access--as important determinants of urban economic growth. In cities and their neighborhoods place-based investments are impacting the quality of life and long run sustainability of communities.

Because of the new role of quality of place, such investments are now critical public policy tools with the potential to turn around the decline of cities and their neighborhoods. Although the importance of place based investments<sup>1</sup> is recognized, there is little empirical

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evidence directly quantifying their impact. Researchers have only begun to measure how specific place-based investments, such as new community gardens or newly landscaped commercial corridors, affect neighborhoods.

The purpose of this study is to describe a methodology for quantifying the economic benefits of green investment and to use the methodology to measure gains from recently implemented green investment initiatives in the City of Philadelphia. The methodology, which deploys precise, time-based spatial data to identify when and where investment occurs, permits the identification and measurement of the neighborhood-level effects of public investment.

The measurement of these gains can justify public spending. Place-based investments depend on public spending decisions rather than private action, due to the “collective action” problem. Individuals tend to underinvest in goods that provide benefits to others (positive externalities) since these gains to others are not accounted for in their investment decisions. It is up to the public sector to provide public goods. This means that place-based investments must rely on scarce public resources in order to be procured. Thus it is important to

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<sup>1</sup> See Richard Florida (2003) on how quality of life makes a difference in attracting new knowledge workers to urban places

demonstrate that such strategies produce measurable improvements to neighborhood quality.<sup>2</sup>

We also can use this methodology for gaining a deeper understanding of the process of neighborhood change. Urban economists<sup>3</sup> and others have long discussed how physical signs of deterioration and distress accelerate the progression of neighborhood decline by inducing out-migration and abandonment. Transforming blighted vacant lots through greening activities may reverse this process through changing perceptions of neighborhood distress, arresting rates of housing abandonment and, restoring the local property tax base. This can result in a “virtuous” cycle of lower tax rates which helps in the revitalization of older communities.

Nonetheless, evidence identifying the impact of specific place based and additional growth investments has been limited due to data and technological barriers. This study benefits from advances in

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<sup>2</sup>Identifying these gains enables the use of funding sources that would otherwise not be available.

Anticipated growth in property tax revenues stemming from a proposed urban greening project can be used to demonstrate the feasibility of funding place-based investments through self-financing mechanisms, such as tax increment financing (TIF) or the establishment of a Business Improvement District (BID).

<sup>3</sup> See Rothenbeg (1991): The Maze of Urban Housing Markets: Theory, Evidence and Policy.

geographic information systems (GIS) technology which enables the merging and analysis of large spatial datasets.<sup>4</sup>

Most importantly, as discussed in detail below and in the chapters by Smith and Bonham in this volume, we take advantage of specific public initiatives on place based green investment in Philadelphia and the availability of data on the place and timing of these investments. Using these data and methodology, we demonstrate that greening activities and place-based investments are responsible for considerable gains in the value of homes and the desirability of neighborhoods, throughout the City of Philadelphia.

### **Urban Greening and Place-Based Investment in Philadelphia**

Philadelphia, as a former manufacturing center, experienced a major population decline due to deindustrialization from approximately 2 million people in 1950 to 1.5 million in 2005. As a result, many neighborhoods in Philadelphia show signs of disinvestment and blight.

The city currently has an estimated 40,000 vacant lots comprising upward of 1,300 total acres of land and 71,887 (Census

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<sup>4</sup> The database merges home sales with information on place-based public investments and neighborhood-level attributes, creating an integrated spatial database. The dataset also includes information about value and additional variables that affect property values, such as the physical characteristics of specific houses, the location and density of the surrounding neighborhood, and the time of sale, as discussed below.

2000) units of vacant housing, often a precursor to vacant land.<sup>5</sup>

Blighted lots are distributed throughout the city. With the exception of the center city business district, no neighborhoods are entirely exempt, although there are neighborhoods that are especially hard hit. In these neighborhoods, vacant lots and vacant and abandoned housing are sporadically distributed among semi-intact blocks of rowhouses, creating an irregular pattern of vacancy, with few large tracts appropriate for redevelopment. Given the spatial pattern of intermittent vacancy and occupancy, urban greening has emerged as a potentially key land management strategy in Philadelphia.

Philadelphia and similar declining cities are faced with the challenge of countering the effects of neighborhood decline and uneven development. Vacant lots are points of blight that can undermine the social fabric of neighborhoods. They contribute to crime and render neighborhoods unattractive, unhealthy, and unsafe for residents and particularly for families with children, and they contribute to further disinvestment as they discourage maintenance of the existing housing stock.<sup>6</sup>

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<sup>5</sup> This is based on the smallest allowable residential lot size under current zoning (1,440 square feet) to conservatively estimate the total acreage of land due to demolished residential properties. See Philadelphia City Planning Commission (1995).

<sup>6</sup> The concept of "Broken Windows" was used by the New York police to clean up the city's streets. ([http://www.nationalreview.com/comment/bratton\\_kelling200602281015.asp](http://www.nationalreview.com/comment/bratton_kelling200602281015.asp))

Philadelphia as a city of neighborhoods has the potential to deliver attractive housing in pleasant communities, but this potential is undermined by the pervasive disamenity of untended, blighted land. Throughout the city, green infrastructure has been neglected with the loss of trees, greenways and the neglect of streetscapes in major commercial corridors that are entryways to the city and its residential neighborhoods. The potential to reverse this and enhance the quality of life in Philadelphia neighborhoods is recognized but difficult to carry out. To do this requires collective will and funding.

Green investment is often an individual undertaking. People can and do plant their own trees in order to enhance the attractiveness of their homes when the benefits of doing so exceed the costs. However, without collective action, similar public investment may or may not occur, even when clearly desirable. The result is that worthy investment that can reverse neighborhood blight may not be undertaken. This also means that successful collective action can have

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The buildings whose windows were fixed no longer served as a refuge for the criminals and drug dealers and thus helped in abating the incidences of crime in the neighborhood.

Wachter and Wong (2007) point out that green investment such as tree plantings can be viewed as a signaling event. If so, the event can have value above and beyond that of just the investment itself. For example, it indicates that investment in a neighborhood is occurring, that social capital between residents is improving, and that the neighborhood appears to be on a perceived "upswing." The authors measure the inter-temporal dynamics of this effect through an event-study methodology that measures how the capitalization of green investments varies with time from the event.

large returns--indeed, far larger returns than undertaking individual greening investments.

This paper shows a method to value the quality of life improvements in neighborhoods undertaking green investment strategies. These quality of life improvements are measured by estimating the increased willingness to pay for neighborhood amenities, including tree plantings, community corridor improvements, and vacant land clean-up and maintenance.

In a precursor to this city-wide study of these investment strategies, we first analyzed the impacts of vacant land cleanup in a specific area, New Kensington, which pioneered this strategy in a multiyear vacant land management program run jointly by the New Kensington Community Development Corporation (NKCDC) and the Pennsylvania Horticultural Society (PHS).<sup>7</sup> The NKCDC- and PHS-sponsored Vacant Land Management Program was launched in 1995 to address the growing crisis of vacant land caused by a cycle of abandonment, demolition, and neglect in this formally heavily industrialized community.

During the first year of the program, PHS planted street trees and established community gardens with organized block groups. By 1996, NKCDC and New Kensington residents implemented the first

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<sup>7</sup> See Wachter (2005)

large-scale tree planting on six vacant lots. Following these initial plantings, joint efforts between NKCDC and PHS resulted in the ongoing establishment of community gardens, street-tree plantings, and the stabilization of vacant land. NKCDC also began administering a side-yard program in 1996 that facilitated the transfer of vacant property to adjacent homeowners.

The Vacant Land Management Program served as a pilot project for the city's Neighborhood Transformation Initiative (NTI)--a comprehensive campaign begun in 2002 to eliminate the blight caused by long-term vacant structures, abandoned automobiles, and trash strewn vacant lots. The City worked with PHS to design a citywide greening strategy to treat both existing vacant lots and new lots created through ongoing vacant property demolition. Vacant lots were cleared of debris, seeded, landscaped with tree plantings, and enclosed with rustic wood post fencing. Between 2000 and 2003, the program was responsible for cleaning, improving, and maintaining 12,186 lots. Another 18,800 lots were cleared of trash and debris.

NTI also supported improvements of commercial corridors that serve the city's low- and moderate-income neighborhoods. Besides NTI, BIDs also set out to improve commercial corridors. BIDs are geographically defined quasi-public agencies that provide collective public services (including improvements to public spaces) within their

jurisdiction. Typical services offered within a BID include enhanced security, street cleaning, trash removal, and streetscape improvements such as landscaping, lighting and coordinated signage.

Special service districts such as BIDs are strategies often used by fiscally strapped cities that may not be capable of providing the high-quality public services required to improve failing neighborhoods and attract new residents and investment. Commercial establishments within the BID boundary pay an annual fee that covers the costs of the enhanced services provided within the BID, with the understanding that the improvements are likely to lead to increased foot traffic and greater commercial revenues within the district. The oldest and most successful BID in Philadelphia is the Center City District, which was started in 1991 to improve tourism and the quality of life in the downtown area. The data set employed for this research evaluated the impact of the nine BIDs located in neighborhoods across the city.

### **An Approach to Measuring the Economic Benefits of Green Investment**

Despite the importance of efforts to revitalize communities, there is little dynamic research on the potential for new public investment and reinvestment to improve neighborhood quality. Increases in property values occur through “capitalization”--that is, a

process in which any asset gains in value when the per period returns on that asset increase. Thus, when neighborhoods become more satisfactory places to live, “returning” more quality of life, neighborhood housing prices increase.

Most studies of house-value capitalization deploy a traditional “hedonic” specification<sup>8</sup>, in which the variables of interest, such as adjacency to a park, are added to a basic specification of house size, location, and other characteristics. Such a static approach while quite useful does not capture the gains from new investments and may underestimate the benefits of the amenity. Parks like other amenities may be associated with other positive housing characteristics. The correlated attributes may make it difficult to identify separately the positive impacts of the park.<sup>9</sup>

Here we not only enter the greening variables into the specification, but also include the timing of the greening initiative.<sup>10</sup>

The methodology deploys an econometric analysis of both spatial and

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8 See Rosen (1974) for the classic discussion of the modeling of house prices. For a discussion on alternative price methodologies see Case et.al (1991), Gillen et.al (2001), Lee et.al (1998) and Thibodeau et.al (2001).

9 See Mills and Hamilton. Urban Economics, HarperCollins, New York, 1994) for a good discussion of why it is difficult to identify neighborhoods effects of amenities using traditional hedonics

10 See Hammer et.al (1974) for an early hedonic study of the impact of parks.

Correll et.al.(1998), Crompton et.al.(2000) and Lutzenhiser et.al (2001) show the impact of green investment using the hedonic methodology

time-based data, and integrates separately collected datasets into one database.

These include data on City of Philadelphia property sales and more than fifty attribute characteristics for over 120,000 properties and over 200,000 sales for the period from 1980 to 2005. Additional datasets on neighborhood attributes such as public safety, public transit accessibility, commercial-corridor quality, and schooling, as well as place-based investment data, were collected and integrated with the property database. The datasets permit the tracking of the quality and quantity of these investments by specific geographical location and, where available, the precise timing of public investments.

In particular, the PHS provided data on the location and timing of new tree plantings, streetscape treatments, and vacant lot stabilization efforts. As a result, we are able to compare neighborhood values before and after these investments occurred based on an analysis of nearby property sales.

These data are used to construct a larger spatial database that combines the value and attribute data (such as property parcel price, square footage, and unit amenities) with basic geographic information (for example, street address, latitude and longitude, distance from central business district), and information on the property's relation to various public service areas, including the school district and police

precinct where the property is located, and whether the property is situated within a business improvement district. The spatial database and GIS technology allow us to estimate a measure of the impact on values of many place-based variables defined at different geographical scales for individual neighborhoods and for the city as a whole.

These data also allow us to control for the many attributes that contribute to property values. Hedonic pricing models deconstruct a good or service traded in the marketplace into a bundle of distinct attributes. These attributes constitute the essential physical features demanded by consumers and can be valued individually.

In this study, as expected, we find physical attributes associated with higher house prices include more square footage; a larger lot size; better physical condition; the presence of amenities such as fireplaces, central air conditioning, or a garage; and being either in or relatively close to downtown. Factors associated with lower house prices include a street-corner location, being renter-occupied, or being in a depreciated condition.

A time trend variable is incorporated into the model in order to control for the state of the overall housing market, which is highly dependent on the availability and cost of financing. Except for a period from 1988 to 1995, overall housing prices have gone up in Philadelphia

over time through 2004, a period in which the cost of financing for home purchase declined.<sup>11</sup>

We also include measures of neighborhood public services. While we lack direct data on new investment in these services, we have some outcome measures, specifically a measure of school quality (the high-school dropout rate) and a measure of public safety (an index of local crime). We find again, as expected, that the quality of schools and public safety in a neighborhood also matter a great deal<sup>12</sup>. Our results indicate that higher crime rates are associated with lower home values on the order of about –14 percent for every 1 percent increase in the overall crime index. Further, a high dropout rate in high schools, after controlling for the high poverty rate of the student body, is also shown to be negatively correlated with house prices, by approximately –5 percent.

Finally, location matters as measured not only by the distance to the central business district but also as measured by access to public transit. The results suggest a positive relationship between house values and proximity to subway stops. Homes within walking distance

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<sup>11</sup> For a further discussion of the results see Wachter and Gillen (2006) report for the William Penn Foundation.

<sup>12</sup>Bradbury et.al (2001) and Bowes (2001) demonstrate the specific value of public services. Ellen et.al (2001) deploy a similar methodology to that employed here.

(less than 1/8 mile) of subway stops carry a price premium of 3 percent over those farther away<sup>13</sup>.

## **Findings on Place Based Investment**

The potential benefits of place-based investment are identified by measuring the additional value that people place on living in neighborhoods where and when such investments have taken place. We test for the impact of public investment by identifying when and where they occur and their effect on the transaction prices of nearby properties. We include data on and discuss results separately for commercial-corridor improvements, vacant land management, neighborhood greening strategies, and BID initiatives.

### *Commercial Greening*

We use the phrase “commercial greening” to denote improvements to public spaces that are commercial in nature; for

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<sup>13</sup> The availability of the required spatial and temporal information determines the extent to which this methodology can be used. This means that since the dates of tree plantings and vacant lot stabilization activities are known, we can separate home sales into “pre-upgrade” and “post-upgrade” periods. However, in the case of for potentially important variables such as school dropout and crime rates, only one time period’s worth of data was available. Areas with high dropout rates may also be areas with related variables that we do not capture in our model. Unlike in the case of the greening investments, we are not able to categorize specific time-based changes in these variables as “upgrade” events and thus cannot as precisely measure their impact.

example, commercial streets or shopping centers. For a corridor that is rated as being in “excellent” condition, being within a one-quarter mile of the corridor imparts an additional 23 percent to a home’s value, while being beyond a quarter mile but within a half mile imparts an additional 11 percent to a dwelling’s value. Being located within a BID service district, by contrast, is estimated to impart an additional 30 percent of value to house values. The value of the BID is higher than the value of an “excellent” commercial corridor because—presumably—a BID is already a commercial corridor in very good condition, plus BIDs offers additional public services--for example, extra signage, police, cleaning, seasonal decorating--that commercial corridors do not.

### *Vacant Land Management*

As we have discussed, vacant lots left in the wake of housing abandonment and demolition often have significant and adverse effects on a neighborhood’s quality of life, attracting refuse and vandals and creating a perception of impaired public safety. Our findings indicate that adjacency to a neglected vacant lot subtracts 20 percent of value from a home relative to comparable homes farther away from the site. Recent public initiatives have worked to “stabilize” these sites through a process of cleaning and greening. This process

involves the removal of discarded trash; grading and amending the soil; planting grass, trees, and shrubbery; and even adding such amenities as benches, sidewalks, and fences. Our results indicate that these efforts almost entirely reverse the negative impact of adjacency to neglected vacant lots resulting in a gain in value of 19%.

### *Neighborhood Greening*

Investment in “neighborhood greening” is a general term to denote everything from adding parks to improving streetscapes to planting new trees in public spaces. As the results listed in Table 1 suggest, proximity to a greening event positively affects home values. Proximity to a new tree planting is associated with an overall increase in house prices of 9 percent.

Streetscapes are part of the “green infrastructure” of the urban environment. A streetscape project represents horticultural treatments to a sidewalk or roadway that improve the appearance of the area, making it a more attractive and pleasant place. Treatments can include tree plantings, container plantings, small pocket parks, parking lot screens, and median plantings. Streetscapes tend to focus on commercial corridors with high visibility and high levels of pedestrian and/or vehicular traffic. Our results indicate that streetscaping imparts a considerable increase in surrounding home values as well, on the

order of a 28 percent gain in value relative to similar homes in comparable areas without streetscape improvements.

In Table 1 we summarize the magnitude of the various estimated effects on house values from different public investments. The column “Percent Impact” shows the expected percent change in value from the base price.

<b>Table 1*</b>		
<b>Summary of Green Infrastructure Findings</b>		
<b>Based upon the 2004 Median-Priced Philadelphia Home of \$82,700</b>		
	<b>Percent Impact</b>	<b>Dollar Impact</b>
<b>I. Commercial Greening:</b>		
<= ¼ mile to a commercial corridor in “excellent” condition (net impact)	23%	\$19,021
¼ to ½ mile to a commercial corridor in “excellent” condition (net impact)	11%	\$9,097
Located in a business improvement district	30%	\$24,397
<b>II. Vacant Lot Management</b>		
Adjacent to vacant lot	-20%	(\$16,540)
Adjacent to a stabilized and greened lot	17%	\$14,059
<b>III. Neighborhood Greening</b>		
Near a new tree planting	9%	\$7,443
Improvements to streetscapes	28%	\$23,156

\*This table summarizes the magnitude of the various estimated effects on house values from different public investments. "Percent Impact" shows the expected percent change in value, while "Dollar Impact" shows the expected dollar change in value when the percent impact is multiplied times the median value of a typical Philadelphia home, which was \$82,700 in 2004.

### **The Implications for the Effect of Greening and Place-Based Investment on Neighborhood Quality**

The purpose of this chapter is to discuss a methodology for quantifying the economic benefits of green infrastructure. We identify key place-based green infrastructure public investments and demonstrate their potential impact using "willingness-to-pay" data as indicators of changes in the overall neighborhood quality of life. Overall, the empirical results suggest large-scale positive impacts from investment in public spaces.

Using these data and methodology, we confirm that greening activities and place-based investments confer additional value to homes and to the desirability of neighborhoods. Among the key findings are that 1) clearing and greening a vacant lot leads to a 17 percent rise in value for adjacent properties; 2) improvements to streetscapes increase the value of homes in proximity to the corridor by 28 percent; and 3) homes located within BIDs are valued 30 percent higher than comparable homes not in BIDs. By employing a

contingent valuation method, which assigns a dollar value to the geographically distributed benefits of new place-based community amenities, our results can help to translate (abstract and theoretical) concepts such as “quality of life” or “sense of place” into measurable economic terms.

Such research as this contributes to our understanding of the determinants of how people value their neighborhoods by identifying the effects of place-based investments on property values in surrounding areas. While the importance of neighborhood effects of community investment seems intuitive, most studies fail to find empirical evidence of such neighborhood effects. Deploying a place-based methodology for evaluating the impact of place-based investments, making use of precise time-based, spatial information to identify when and where the investment occurs (while controlling for other property and neighborhood characteristics) can quantify the benefits of green investments. Since the focus is on investment strategies rather than static characteristics of neighborhoods, the information is relevant to community and city decisions on whether and which investments are supported.

The primary focus of the place-based investments studied here has been greening of public spaces. The methodology used is especially pertinent to studies of greening because the specific time-

and space-based nature of greening events are both observable and measurable. As such, green investments in particular are a particularly apt subject category to measure the returns from place-based investments in public spaces. For policymakers, these results can assist in determining the expected return from place-based investments, as well as identifying the specific types of investments that yield the highest returns.

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