The High Line Park and Timing of Capitalization of Public Goods*

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Abstract

I estimate the impact of opening the High Line Park in New York City on house prices in the surrounding areas. The High Line is a park that opened in June 2009 on the west side of Manhattan near the Hudson River, and draws almost 5 million visitors annually. I use proximity to the park to compare home values over time in areas immediately surrounding the park to areas slightly farther away. Home values within one-third of a mile of the park increased 10% immediately following its opening. This was not simply an overall increase in valuation of parks, or of real estate near the west side of Manhattan, but was directly due to the new public good, the park, itself. The increases in home valuations led to property taxes collected by the city in 2010 alone to nearly surpass the cost of constructing the park itself, suggesting that the benefits of the park far outweighed the costs. New businesses also opened in the surrounding areas in response to the opening of the park, implying that only measuring property values underestimates the broader effects on the economy.

Keywords: House prices; public goods; capitalization; parks.

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1 Introduction

In June 2009, the High Line Park opened on the west side of Manhattan to rave reviews. The park was built above the ground on old railroad tracks, preserving an urban space that had been abandoned and turning it into a thriving part of New York City. The park was built after almost ten years of work to acquire the legal rights to preserve the railroad and turn it into a green space. It has been successful at drawing visitors both from within and outside the city, with almost 5 million visitors in 2013. In October 2013, the creators of the park, Joshua David and Robert Hammond, won the Vincent Scully Prize to "recognize exemplary practice, scholarship, or criticism in architecture, historic preservation, and urban design". Though it is clear that the park has been successful, in terms of the number of visitors, the economic development in the vicinity, and its presence in popular culture, there has been little study as to the economic impacts of the park itself.

In this paper I carefully identify the impacts of the park on house prices in the immediately surrounding area. This is important to address because economic activity is often viewed as a zero sum game – bringing more visitors to the High Line Park and its surrounding restaurants and bars also leads to less money spent elsewhere; for example, there are no economic impacts of opening new sports stadiums [Siegfried and Zimbalist, 2000]. By considering house prices, I measure an economic improvement that need not come at another locale's expense. Further, as house prices rise, so do property taxes collected by the government, suggesting that it may be in the interest of the government to provide funding for similar additional projects if costs can be recouped in the form of higher property taxes.

Tiebout [1956] first developed a model of how voters might influence the allocation of public goods in an area, and that this allocation would be reflected in house prices. Many recent empirical studies have focused on how public goods such as schooling, environment, and sports team have been capitalized into house prices [Black, 1999; Greenstone and Gal-

lagher, 2008; Carlino and Coulson, 2004]. Parks are also a key component of this literature, with Crompton [2001] providing a good overview. The High Line is unique by its very nature – creating the park not only added the amenity of a park, but also removed the disamenity of an unused railway. Documenting the house price impacts of this project is one key contribution.

I find that the value of buildings closer to the park increase relative to those slightly farther from the park. My preferred nonparametric estimates suggest that home values within a third of a mile of the park increase by 10% in the year immediately following its opening. I then estimate the change in property taxes collected within one mile of the park, suggesting that the increase in 2010 due to the park's opening nearly outweighs the cost to the city of constructing the park. These are rough calculations, but suggest that providing funding to the park was a good investment for the city.

Measuring the specific impacts of opening the park is inherently difficult. First, the park opened in the middle of the Great Recession, meaning economic conditions cound confound any results. Second, there was simultaneous gentrification and development in the neighborhoods surrounding the High Line. If gentrification is a direct result of the opening of the park, then these changes can be attributed to the park. If not, this is another potential confounder. Third, part of the deal surrounding the development of the High Line Park involved liberalizing the rules regarding transferrable development rights (TDRs) for immediately surrounding areas, both to preserve light and air space and to appease owners of nearby businesses.[1] Previously, if buildings had not reached their zoned height limit, TDR's could be sold to neighboring buildings; after the new regulations, TDR's could also be sold to several other areas in Manhattan. The increased value of unused options could raise assessed values for buildings near the park.

[1]For a good overview of TDRs and how they can be bought and sold, see Furman Center for Real Estate and Urban Policy [2013].

I deal with these issues by using a difference-in-differences strategy. By using distance from the park to separate buildings into "control" and "treatment" groups, I can difference out the trends in each distance bucket over time. I also use a measure of zip code level development from the County Business Patterns to control for overall economic development in various neighborhoods. By using two data sources, one on government valuations of buildings and one on sales of individual apartments, I am able to deal with the issue surrounding TDR's. Though these TDR's are valuable to a building and would likely increase its sale price, it is less clear that they should matter for the sale of individual apartments, which would not benefit from the overall building expanding upwards (or being able to trade these permits). Valuations are estimated by assessing the approximate income that could be generated if a building was a rental, and the value of this unused option should not affect rental prices. Since I find similar trends in home values and sale prices, it is likely that TDR's are not a significant factor.

It is also crucial to identify the timing of increases in house prices. In theory, any benefits of the park should be priced into the market as soon as they are known (i.e. before the park is actually opened, potentially as early as the announcement of the park); an expected rise in future house prices due to benefits of the public good must lead to a rise in house prices now, otherwise there will be opportunity for arbitrage. However, given lags in development of public goods and uncertainty over length of construction, it seems unlikely that house prices will immediately reflect all potential future gains upon announcement of the park.

The environmental literature has documented the importance of timing for capitalization of public goods. Gamper-Rabindran and Timmins [2011] find that being proposed to the National Priority List of Superfund sites significantly decreases house prices in the area, whereas being deleted from the list at completion of cleanup significantly increases house prices. This builds upon the results from Greenstone and Gallagher [2008], which had found no impact on house prices from being listed as a Superfund cleanup site. They argue that this

may be due to competing interpretations of being listed – there is a stigma of acknowledging the problem of being a heavily polluted site, but there is also the promise of improvement in the future. My results suggest that it is the opening of the park that leads to the strongest increase in house prices, though there are detectable anticipatory increases prior to opening.

There is a large literature focusing on identifying the impact of public goods on house prices, as a means of measuring capitalization. Black [1999] looks at the value parents place on public schools – by analyzing communities on opposite sides of a district border, she shows that house prices increase with average test scores. Her estimates are much lower than the preceding literature due to her careful treatment of unobserved neighborhood characteristics, which are controlled for by using proximity to district boundaries to plausibly argue that houses on opposite sides are similar in their non-schooling public goods. This paper uses the distance to the park, rather than the distance to a boundary, as a controlling variable (though Black uses a cross-section, rather than a time series). Further, because there is no official boundary line that separates my treatment and control, my estimates are not subject to jumps in sociodemographic characteristics resulting from discrete differences in a public good that may have influenced Black's findings.

Most relevant to this paper is Voicu and Been [2008]. Their paper uses similar data from the New York City Department of Finance to measure the impact of community gardens on property values, using proximity to the gardens. They find that proximity to a garden leads to an increase in the sale price of homes following the opening of a garden. They then estimate that the increase in property taxes stemming from opening a community garden outweighs the cost of building and maintaing the garden. However, by focusing only on sales, there might be a different quality of property for sale by distance to the garden, especially after the opening of the new amenity nearby. The authors note that this is a concern, and that even by using repeat sales they cannot overcome this issue. By using assessed property values of all buildings, I am able to avoid the selection bias of which properties are sold.

The rest of the paper proceeds as follows. Section 2 presents a brief history of the High Line Park. Section 3 describes the data that I use and the methodology. Section 4 describes my main identification strategy and presents the primary regressions results describing the impacts of opening the park on home prices near the High Line. Section 5 presents rough calculations suggesting that the increase in property taxes outweighed the costs of building the park. Section 6 concludes.

2 History of the High Line

The High Line is a park that was established on old train tracks in western Manhattan.[2] The location of the High Line in Manhattan, along with several neighborhoods and other parks, is presented in figure 1. The High Line was built in the 1930's as a means of removing freight lines from the streets of New York, which had been extremely dangerous to pedestrians. Train traffic started slowing down in the 1960's with increases in truck traffic on the interstate highways, and led to a southern part of the original High Line being demolished. In 1980, the final train ran on the High Line, with the train company that owned the tracks eventually looking to demolish it. Property owners in Chelsea also sought to demolish the tracks as they felt the abandoned, deteriorating tracks were hurting their businesses.

In late 1999, Robert Hammond and Joshua David created the group Friends of the High Line, which sought to save the High Line and turn it into a park. There were many legal battles that needed to be won in order to build the park – at the end of Mayor Giuliani's term in January 2001 he signed papers to demolish the High Line. The incoming Mayor Bloomberg was an advocate for the High Line and managed to help stave off demolition until a judge in March 2002 ruled that the city did not have the right to issue the demolition papers. The group also needed to receive approval for railbanking the High Line. Railbanking allows rail

[2]Much of the description from this section comes from the book written by the co-founders of the High Line, David and Hammond [2011].

easements to be set up for interim trail use, so that the easement that lets the government use privately owned land for train transit would not be lost once the railroads were abandoned and no longer used under their intended purpose. In June 2005, the Certificate of Interim Trail Use was issued, which helped give the project a sense of inevitability.

From April to October 2005, the Museum of Modern Art displayed an exhibition with the final architectural plans for the High Line, providing further evidence in the general public that the park would be built. In April 2006 construction started on the first segment of the park, running from Gansevoort Street to West 20th Street, which would eventually open in June 2009. The second segment of the park, running from 20th Street to 30th Street, opened two years later in June 2011. These dates are important to consider in determining when the High Line was capitalized into house prices. The crucial dates considered will be 2005, when plans for constructing the park were officially approved; 2006, when construction of the park started; and 2009, when the park opened. All of these dates are shown in the timeline of key events in figure 2

Though a lot of funding for the construction and eventual maintenance of the park came from private donations, there was significant public involvement. An early cost estimate suggested that it would be upwards of $150 million, with over $100 million coming from the city. In addition, approximately $18 million of federal funds were provided from the transportation bill. These public funds can be seen as an investment – by ensuring that the park opened the government guaranteed that they would see the added revenue from increases in property taxes due to higher real estate valuation.

The High Line has been extremely popular and successful from its inception. Many wealthy New Yorkers and famous actors were involved in helping to fund and build the park, and it is one of the rare attractions in New York which is viewed positively both by locals as well as tourists. Even before opening, demand was high to see how the park would turn out. In October 2007, the Friends of the High Line group sold out reservations for advance tours

in less than five minutes. In addition, the park now sees almost 5 million annual visitors, with some summer weekends alone drawing over 100,000 visitors.

3 Data and Methodology

I conduct two complementary analyses of home prices in New York City using publicly available data. First, I use a panel of assessed property values which goes back to 2007. This is the primary dataset for analysis, both because the panel structure allows for a fixed effect to control for unobservable characteristics of each building and because it is directly used in calculating property taxes. Second, I use a pooled cross section of sales data that extends back to 2003, primarily to cover a time frame that spans the history of the park.

The property assessment data are compiled by gathering all the properties that are listed in the Condominium/Cooperative Comparable database provided by the Department of Finance from the New York City government. Valuations are determined for property tax purposes, and by law reflect the income-earning potential of a property as opposed to its likely sale price. Buildings are valued by considering the amount of income they could produce if the apartments were rented. The Department of Finance reassesses property values every year. I use all of the properties within these two databases (condominiums and cooperatives), to create my dataset.

For the property assessment database, there are a total of 3,402 properties assessed between 2007 and 2012 within 2 miles of the High Line Park. In order to accurately identify the fixed effects analysis, I only use properties that have at least 5 years of data from 2007-2012 (2011 has lots of missing data for unknown reasons). This leaves me with 1,382 properties.[3] This database provides statistics like market value and square footage, as well

[3]Approximately 75% of the buildings with at least five years of data are of building classes C6, D0, D4, and R4. These building classes are residential, including Walk-up Cooperatives, Elevator Cooperatives, and Residential Condos in an elevator building. By contrast, these classes make up under 15% of the dropped buildings. Almost half of the dropped buildings are either old law tenements or walk up family apartment

as building class codes, year built, and other descriptive factors that can be used in modeling home values.

I use ArcGIS to geocode addresses and determine their distance from the High Line Park. I can measure both the distance to the park itself, or to one of its entrances (which are at approximately two block intervals). This essentially makes no difference in the analysis, as the change in distance is negligible. I use two-thirds of a mile as the cut-off point for being close enough to the High Line to be considered "treated". First, most apartment buildings within two-thirds of a mile of the park advertise this fact explicitly, whether by mentioning the High Line or including pictures of it. Second, this is approximately a reasonable walking distance – two-thirds of a mile is about four avenues or thirteen blocks on New York City streets.

My primary estimating equation is as follows:

$$\text{Value}_{it} = \alpha + \sum_{t=2008}^{2012} \beta_t \text{Year}_t * \text{Dist}_i + \phi \text{Dist}_i + \xi_t + \theta_i + \delta \mathbf{X}_{it} + \varepsilon_{it} \tag{1}$$

The dependent variable is the logged market value of building i in year t, which is reported in the property assessment database. The coefficients of interest are measured by β_t, which will capture the differential trend in house prices at various distances relative to 2007 (the omitted year), before the park opened. I use various measures of each building's distance from the park, including a linear measure of distance, inverse distance, and finally a nonparametric dummy for $\frac{1}{3}$ mile bins of distance from the park. The coefficients can be interpreted as a percent change in value. One advantage of the property assessment database is that by tracking the same buildings over time, I can use a building fixed effect, θ_i, to account for any fixed characteristics of the building itself over time. ξ_t consists of year dummies for the years 2008-2012.

buildings that include stores.

The key identifying assumption is that the only changes in home values over the study frame extremely close to and slightly further from the park are derived from the High Line Park itself. Values can increase and decrease over time, however this value must change in a similar fashion both near and far from the park, as in a difference-in-differences specification.

One potential threat to identification is if neighborhood characteristics vary differentially by distance to the park. For example, gentrification or commercial developments like new restaurants may invalidate the difference-in-differences assumptions. Thus, I control for time varying neighborhood characteristics with annual data at the zip code level on the number of establishments by NAICS code from the annual County Business Patterns survey (for example, the number of full service restaurants, bars, fitness clubs, etc).[4] This is represented in my primary estimating equation by $\mathbf{X}_{it}$. However, it is also possible that gentrification and economic development occurs as a result of the park, in which case this should be considered as part of the impacts.

I therefore use a similar estimation strategy to assess the impacts of the High Line on the surrounding economic development, as measured in the County Business Patterns data. The counts of business are the dependent variable to see if the High Line is a cause of gentrification. The estimating equation is:

$$X_{zt} = \alpha + \sum_{t=2004}^{2011} \gamma_t \text{Year}_t * \text{Highline}_z + \phi \text{Highline}_z \theta_t + u_{zt} \tag{2}$$

The dependent variable, X_{zt} is a measure of the number of establishments by NAICS category in each zip code z in year t. Highline_z is an indicator for if the zip code includes the High Line Park, which is true for 3 of the 30 zip codes in Manhattan that are part of my dataset. The coefficient γ_t captures the differential trend of businesses classified as a particular NAICS code in High Line zip codes relative to non-High Line zip codes, relative to the year 2003.

[4] 2012 CBP data is not yet avaiable, so I simply use the 2011 data for 2012 as well, assuming that it will be approximately correct

I also use a dataset on home sales to show trends were similar by distance before 2007. This dataset includes the price of all sales of individual apartments or entire buildings going back to 2003, and is thus a pooled cross-section of sales over time. It is inherently different to the property assessment database because the valuation reflects the rental income potential, whereas this dataset gives the actual sale price of a building. The drawbacks to this dataset are threefold: it does not directly influence property taxes; it does not allow for panel analysis to control for unobserved characteristics about each building; and it has a scarcity of descriptive variables about each sale.

Focusing only on Manhattan leads to a sample of 167,327 sales.[5] Of this sample, 22,187 (or approximately 13% of observations) are dropped because they are sold for $0.[6] There is also scant information on characteristics of the housing units; square footage is missing, and the only descriptive statistics about the properties sold are building class codes, the number of units, and the year built. This makes it difficult to model the sale price, particularly because I cannot include a fixed effect to control for unobserved characteristics of a building.

If the housing stock, or more importantly the stock of houses sold, differs systematically across neighborhoods, the measured impacts of the park will be confounded. This is not an issue in the property assessment database because it includes all buildings, but leads the sales dataset to potentially suffer from selection bias [Voicu and Been, 2008]. In response to construction and the knowledge that the park will open, people near the High Line may have delayed selling their homes while those at further distance did not, which would threaten identification. Figure 3 shows the volume of sales by distance to the High Line Park, depicting the trend within half-mile distance buckets over time. The number of sales at all distances

[5]This only includes sales of condo and cooperative buildings, which is the primary building type that I focus on in the Property Assessment Database analysis.

[6]I analyze the counts of zero sales both by neighborhood and by half-mile bin distance to the High Line Park. There is some variation around this 13% number, for example the number with zero sales in the 1.5-2 mile distance bin is 19.5%. However, this does not seem significant enough to influence the results, especially given that the primary results come from the Property Assessment Database, and the sales simply provide further suggestive evidence regarding the main trends.

drops in 2009 and 2010 from the Great Recession, with sales rebounding but still remaining below pre-recession levels. This is at least somewhat suggestive that the properties are fairly similar – if there were large differences by distance this would raise a red flag.

4 Results

Figure 4 shows the average market value per square foot of condo and coop apartment buildings within two-thirds of a mile of the High Line versus two-thirds of a mile to one and one-third miles from the High Line. Though the values at all distances tend to be quite similar prior to 2009, in 2010 there is a clear trend break with valuations of buildings closest to the park rising more than those slightly farther away. These results are not driven by extreme outliers as the same trends exist when using median house prices, not pictured.

Figure 5 provides further suggestive evidence that the opening of the park causes home values to increase. The figure divides properties by distance to the northern and southern segments, which opened at different times.[7] Increases in home values near the southern part of the park, which opened in 2009, slow down in 2011, whereas home value increases persist through 2011 near the northern part of the park, which opened in 2011. The boundary between the southern and northern sections was determined entirely by funding; the first segment was originally intended to go up to 15th Street because that was all that could be afforded at the time of planning, but when fundraising was more successful than anticipated construction extended five blocks further to 20th Street.

Figure 6 shows the average sale price of single unit residential apartments (characterized as apartments in condo or coop buildings) to provide a longer history than can be measured with the valuation data, using the same distance definitions as in figure 4. These data do

[7]In order to accurately group homes by distance to the northern and southern segments of the park, I restrict the distance to be within a quarter mile of each segment. If I were to use the two-thirds of a mile buffer, as in figure 4, most of the properties closest to the northern portion of the High Line would be counted with the southern portion of the High Line.

not control for potential differential characteristics of apartments sold at each distance, such as changes in quality or size, due to data limitations, and should thus be considered only as suggestive evidence. Properties at all distances sell for similar amounts through 2008, with a differential increase in sale price for homes closest to the High Line in 2009, the year the park opens. This is in contrast to the valuation data, where the largest differential increase in home values occurred in 2010. This may be because the valuation data is government assessed, and thus may have a lag in capturing the value that is reflected immediately in the actual sale price of homes.

Given the historical similarity in trends between the home sale and valuation datasets, I assume that the trends in home values prior to 2007 do not differ by distance to the park, as is true with home sales. If true, the impacts of the park are not realized earlier than 2007, despite the fact that construction began in April 2006. The similarity in trends between home sales and home values also suggests that expanding transferrable development rights (TDR's) near the High Line was likely of secondary importance. Though TDR's are valuable to a building and would likely increase its sale price, it is less clear that they should matter for the sale of individual apartments, which would not benefit from the overall building expanding upwards (or being able to trade these permits). Valuations are estimated by assessing the approximate income that could be generated if a building was a rental, and the value of this unused option should not affect rental prices.

Next, I run regression analyses to more precisely identify the causal impact of the park, under the previously stated assumption that the only thing differentially impacting house prices at various distances from the High Line over time is the park itself.

Table 1 estimates equation (1), with distance entering non-parametrically, using one-third mile bins to assume that distance functions the same way within each bin, but can vary across bins. Only the coefficients on the year-distance interactions are reported to preserve space. Standard errors are clustered using east/west blocks of Manhattan, providing 82 clusters

for the primary regressions including all buildings within 2 miles of the High Line Park.[8] Properties from 1.67-2 miles from the park and the year 2007 serve as the omitted categories, so that all coefficients can be interpreted as the percent change in home values relative to buildings at the farthest distance prior to the park's opening.

The row for 2010 shows that the properties nearest to the park saw a dramatic increase in home values of almost 18% in the wake of the park's opening. The impacts dissipate as properties get farther from the park – the slopes are monotonically decreasing, but still significant up to 1 mile away from the park. Though there are significant increases in home values within 1 mile of the park, there is no effect at all farther than 1 mile away. Thus, even though one mile is quite far to walk and the buildings this far away do not tend to advertise their proximity to the High Line, there are still economically and statistically significant increases in home values attributed to the park's opening.

There are also statistically significant, but smaller in magnitude, increases in property values in both 2008 and 2009 in the region closest to the park. This suggests that some of the value of the park was priced in before it opened, showing anticipatory increase in home values. For properties near the park, the relative decrease in impacts in 2011 and 2012 to approximately zero relative change from 2009 represent the convergence between "treatment" and "control" that is observed in figure 4.

In the property tax analysis that follows, I focus on the one year change in property values from 2009-2010, the year after the park opened. This is calculated by subtracting the two coefficients, so that the one year change in property values for buildings closest to the High Line in 2010 is $0.176 - 0.074 = 0.102$, or about 10%. Though I do not present such a

[8]The clusters are created by locating the nearest intersection to each property in ArcGIS, and using the relevant street to assign each property to a cluster. For portions of Manhattan that do not fall on the grid, in particular the West Village and below Houston Street, I approximate the groups using appropriate east/west streets. In addition, I also clustered standard errors using neighborhoods – although there are not enough neighborhoods to guarantee that the standard errors are correct the significance of results with this method remains essentially unchanged.

table separately, there is a statistically significant difference in 2010 relative to 2009 for all three distance bins within one mile of the park.

As a robustness test, I estimate regressions of equation (1) using both linear and inverse distance as the primary explanatory variable, which yields similar results.[9] I also run placebo tests to assess if the increase in value found in table 1 is due to the opening of a new park or a simple revaluation of parks in general.[10] Table 2 estimates identical regressions for five parks spread geographically throughout Manhattan. These include several parks that are marked on the map in figure 1, as well as Riverside Park, which is similar to the High Line in its location on the western portion of Manhattan along the Hudson River, but is much farther north. The table only presents estimates for 2010, the year that the High Line had the greatest impact on home values, though all years are included in the regressions.

Several notable trends emerge providing further evidence that the earlier findings are robust. None of the other parks demonstrate the same monotonically decreasing impacts observed with the High Line, with proximity to several parks estimated to have a negative impact on home values. In addition, though the impact in the closest distance bucket is significant for Madison Square Park, the magnitude is much smaller than the 17.6% impact on properties within one-third of a mile of the High Line. The general trend is thus clear – the increase in home values observed near the High Line Park is not part of a change in the way that parks are valued in general, but rather due to the opening of the park itself.[11]

Finally, I estimate equation (2) to assess the impacts of the High Line on the surrounding economic development, as measured in the County Business Patterns data. Note that the counts of businesses for several establishments were included as controls in the previous regressions, but are now used as a dependent variable to see if the High Line is a cause of

[9] These tables are available on request from the author.

[10] New Yorkers for Parks and Ernst & Young [2003] shows that in general, properties near parks in New York City are valued more highly than those farther away from parks.

[11] Figures and tables for these robustness checks on placebo parks that are similar to the others presented throughout this section are available on request from the author.

gentrification.

Table 3 presents the results from running this alternate regression specification on economic development trends throughout New York City. As can be seen in the first two columns of table 3, there is an increase in the number of businesses near the High Line Park. The increase in "Arts, Entertainment, and Recreation" establishments starts in 2008, near the opening of the park, with the biggest increase measured in 2011. The only statistically significant increase in "Accomodation and Food Services" occurs in 2011, with an increase of 36 establishments in High Line zip codes relative to 2003. The primary driver of this result is full service restaurants, which increase substantially in 2011, after the High Line has opened. This suggests that gentrification near the High Line is due to the park itself, implying that only measuring property values underestimates the broader effects on the economy.

5 Property Taxes

I estimate the added property tax revenues the city collects from the introduction of the High Line Park, as a rough calculation of the net benefit of building the park. There are many simplifying assumptions that must be made, and thus these results should be taken with a grain of salt. For example, the home value data are only for a subset of buildings, but estimating the total additional property taxes requires a measure of the universe of housing. Since the economically and statistically significant impacts occur within one mile of the High Line, I will estimate the change in property taxes within this buffer.

Calculating property taxes depends both on the tax class and the assessed value, which is the amount of the property that one pays taxes on. Tax class 2 encapsulates all primarily residential buildings with four or more units, which is the type of building that has been considered thus far in the analysis. The tax rate in 2008-2009 for this type of property is 12.596%, and the assessed value for tax class 2 is 45% of the market value. One key

restriction is that the assessed value cannot increase more than 8 percent in a given year or more than 30 percent in five years, which will matter since the measured change relative to 2009 for properties within one-third of a mile was 10%.

The nonparametric distance bin estimates from table 1 yield the net impacts of the park in 2010 relative to 2009 by simply summing the difference in coefficients from each bin, restricting the nearest bin to be 8%. Thus, within $\frac{1}{3}$ of a mile of the park housing prices increased by 8%, from $\frac{1}{3}$-$\frac{2}{3}$ of a mile housing prices increased by 7.6% and from $\frac{2}{3}$-1 mile prices increased by 5.3%. Assuming that housing is uniformly distributed over the (approximate) circle created around the High Line, this would mean $\frac{1}{9}$ of the houses are in the bin within $\frac{1}{3}$ of a mile, $\frac{3}{9}$ are in the next bin, followed by $\frac{5}{9}$ in the farthest bin.[12] The weighted net increase in home value is thus approximately 6.3% in 2010 alone. Thus, the property tax bill should also increase by 6.3%.

Next, I estimate the initial property tax bill. First, I need the total number of housing units within a one-mile radius of the High Line. This area approximately spans Manhattan's Community Districts 2 and 4. District 2 has 56,211 housing units in 2010, and district 4 has 69,598 units.[13] This area doesn't quite go east enough to cover the one mile radius from the park, but also does go a little further south. Thus, as a rough approximation, I take the housing stock within a one mile radius of the park as the 125,000 total units in these two community districts. This seems reasonable, given that the 2011 New York City Housing and Vacancy Survey[14] reports a total of 841,000 total units within Manhattan, and this radius

[12]These calculations should be noted to be rough estimates. For starters, the High Line is not a point, so the precise area within one mile of the park is not a perfect circle. Additionally, because of its location on the far west side of Manhattan, some of the area within the one mile radius cannot include housing because of the Hudson River. For simplicity, in this calculation I assume that each of the bins lose properties proportionately. Though this assumption is likely inaccurate, it is a conservative estimate – the closest properties to the immediate west are within the closest distance bin, which increased in value the most and are thus most discounted in the calculation.

[13]See reports here: http://www.nyc.gov/html/dcp/pdf/lucds/mn2profile.pdf and here: http://www.nyc.gov/html/dcp/pdf/lucds/mn4profile.pdf

[14]See report here: http://www.nyc.gov/html/hpd/downloads/pdf/HPD-2011-HVS-Selected-Findings-Tables.pdf

covers approximately one-sixth of the island. In my data, I can calculate the average home value per unit by dividing the market value for a building by the total number of units. This yields an average value per housing unit within a one mile radius of the High Line in 2009 of approximately $200,000.[15] Thus, I estimate the full value of the housing stock as $25 billion.

Given that the assessed value is 45%, and the property tax rate is 12.596%, this yields an estimate of $1.4 billion in property taxes collected before the park opened in 2009. This seems reasonable in light of the approximate $14.5 billion total property tax bill throughout New York City in 2009.[16] Thus, an increase of 6.3% in property values associated with the introduction of the High Line implies an increase in property taxes of approximately $90 million.[17] As of 2011 the city had spent $115 million on building the park[18], and thus this is almost sufficient to cover the costs in one year alone.

This estimate likely undervalues the true economic benefits for several reasons. First, it only considers the impacts in one year (2010) within a one mile radius of the park. Table 1 suggests that the true impacts may in fact be larger when considering the change since 2007, and that increases in home values are persistent over time. Second, it assumes that the housing stock remains fixed (i.e. no new homes are built), and ignores non-tax consequences like improved health or added investment that may be associated with the High Line. Third, it disregards any change in the broader economy, for example a change in sales taxes from greater business activity due to the High Line. This figure of $90 million is the increase in property taxes in 2010 alone, if the true impact is persistent then the subsequent rise in home values has been a very significant windfall for the New York City government.

[15] According to Zillow, at the beginning of 2010 the home value index in Manhattan was $1.07 million. In reality, this is likely an underestimate of the value near the High Line since this part of Manhattan is particularly expensive. Thus, this demonstrates the difference between the sale price and the assessed value.

[16] See report here: http://www.nyc.gov/html/omb/downloads/pdf/methodology_2010_02.pdf

[17] As part of the plan of building the High Line, an economic feasibility study was produced by HR&A Advisors, Inc. This study, commissioned in 2002, estimated that the incremental property taxes collected would be $250 million over 20 years, which my estimate likely reaches within two years.

[18] See article here: http://www.nytimes.com/2011/06/06/nyregion/with-next-phase-ready-area-around-high-line-is-flourishing.html

6 Conclusion

In conclusion, there is fairly substantial evidence that the opening of the High Line Park did lead to a large increase in home values. The largest impacts tend to be measured in 2010, in the year after the park opened, but there are detectable increases quite close to the park in 2008 and 2009. This implies that it is the opening of the park that matters most, but home values do increase prospectively before the park actually opens. My preferred estimates suggest that the opening of the park led to a one-year increase in home values of approximately 10% for apartments within one-third of a mile of the park. The overall sentiment within the neighborhoods immediately surrounding the park reflects the success that it has had in boosting economic development. One local property owner who had originally been in favor of abolishing the High Line, but eventually came around to support the park, summed this up nicely in saying, "The High Line had been an impediment for so many years. [They] changed it into a catalyst."

Given the increase in property taxes suggested by these coefficients, the park likely paid for itself. Other cities would well look to this example and consider building their own parks. Indeed, there are also two other cities, Paris and Chicago, with similar parks. In Paris, the Promenade plantee opened in 1993, so it seems unlikely that historical data on house prices would be available to perform a similar analysis. In Chicago, the Bloomingdale Line recently opened, converting a 2.7 mile old railroad trak into an urban park space called the 606. If executed correctly, this will also likely be a large revenue generator for the Chicago local government, which is cash strapped with its pension obligations.

One puzzle presented by figures 4-6 is why the prices near the park converge back to the same level over time. There are several potential stories that may explain this fact. First, we may think that in the short run, the supply of housing is perfectly inelastic since new housing cannot simply appear on the market overnight. An increase in demand driven by

the park would thus increase the price of housing in the short run, but be unable to increase quantity. Over time though, construction of new housing may take place to meet the new demand in the market. Indeed, we see this in New York City, as evidenced by several brand new high-rise buildings immediately surrounding the High Line Park. Further, the findings from the New York City Housing and Vacancy survey in 2011 reports the highest number of housing units ever. Though the exact growth cannot be compared to 2008, there was rapid growth of 2.1% in the housing stock, the fastest measured, between 2005 and 2008.[19] If the long run supply of housing is perfectly elastic, then the increase in demand would not change price, but would rather simply increase quantity.

An additional reason that home values may have converged is related to disutility caused by congestion from the park. The park has been extremely successful, drawing in 4.4 million visitors in 2012. However, the glut of visitors also leads to much congestion, and the sentiment regarding this was captured in a 2011 *New Yorker* article describing "the new Chelsea that is emerging on weekends, as visitors flood the elevated park: touristy, overpriced, and shiny."[20]

One area for future work is to examine some of the impacts of externalities of the park. In general, parks represent a convenient place for nearby residents to exercise. Though the High Line is a place primarily used by walkers, it would be interesting to observe health trends in the regions immediately surrounding the park to analyze if the park provides an additional value by improved public health. In addition, it would be interesting to see if the park, and the assumed additional time that people spend outdoors, leads to changes in behavior and attitudes towards environmental issues. These effects would likely be second order relative to the large gains in property valuation and thus property taxes observed.

[19] http://www.nyc.gov/html/hpd/downloads/pdf/HVS-Chapter-4.pdf
[20] http://www.newyorker.com/arts/reviews/tables/2011/08/08/110808gota_GOAT_tables_levy

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Table 1: Logged Market Value Interacted with Distance Bins

	0-0.33 miles	0.33-0.67 miles	0.67-1 miles	1-1.33 miles	1.33-1.67 miles
2008	0.048***	0.023	0.010	0.001	0.019
	(0.017)	(0.018)	(0.035)	(0.016)	(0.014)
2009	0.074***	0.039**	0.033	-0.006	0.004
	(0.025)	(0.019)	(0.033)	(0.021)	(0.016)
2010	0.176***	0.115***	0.086**	0.025	0.034
	(0.032)	(0.025)	(0.035)	(0.024)	(0.025)
2011	0.124***	0.091***	0.116**	0.010	0.027
	(0.037)	(0.028)	(0.047)	(0.022)	(0.039)
2012	0.082**	0.067**	0.083***	0.009	-0.003
	(0.042)	(0.026)	(0.030)	(0.023)	(0.027)
Robust standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

NOTE: Presents regression results from estimating equation (1), calculating the distance variable by grouping properties into $\frac{1}{3}$ mile bins of distance from the High Line park. The sample consists of 1,379 buildings with at least five years of data from 2007-2012 located within 2 miles of the High Line park, for a total of 7,458 building/year observations. Standard errors are clustered by east/west block of Manhattan, with 82 clusters.

Table 2: Logged Market Value Interacted with Distance Bins, Placebo Parks

	0-0.33 miles	0.33-0.67 miles	0.67-1 miles	1-1.33 miles	1.33-1.67 miles
Madison Square	0.108***	0.050***	0.072***	0.045**	0.036**
	(0.026)	(0.017)	(0.024)	(0.019)	(0.018)
Sara Roosevelt	-0.064**	-0.064**	-0.089***	-0.006	0.001
	(0.032)	(0.026)	(0.031)	(0.026)	(0.028)
Washington Square	0.050	0.084**	0.073**	0.090***	0.064*
	(0.046)	(0.032)	(0.032)	(0.030)	(0.032)
DeWitt Clinton	-0.043	-0.030	-0.051***	-0.086***	-0.010
	(0.040)	(0.020)	(0.017)	(0.015)	(0.024)
Riverside	-0.089***	-0.072***	-0.163***	-0.101***	-0.024
	(0.022)	(0.018)	(0.039)	(0.034)	(0.016)
Robust standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

NOTE: This table runs identical regressions to table 1, but only presents the 2010 row for each of the 5 placebo parks to preserve space. Presents regression results from estimating equation (1), calculating the distance variable by grouping properties into $\frac{1}{3}$ mile bins of distance from each of the various park. The sample consists of buildings with at least five years of data from 2007-2012 located within 2 miles of each park. Standard errors are clustered by east/west block of Manhattan.

Table 3: Commercial Business Patterns Trends, Interacted with High Line Zip Codes

	Arts, Entertainment, and Recreation	Accomodation and Food Services	Full Service Restaurants	Limited Service Restaurants	Drinking Places
2004	-15.0	-26.3	-17.0*	-6.5	-1.5
	(12.0)	(18.5)	(9.5)	(7.1)	(2.0)
2005	-5.7	-14.3	-8.0	-3.5	-0.5
	(12.0)	(18.5)	(9.5)	(7.1)	(2.0)
2006	6.0	-6.3	-5.7	-2.8	3.5*
	(12.0)	(18.5)	(9.5)	(7.1)	(2.0)
2007	12.7	-0.7	-6.0	-3.8	1.8
	(12.0)	(18.5)	(9.5)	(7.1)	(2.0)
2008	22.0*	10.0	-3.3	2.2	4.2**
	(12.0)	(18.5)	(9.5)	(7.1)	(2.0)
2009	23.7**	5.0	-0.0	0.2	1.8
	(12.0)	(18.5)	(9.5)	(7.1)	(2.0)
2010	20.3*	11.7	0.7	2.5	-0.5
	(12.0)	(18.5)	(9.5)	(7.1)	(2.0)
2011	26.3**	36.0*	18.7*	5.5	0.5
	(12.0)	(18.5)	(9.5)	(7.1)	(2.0)
Observations	294	294	294	294	294
Zip Codes	30	30	30	30	30

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

NOTE: Presents regression results from estimating equation (2). Dependent variables include the number of establishments, by NAICS category, in each zip code, from the County Business Patterns data.

Figure 1: Map of High Line and Surrounding Neighborhoods

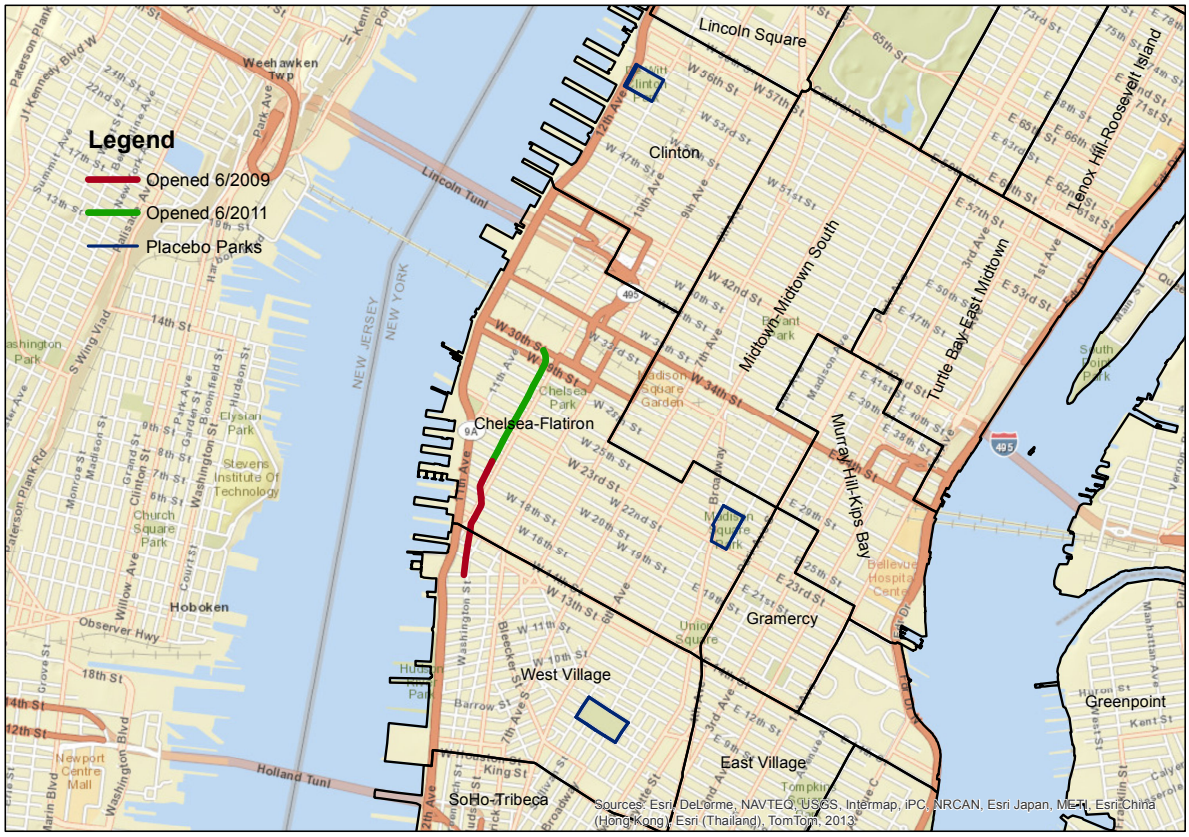


Figure 2: Timeline of High Line Key Events

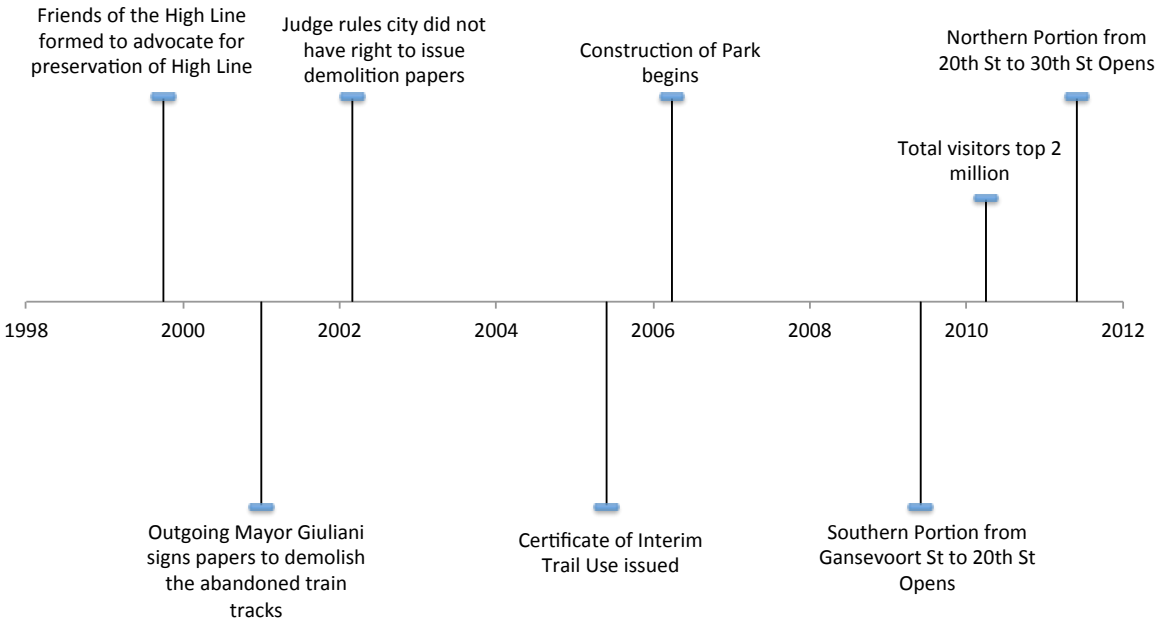
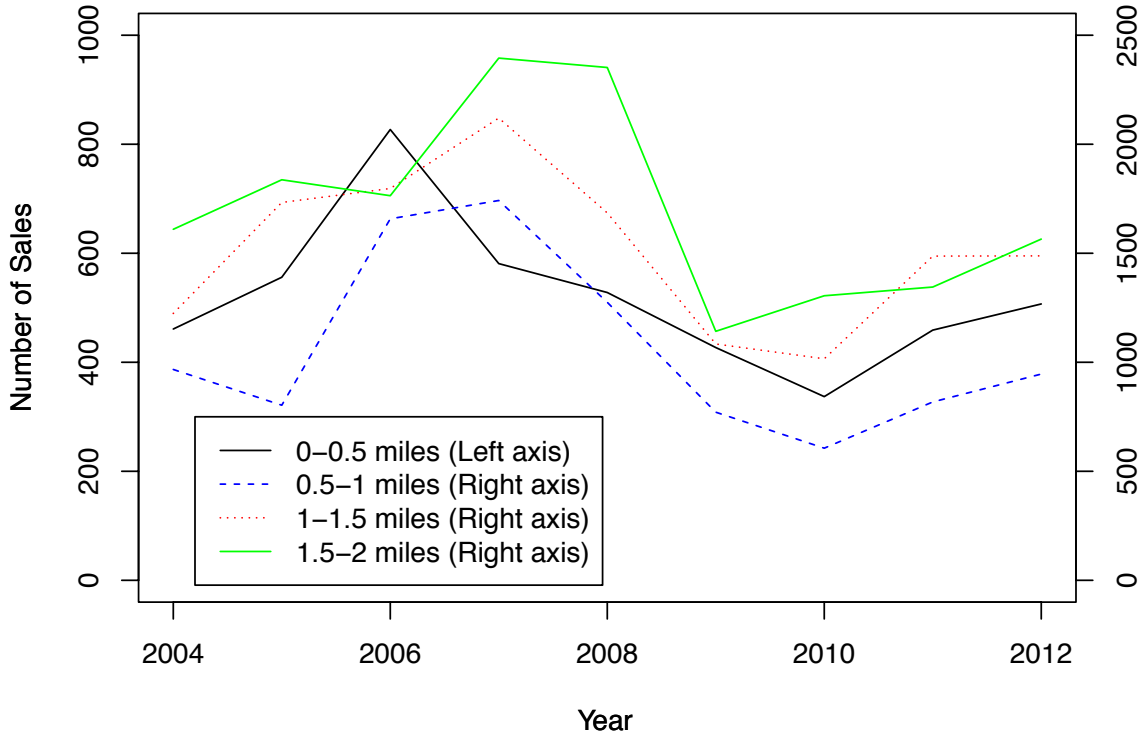
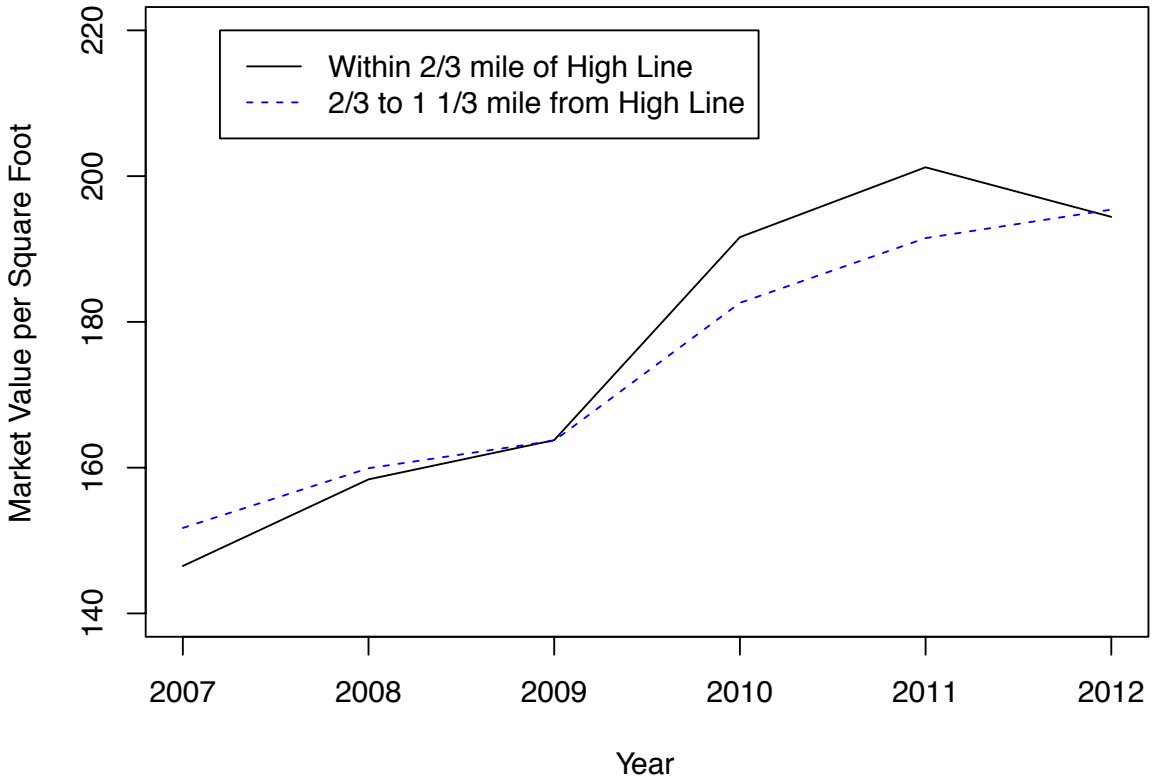


Figure 3: Home Sales By Distance to High Line Park



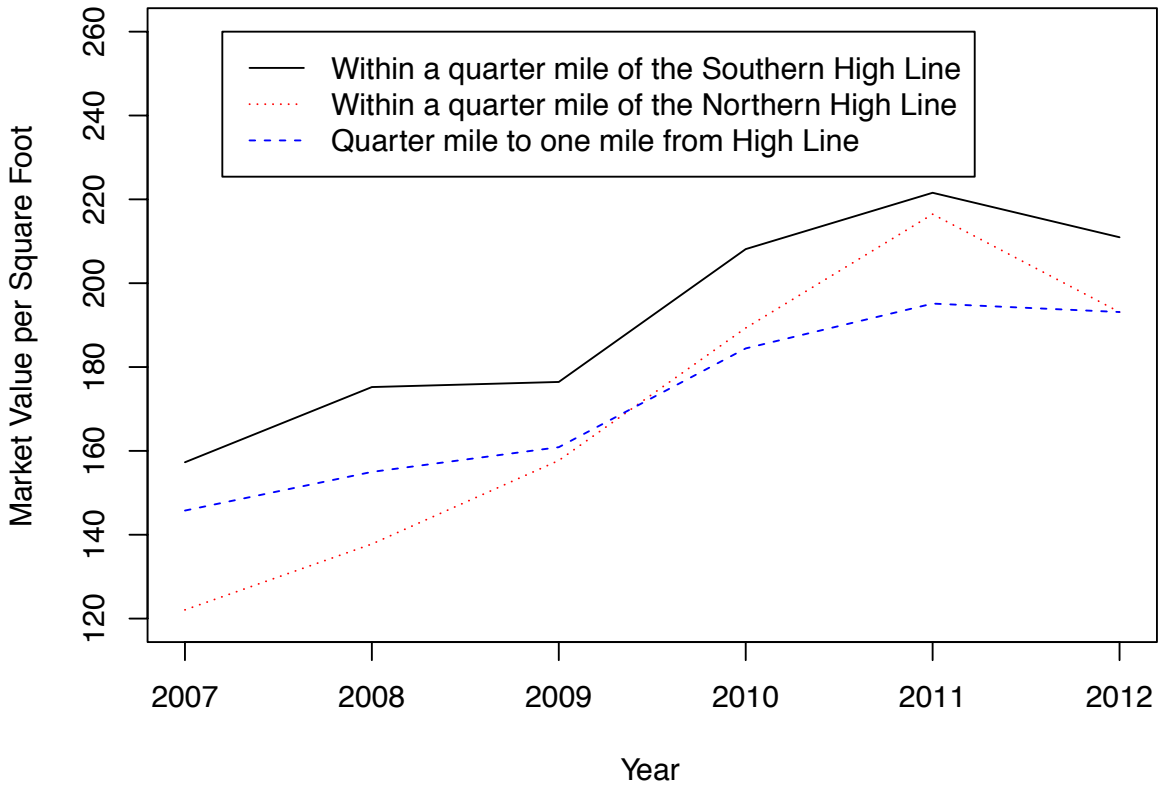
NOTE: Sample period: 2004-2012. Number of annual home sales of condo and coop apartments from the New York City government's home sales database. Excludes apartments sold for $0.

Figure 4: Home Valuations Near High Line Park



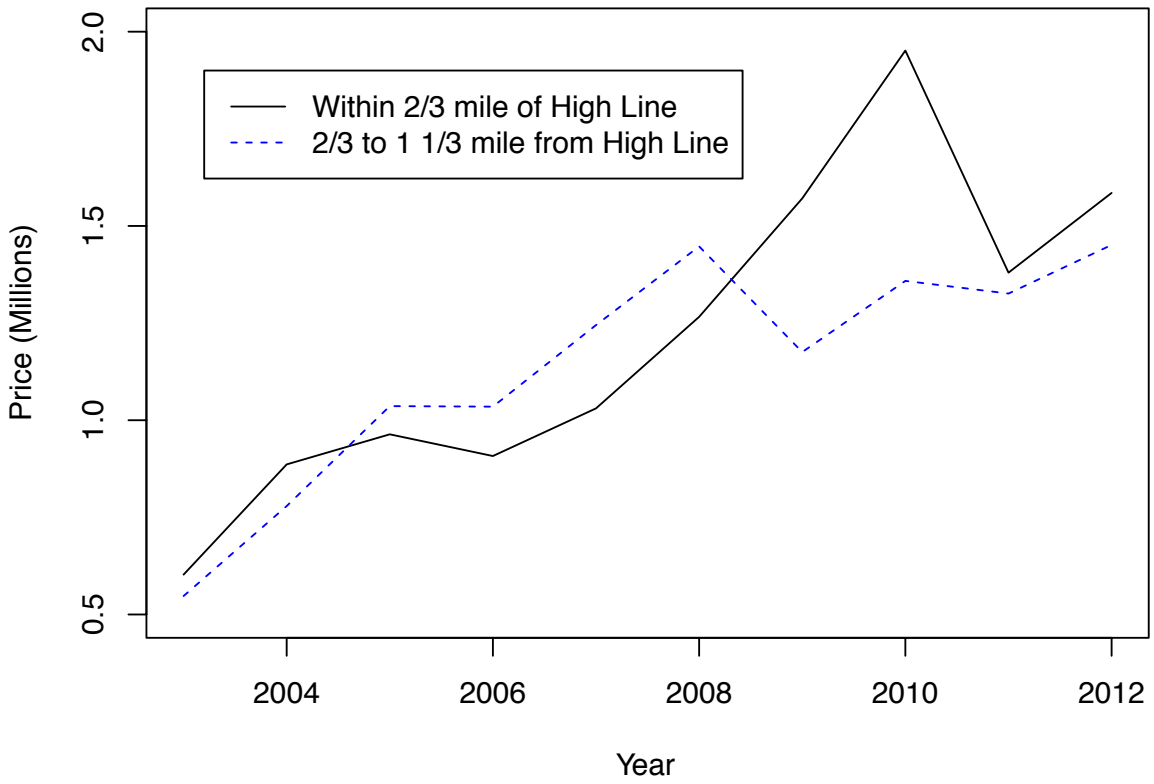
NOTE: Sample period: 2007-2012. Valuation of condo and coop apartments from the New York City government's reports on comparable rental income archives.

Figure 5: Home Valuations Within 1 Mile of High Line Park



NOTE: Sample period: 2007-2012. Valuation of condo and coop apartments from the New York City government's reports on comparable rental income archives.

Figure 6: Home Sales Near High Line Park



NOTE: Sample period: 2003-2012. Home sales of condo and coop apartments generated using the New York City government's rolling annual home sales database.