DO NEIGHBORHOOD PARKS IN A DECLINED
CITY IMPROVE HOUSING PROPERTY VALUE?

By

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ABSTRACT

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Many studies that have assessed the economic benefit of urban greenspace have demonstrated that greenspace has a positive effect on the property value and overall desirability of properties. Previous studies, however, have yet to explore the City of Detroit after the 2013 Bankruptcy, the subsequent decline in population, and the relationship of greenspace toward the single-family property value. In this research, real estate transactions were collected from Michigan's city of Detroit open data portal, to examine the relationship between community park size, proximity to the park, and the monetary value of single-family housing property. The data gathered was inputted into GIS in order provide spatial results that are more reliable to see, analyze, and understand the patterns and relationships. The results of the statistical model showed that an inverse correlation exists between parks and single-family house transaction value. This correlation highlights the current conditions that are in prevalent in the greater Detroit. This research is an effective gauge to steer the future municipality planning of the communities affected by the population decline.

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CHAPTER 1 INTRODUCTION

Urban greenspaces that are designed using solid ecology principles and modern standards provide a myriad of benefits such as a population with less obesity, reduced heart disease, mentally healthier people (Kim et al., 2016; Nowak et al., 2006; Wolch et al., 2014) storm water collection and filtration (Fu et al., 2021b; Hurley & Forman, 2011; Sohn et al., 2019), healthier ecosystem and pollinators (Bellamy et al., 2017), and carbon sequestration (Strohbach et al., 2012). In addition to the ecological and population health benefits, many fiscally based research studies suggested that greenspace can affect land value of nearby residential properties (Conway et al., 2010; Crompton, 2001; Haaland & van den Bosch, 2015; Kim et al., 2018; W. Li et al., 2015; Nicholls & Crompton, 2005; Wolch et al., 2014). The overwhelming empirical evidence suggests that the increase in the surrounding property value attributed to the park's intrinsic value out stripped the value of the park to the city as additional revenue source from increased developments (Crompton, 2001).

In a previous study (Voicu & Been, 2008), they compared the sales of over 500,000 properties before and after the opening of a community garden in the Bronx area, NY, USA. Their findings showed a significant impact on property values across different neighborhoods. Similarly, Conway et al. (2010) examined the sales of 260 single familyhouses from 1999 to 2000 in Vermont Corridor near downtown Los Angeles in California, USA using the standard Hedonic pricing model, to estimate the greenspace effects. The results of their study showed how houses at the immediate vicinity of greenspace had higher market values than others. However, these studies were focused on cities or communities that were in a period of population growth. Other studies found the opposite to be true in many cities in which population was in decline or the neighborhoods selected had not yet had a sufficient recovery period to show the identifiers that were associated with the forementioned studies of growth.

Despite the number of studies that showed significant associations between house values and greenspace, previous research was not conducted in cities in population decline, specifically Detroit, MI, USA. The decline of a city has been defined and measured by numerous researchers, and various factors have been identified such as the gross domestic product, the population, or its fiscal solvency(Desan, 2014). Little is known about the impact of the different attributes that make up these greenspaces (Rosiers et al, 2002), the aesthetic quality of greenspace (Conway et al. 2010), the optimum amount of greenspace needed to create positive impact in a city in decline and do these factors translate to the city of Detroit. Taking a holistic view when approaching the data collection, this study was able to get a view on the current trends for five neighborhoods in Detroit. As of 2019 Detroit is showing signs of population growth with the vacancy rate for commercial properties shrinking to 13.10 percent, however the average residential vacancy rate of the inner communities still at a staggering 27.00 percent. The level of vacancy translates to lower revenue for the neighborhoods and then result in less programing for activities.

The main purpose of this study is to examine the correlation of the existing neighborhood parks and single-family housing property values in communities facing urban vacancy issues. Results of this study will show housing value in properties in five of Detroit's neighborhoods to help in the understanding the current value of parks and the need for policy makers to promote its use. This research will also assess the future fiscal costs and benefits and environmental impact of parks in relation to residential housing in the city of Detroit.

CHAPTER 2 LITERATURE REVIEW

This chapter will review the methods, findings, and gaps in previous studies in measuring the impact of parks in the urban Detroit environment. Furthermore, this chapter will focus on reviewing the quality of urban parks and how they affect the overall value of surrounding properties. Finally, two different measuring approaches to quantify the property value will be addressed.

2.1 Urban Parks and Housing Sales Prices

Size and location are important factors in determining whether a park will have a significant impact on neighboring property. Numerous studies have been accomplished to identify the optimal size, type, and location of various types of greenspaces (e.g. golf courses, gardens, urban farms, empty lots, brownfields, etc.) (Beer et al., 2003; Brander & Koetse, 2011; Lutzenhiser & Netusil, 2001) and urban parks (More et al., 1988). Simultaneously, studies have been conducted to determine how large parks need to be in an urban environment to effectively deal with stormwater and air pollution (Bellamy et al., 2017; Strohbach et al., 2012).

Recent studies have investigated the use of park's adjacent neighborhoods with different median incomes to quantify the usage (Cohen et al., 2013, 2016). The significant usage difference was found to be attributed to the budgetary restrictions of the parks adjacent to the neighborhoods with lower median incomes due to the reduced tax revenue. Reduced budgets in turn limits the activity programing and can monetarily change the effect the park has on neighboring properties. This devaluation of the parks by the residents adjacent to the parks the effects the premium new potential owners will pay to be near a park.

The devaluation of properties near parks has been observed in a study by Crompton (2001). In this study it was observed that a lack of proper maintenance and security can turn a park from an asset to a liability (Crompton, 2001). Also observed by Crompton (2001) was diverse types of parks bring different value, an example of that is a flat open sports field is less desirable than a naturalistic park with trails. Thus, the surrounding properties would be affected differently depending on the park type, level of maintenance, security, and activity programing. The density of development adjunct to the park plays a role as well, for example a park in a rural area can present trespassing concerns for the local landowners that have put fences and post no trespassing signs around their property boundary.

Previous studies, however, have concentrated primarily on cities not in population decline (Guerrieri, 2012) and have addressed cities in more stable population and economic conditions. This study will bridge that gap as 11.00 percent of the top 200 US cities (Bureau, n.d.) are currently in population decline.

2.2 Quantifying Property Values

In the field of environmental price analysis there have been many approaches on data collection including aerial imagery (Saphores & Li, 2012). Most of these studies use the hedonic pricing model (HPM) (Brander & Koetse, 2011; Sirmans et al., 2005) and the contingent valuation method (CVM) (Brander & Koetse, 2011) for their analysis. The HPM has been widely used because of technological advancements in recent years which allows the leveraging of the HPM with remote sensing, and geographic information systems (GIS) (Kim et al., 2018; Murayama & Thapa, 2011; Sohn et al., 2020). The background for the HPM and CVM methods is explained in more detail in the sub-sections below.

2.2.1 Hedonic Pricing Model

The HPM, a method of calculating/predicting real estate prices can be traced back to the late 1930's, however, the more significant and relevant work of Lancaster in1966 and Rosen in 1974 (Sirmans et al., 2005) is what is thought of as the beginning of the method used today. This model says the price (P) of a house will be affected by the structural characteristics of the house itself (s), characteristics of the locality/neighborhood (n), and environmental characteristics (e), P=f(sn, nn, en). This model has been updated numerous times since it was conceived and will account for the variables of the housing marketing when calculating the necessary pricing per square foot in relation to the proximity of greenspace(Cohen et al., 2016; Kim et al., 2018; Sohn et al., 2020).

Looking at a study of Los Angeles the HPM looked at 324 single family residence transactions between 1999 and 2000 (Conway, 2010). In the model the study included characteristics of the house, such as lot size, building area, number of rooms, year built,quality and condition. The houses were then geocoded in Arc View 3.2 and Arc info 7.2.1 for the creation of a Point layer of houses. After including factors such as living area, lot size, and age and removing outliers, the findings were statistically significant showing every 1.00 percent increase of living area increases the expected sale price by about 0.60 percent. Also, every 1.00 percent increase in lot size increases the expected sale price by 0.12 percent (Conway, 2010).

2.2.2 Contingent Valuation Method

The contingent valuation method is used to calculate and predict the value of the items that are not as tangent (i.e. bedrooms), instead, contingent valuation looks at intangibles like environmental preservation. This model takes into consideration what people are willing to spend to produce an evaluation. Brander & Koestse (2011) describe that the value of urban open space has a relationship with population density. This is determined by how much a person is willing to pay to be near the open space. This study collected 38 Contingent valuation studies on urban and peri- urban open space as part of their literature review. They included 15 countries and US states including categories of open space like parks, greenspace, undeveloped land, and agricultural land. These categories were distilled down due to low observations of the individual categories. They used the model where i takes values from 1 to the number of observations and subscript j takes values from 1 to the number of regions, α is the constant term, μj is an error term at the second (region) level, εij is an error term at the first (observation) level, and the vectors $\boldsymbol{\beta}^c$, $\boldsymbol{\beta}^a$ and $\boldsymbol{\beta}^s$ contain coefficients to be estimated by the model on explanatory variables in $\boldsymbol{X}^c$, $\boldsymbol{X}^a$ and $\boldsymbol{X}^s$, respectively. They assumed that μj and εij followed a normal distribution with means equal to zero and that they are uncorrelated, so that it is sufficient to estimate their variances, σμ2 and εσε2 respectively. In their model, the level 2 error term represents each region's departure from the population mean, represented by the constant term(Brander & Koestse, 2011). The results found a positive and significant relationship between the value of open space and population density (measured at the state, county, or provincial level). A 10.0 percent increase in population density results in a 5.0 percent increase in the value of open space. (Brander & Koestse, 2011). This observation is particularly relevant for this study as Detroit is in a period of population decline.

2.3 Detroit's Declination Impact

Globally the world's population continues to increase with an expected urban population doubling by 2050 (Newman et al., 2016). The vast majority of the population will continue to push city expansion in the near future spawning mega cities with populations of more than 10 million (Newman et al., 2016). The government of these cities will aid in the determination of growth by their application of policies regarding urban vacancy and toward the acquisition of surrounding municipalities as needed to encourage the growth needed to thrive (Newman et al., 2016).

Detroit's current trajectory is one of rebuilding and an updated identity discovery after the automobile industry collapse and subsequent Bankruptcy of the city (Desan, 2014). Figure 1 shows that the urban vacancy of Detroit in 2019 was between 18.2 percent-34.3 percent. The city's population decline effected many faucets of the normal metrics that are associated with a city with healthy population growth. The study of Detroit's previous population decline of the 1980's documented that lower median income neighborhoods population declined first followed by the next highest median income neighborhood and repeating up to the highest median income neighborhoods. The rational for this is that people in general want to live next to the highest median income neighborhood their budget can afford because of the amenities provided in higher income neighborhoods tend to be more substantial because of the greater mileage provided by the resident of those higher income neighborhoods (Guerrieri, 2012). The out-migration of higher median income residents of a city directly effects the amenities of the city, creating a less desirable place to live (Figure 1) (Guerrieri, 2012).

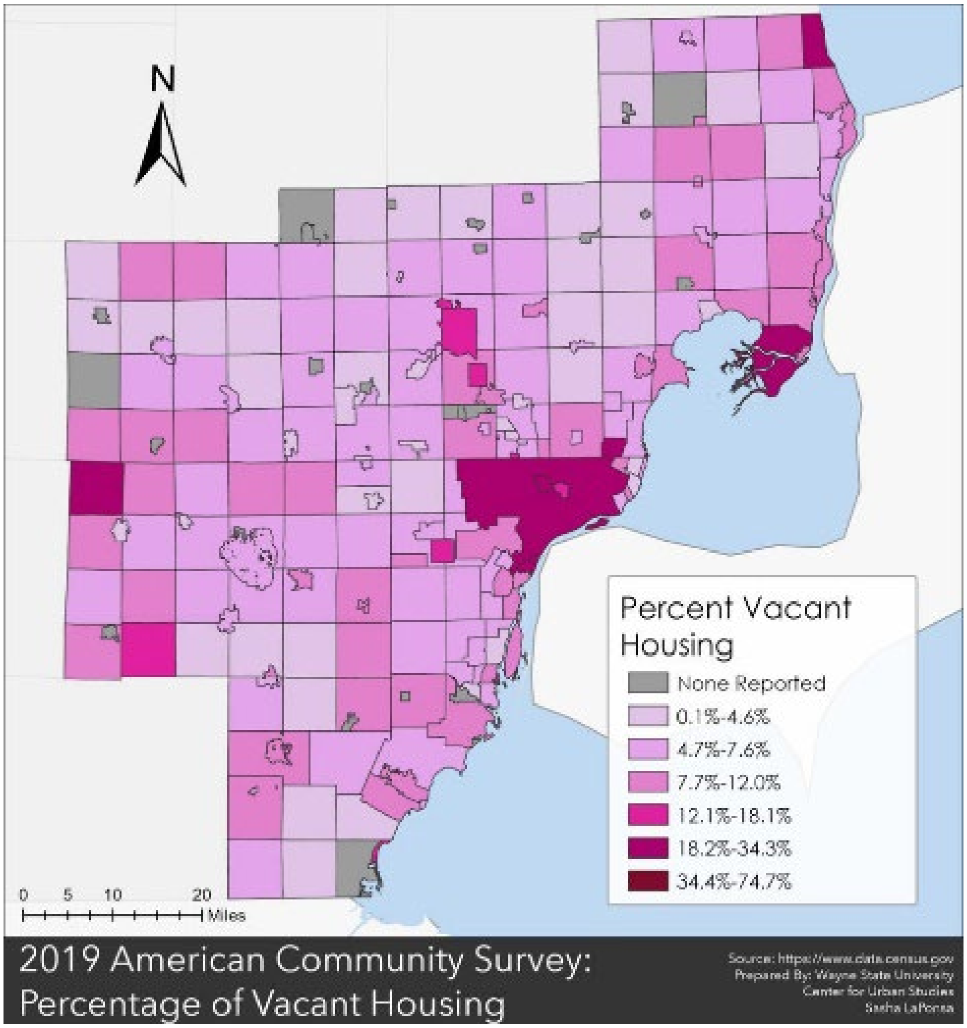

Figure 1 *Vacancy Rates of Detroit and Vicinity Areas*
Credit: U.S. Census Bureau QuickFacts, n.d.

CHAPTER 3 METHODOLOGY

When researching the effect of different factors of property value in an urban environment, it will fundamentally come to location. Location of the resources needed by a community for it to be a desirable and functionally efficient to dwell. This study examines the correlation of the park location and size, and single-family housing value in Detroit. To conduct the analyzation of the relevant factors the HPM was selected over the CVM for the ability to calculate the importance of relevant variables.

3.1 Study Area and Sample

As the largest city in Michigan, the center of the automotive industry Detroit is the 24th most populated city in the US (*U.S. Census Bureau QuickFacts*, n.d.). The total population of Detroit in 2020 is estimated at 639,111 (*U.S. Census Bureau QuickFacts*, n.d.), down 10.46 percent from 2010 (*U.S. Census Bureau QuickFacts*, n.d.). The decline in the city's population is a result of the auto industry collapse and the 2008 finical crisis. This collapse had a widespread effect throughout the Midwest, as the cities with part manufacturing plants suddenly either reduced production or shut down entirely. Detroit's involuntary identity crises creates a great opportunity to study the economic potential of efficient and environmentally friendly re-development of the city. Specifically, this study examines the potential benefit for additional greenspace in the core of the city, as new industry returns to Detroit and the demand for residential housing begins to increase once again. The research selected five neighborhoods that had both a strong set of data points (real-estate transactions) and parks within 1 mile. Corktown, North Corktown, Delray, North End, and Islandview were the selected neighborhoods in the Detroit Metropolitan Area and the 96 transactions associated with these neighborhoods to include in the data set (Figure 2).

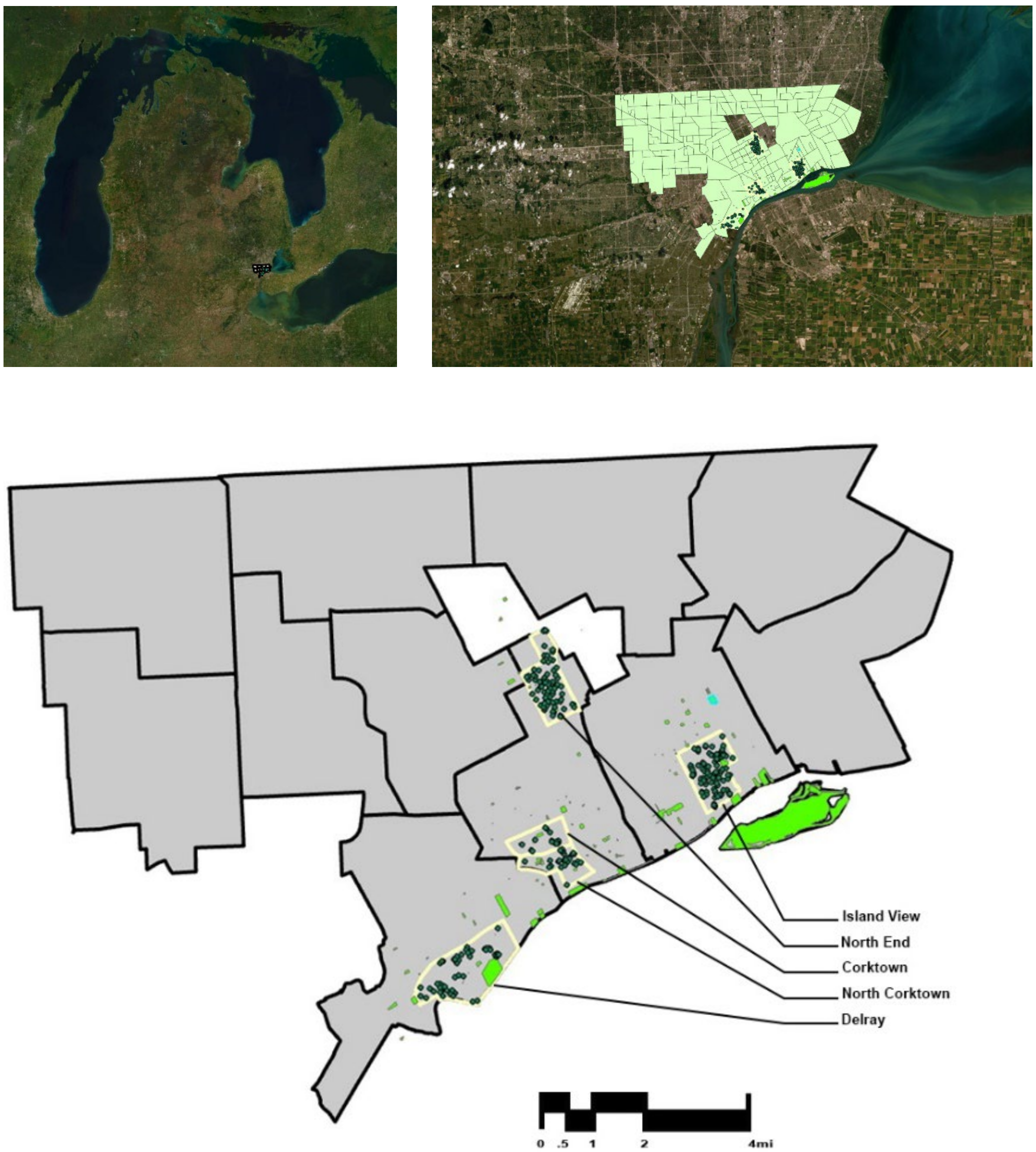

Figure 2 *Study Area*

3.1.1 Selected Neighborhoods

To meet the main study purpose, several neighborhoods in Detroit were selected regarding issues of population decline, socio-economic status, and data availability. Like many neighborhood's in the Detroit umbrella Corktown is one that has had a significant shrink since its peak in the 1930's where the population was approximately 30,400 residents(*Greater Corktown*, n.d.). The population in 2019 was 3,555 which 11.0 percent of its former level. That being said Corktown has seen a 10.0 percent population growth in recent years with potential of greater growth in the future with recent significant investment by large corporations(*Greater Corktown*, n.d.). Corktown's median income is $45,000 which is significantly higher than the City of Detroit's median income level of $30,000 and neighboring North Corktown's of $19,000. The greatest percentage of the population, 22.0 percent, of Corktown is between the age of 25-34 with an educated background with 69.0 percent of the adult residence having some college or higher.

Neighboring city of North Corktown has significantly differencing statistics to that of Historic Corktown. The population has a much lower education level to it neighbor with 45.0 percent having some college or higher and an annual average income level of $19,000. This level of difference explains the lower percentage of owner-occupied residences, 15.0 percent compared to Corktown's 20.0 percent (*City of Detroit Open Data Portal*, n.d.).

The neighborhood of North End has a population total of approximately 1,343 people. The population has an education level of 43.6 percent having some college or higher, and a median income of $32,600. The owner-occupied residential level to North End was higher with 35.9 percent being owner-occupied(*City of Detroit Open Data Portal*, n.d.).

Delray was annexed by Detroit in 1906 and is home to the Gordie Howe international bridge which is the second international bridge with Canada. Like the rest of Detroit Delray's population peaked around 1930 with a population of around 24,000 people, Since the 30's the population of Delray has shrunk to around 3,000. The median income for Delray is $27,811 and has an education level of around 30.0 percent of the population with some college or higher (*City of Detroit Open Data Portal*, n.d.).

Finally, the neighborhood of Islandview has 5,827 residents, and the median age of the population is 45 and has a median income of $25,926. 43.0 percent of the population has some college or higher(*City of Detroit Open Data Portal*, n.d.).

3.1.2 Selected Parks

When evaluating the effect of parks have on housing transaction value is important to consider the condition, programming, and location of the parks in relation to the housing. The location in relation to the housing is included in the HPM. For this study, the conditions and activity programming of the 20 parks in Table 1 associated with the sales transactions has been investigated.

Table 1 Park Selection

NAME	NEIGHBORHOOD	ACRES
Muliett Park	Corktown	0.88
Murphy Park	Corktown	0.13
Roosevelt Park	Corktown	7.41
Savage Park	Corktown	2.21
Stanton Park	Corktown	0.43
Stanton Park	Corktown	0.76
Beard Park	Delray	0.33
Cottrell-Erie Park	Delray	0.08
Bradley Park	Island View	2.11
Butzel Playground	Island View	10.58
Gabriel Richard Park	Island View	17.15
Kiwanis Club Playlot No. 1	Island View	0.92
Mt. Elliott-Zender Park	Island View	0.22
Pingree Park	Island View	9.09
Downey Park	North Corktown	0.82
Nagel Park	North Corktown	4.40
Bennett Park	North End	1.79
Bradby Park	North End	2.95
Considine Park	North End	0.89
Holbrook-Pagel Park	North End	0.16
Maiullo Park	North End	0.85

The current condition of those selected parks ranges from open derelict greenspace in Figure 3, to well-constructed and maintained in Figure 5. The majority on this list however do fall on the needing, renovation, permanent facility construction and regular maintenance side of the scale in Figure 4.

Figure 3 *Cottrell-Erie Park*
Credit: 2022 google maps

Figure 4 *Pingree Park*,
Credit: 2022 google maps
Note: Temporary bathrooms and Storage

Figure 5 *Stanton Park*
Credit: 2022 google maps

3.2 Data Collection

This research analyzed real estate sale transactions in the MetroDetroit area from January 2016 to Dec 2020. This data collected in Table 2 from the City of Detroit's open data GIS library and contained information pertinent to the size and location of the properties relative to parks, along with the transaction value (*City of Detroit Open Data Portal*, n.d.). To remove the outliers in the sample size, properties that fall below the 1st percentile or above the 99th percentile were excluded from the study.

Table 2 Neighborhood Transactions

Neighborhood	# Transactions
Corktown	19
North Corktown	4
Delray	12
Island View	27
North End	37

In addition to property transaction prices, this study collected variables of the neighborhood data that represent the social and environmental features. Based on Geographic Information Systems (GIS) available from the City of Detroit, the study calculated the distances to parks within specified distances and size of the selected parks. In addition to the transaction price, square footage, lot size, bedrooms, bathrooms, garages, and fireplaces were added to the dataset.

To determine the spatial scale to measure the influence of parks on single-family housing property values, this study first applied a one-mile Euclidean buffer from each park to define the maximum spatial range to identify neighborhood parks of each single-family house property. Then a series of Euclidean distances were calculated to the closest neighborhood park from each property within the one-mile buffer spatial setting. This distance has been widely used in many previous studies as distances the residents of the neighborhoods would be likely willing to walk (Ng etal., 2014).

3.3 Data Analysis

This research adopted the hedonic pricing model (HPM) to examine the relationship of neighborhood parks and the single-family housing transaction values in the study area. Hedonic pricing models have widely been used to study the various effects of numerous environmental factors on the real estate market value (Brander & Koetse, 2011; Rosen,1974; Sirmans et al., 2005). The dataset was analyzed using regression modeling, where various factors will be integrated to test the effect of cost/greenspace in a sub population. The following equation describes our hedonic modeling framework: $\mathbf{P} = \mathbf{S}\boldsymbol{\beta}_{\mathbf{S}} + \mathbf{L}\boldsymbol{\beta}_{\mathbf{L}} + \mathbf{N}\boldsymbol{\beta}_{\mathbf{N}} + \mathbf{Q}\boldsymbol{\beta}_{\mathbf{Q}}$ **P** is a vector of sale transaction prices; **S**, **L**, **N**, and **Q** are matrices representing the variables of housing structural characteristics (e.g. square footage, number of bedrooms, etc.). βs, βL, βn and βq are vectors of estimated parameters respectively.

The data analysis for this study focused on detecting the significance of different housing factors when explaining the current housing market considering the location and size of the existing parks in the declining neighborhoods. The research involved four major steps of data analysis. First, descriptive statistics were extracted from GIS and Zillow, overall cost of transaction, location, number of bedrooms, number of bathrooms, house square footage, number of fireplaces, and if there was a garage. Furthermore, this step evaluated location of the residence in connection to the closest park near their neighborhood. Then the standard diagnostic testing was performed to identify key variables and outliers.

Second, analyses were conducted to comprehend any correlations between each independent variable and dependent variable. The correlations among location, number of bedrooms, number of bathrooms, square footage, number of fireplaces, garage and the correlation to the transaction were evaluated.

Finally, a HPM model was estimated to predict outcome variables using the structure variables captured by the selected variables in Table 3. The HPM model hypothesized that the transaction price would be affected by size and spatial distance to the selected parks, square footage of the property, number of bedrooms, number of bathrooms, number of fireplaces and the number of garages. Different distances were trialed in this research, such as a one, half and a quarter-mile Euclidian buffer which were shown to be irrelevant before deciding on the final model that included all samples within one mile.

Table 3 Variable Measurement and Data Sources

Variable	Measurement	Unit	Data Source
Dependent variables			
Single Family housing value	Single-family housing market value in 2019 (logged)	dollar (US$)	Detroit open data portal*
Independent variables			
Living area	Gross house area excluding garages, balconies, and landscape areas	Ft^2	Detroit open data portal
Bedroom	Number of bedrooms	count	Detroit open data portal
Bathroom	Number of bathrooms	count	Detroit open data portal
Garage	Number of garage spaces	count	Detroit open data portal
Fireplace	Number of fireplaces	count	Detroit open data portal
Distance to Park	Euclidean Distance to nearest park	m	Detroit open data portal
Park size	Park size of the nearest park from the selected property	acre	Detroit open data portal

(*City of Detroit Open Data Portal*, n.d. https://data.detroitmi.gov/)

CHAPTER 4 RESULTS

4.1 Descriptive Statistics of the Selected Properties

In Table 4, the descriptive statistics for transaction value show the characteristics of selected single-family houses and parks for this study. For the housing transaction characteristics, the sales price ranged from $2,100.00 to $1,000,000.00 with a mean sale price of $211,786.06. The average square footage of the properties was 1,966.84 sqft with about 3 bedrooms and a mean bathroom quantity of 1.95. Less than half of the properties had garages and about 1 out of 11 had a fireplace. For the parks properties, the parks mean size was 2.58 acres and were between 29 and 730 meters away from individual properties.

Table 4 Descriptive Statistics of the Selected Properties

	Mean	Std.	Minimum	Maximum	Range
Transaction Value ($)	211,786.06	205,185.63	2,100.00	1,000,000.00	997,900.00
Park Size (Acres)	2.58	3.34	0.08	17.15	17.07
Park Distance (m)	352.88	179.11	29.14	730.41	701.27
Number of Bedroom (EA)	2.99	1.18	1.00	8.00	7.00
Number of Bathroom (EA)	1.95	0.82	1.00	4.00	3.00
Number of Garage (EA)	0.39	0.64	0.00	2.00	2.00
Number of Fireplace (EA)	0.09	0.29	0.00	1.00	1.00
Living Area (Sqft)	1,966.84	1,262.71	729.00	8,940.00	8,211.00

Note : Std: Standard Deviation

4.2 Correlation Between Selected Parks and Single-Family Housing

Correlation analysis in Table 5 reported that the distance to the park had a negative relationship with the housing transaction price, at a level of .284. This level means the further away from the parks the housing is the greater the transaction value. A similar result was reported in previous studies (Crompton, 2001) in which due to poor conditions and programming the parks became associated with dereliction and crime. This association then had a negative impact to the final transaction price of the single-family home. However, park size did not show any significant relationship to the housing transaction value.

Table 5 Correlations Bivariate Analysis

Correlations Bivariate Analysis									
		Transaction Value ($)	Park Size (Acres)	Park Distance (Meters)	Number of Bedroom (EA)	Number of Bathroom (EA)	Number of Garage (EA)	Number of Fireplace (EA)	Living Area (SqFt)
Transaction Value ($)	Pearson Correlation	1	-0.124	.284**	-.500**	.214*	-0.019	-.206*	0.136
	Sig. (2-tailed)		0.226	0.005	<.001	0.036	0.855	0.043	0.184
	N	97	97	97	97	97	97	97	97
Park Size (Acres)	Pearson Correlation	-0.124	1	-.240*	-0.039	-0.188	-0.156	-0.054	0.138
	Sig. (2-tailed)	0.226		0.018	0.707	0.065	0.127	0.597	0.177
	N	97	97	97	97	97	97	97	97
Park Distance (m)	Pearson Correlation	.284**	-.240*	1	-0.129	.205*	0.061	-0.131	-0.032
	Sig. (2-tailed)	0.005	0.018		0.207	0.044	0.551	0.202	0.754
	N	97	97	97	97	97	97	97	97
Number of Bedroom (EA)	Pearson Correlation	-.500**	-0.039	-0.129	1	.382**	0.061	0.155	0.046
	Sig. (2-tailed)	<.001	0.707	0.207		<.001	0.554	0.131	0.657
	N	97	97	97	97	97	97	97	97
Number of Bathroom (EA)	Pearson Correlation	.214*	-0.188	.205*	.382**	1	-0.021	0.02	0.128
	Sig. (2-tailed)	0.036	0.065	0.044	<.001		0.841	0.844	0.21
	N	97	97	97	97	97	97	97	97
Number of Garage (EA)	Pearson Correlation	-0.019	-0.156	0.061	0.061	-0.021	1	.250*	-0.007
	Sig. (2-tailed)	0.855	0.127	0.551	0.554	0.841		0.013	0.944
	N	97	97	97	97	97	97	97	97
Number of Fireplace (EA)	Pearson Correlation	-.206*	-0.054	-0.131	0.155	0.02	.250*	1	0.014
	Sig. (2-tailed)	0.043	0.597	0.202	0.131	0.844	0.013		0.893
	N	97	97	97	97	97	97	97	97
Living Area (SqFt)	Pearson Correlation	0.136	0.138	-0.032	0.046	0.128	-0.007	0.014	1
	Sig. (2-tailed)	0.184	0.177	0.754	0.657	0.21	0.944	0.893	
	N	97	97	97	97	97	97	97	97

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4.3 Final Hedonic Pricing Model Result

The final HPM is reported in Table 6. The final model had a R Square value of .483. Among the selected variables, the number of bedrooms showed a significantly negative relationship to the single-family housing transaction value, while the number of bathrooms was positively associated with the transaction value. The results are supported by previous studies that showed single-family homes selling with a higher transaction price when there is a larger number of bathrooms, while the number of bedrooms has a significantly diminished return after 2-3 bedrooms and thus can negatively impact the sales price beyond that. This is consistent with the findings from previous studies (Crompton, 2001). However, the variables related to the park size and distance did not show a statistically significant relationship to the housing prices.

Table 6 Hedonic Pricing Model Result

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
Constant	281398.689	66302.827		4.244	<.001
Park Size (Acres)	-4124.643	5001.134	-0.067	-0.825	.412
Park Distance (m)	98.291	94.730	0.086	1.038	.302
Number of Bedroom (EA)	-111626.317	14931.914	-0.640	-7.476	<.001
Number of Bathroom (EA)	103718.283	21978.194	0.415	4.719	<.001
Number of Garage (EA)	14208.559	25749.855	0.044	0.552	.582
Number of Fireplace (EA)	-84969.06	56549.844	-0.121	-1.503	.136
Living Area (Sqft)	20.487	12.677	0.126	1.616	.110

Note: Std: standard; Sig : Significance

CHAPTER 5 DISCUSSION AND CONCLUSIONS

This study used a HPM with factors relevant to estimate the effect of parks on housing transaction prices using objective and quantitative measurement. Most of the previous studies using HPM have been conducted in cities with either stable or growing population and not in cities with declining population (Brander & Koetse, 2011; Li & Saphores, 2012; Saphores & Li, 2012; Sirmans et al., 2005; Sohn et al., 2020). Using studies from cities not in population decline gives limitations when appling the data to shape municipality policy for cities that are seeing population decline. Only a few studies have explored a negative monetary association with the proximity to greenspace and parks (Crompton, 2001); however, in these studies the overall net population gain /loss was not addressed.

This study is one of the first to investigate the impact of neighborhood parks on single-family housing prices in a declined city like Detroit, Michigan. Though the study did not return the expected results linking a positive value association with decreased proximity to or increased size of community parks, it still provides valuable insight to the current situation of parks in these neighborhoods. The final HPM returned expected results in relation to linking increased transaction value with additional bathrooms and decreased value with additional bedrooms. The context of Detroit provided confirmation that careful consideration into the programming and maintenance of the urban park system will be needed as future growth returns to Detroit.

The reason Detroit parks did not demonstrate an additional value source in the

HPM as is attributed to several factors. The physical state of repair of the parks that needs attention in many cases to make them more desirable to neighborhood residence, secondly the activity programming of these parks will be low due to budgetary constraints of the municipalities as highlighted in other studies (Crompton, 2001; Guerrieri, 2012). The effect parks and greenspace have on a city that is in a healthy growth cycle has been well documented and using this study to steer the urban model of the city of Detroit will benefit the future design decisions made by local and regional governments and developers alike. Addressing critical city infrastructure concerns is on the forefront of most city planner's agenda. Although the final results from this research did not provide significant relationships among the size and distance of parks to single-family housing value in the declined neighborhoods, the addition of parks and greenspace to the critical infrastructure list is of great importance to combat global change (Byrne & Jinjun, 2009; X. Li & Zhou, 2019). Previous hedonic studies about urban green space did so in cities not in population decline (Beer et al., 2003; Bellamy et al., 2017; Kim et al., 2018; W. Li & Saphores, 2012). The findings of this study will add to the body of work on urban planning and regional concerns.

It is critical for cities to have good stewardship of every resource that is available and use them in a way that satisfies the concept of the triple bottom line (Alhaddi, 2015). The concept of the triple bottom line relates specially to the city of Detroit. It is a city hit especially hard during the 2008 Automobile industry collapse (Desan, 2014). The city has had to change its primary source of economy and discover new avenues to be fiscally solvent. Directionally steering the current situation and the eventual regrowth of Detroit in an environmentally and socially responsible manner while attempting to extract the highest return on investment possible is essential for Detroit.

The use of Detroit for this study allows observance of a city in decline with immense potential of resurgence. However, this limits the use of the data collected to cities in similar regional, population, financial situations. Additional studies of other cities in population decline would add more depth to this study, however, was not feasible for this study. Another limitation encountered was the addition of commercial spaces to the study, this data was not readily available and was outside of the scope for research. Future studies could be solely dedicated to the impact on commercial spaces.

It is vital to understand the importance of neighborhood parks in cities in population growth and how strategic investment by municipalities will help to fiscally bolster residential properties as shown in the studies done in Los Angeles, Bronx, and Chicago (Li & Saphores, 2012; Newman et al., 2016; Sohn et al., 2020; Voicu & Been, 2008). Providing the future planners development tools to build environmentally sound communities is of great importance given current climatic predictions. These predictors are of special planning and regional concerns and will provide the basis for future development standards in the urban environment. The findings of this research call for future investigation into neighborhoods with high median incomes to gauge the current condition of regrowth within the greater Detroit area.

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