Putting a Price on Parks:

A HEDONIC VALUATION OF URBAN GREEN SPACE IN THE CITY OF SOMERVILLE

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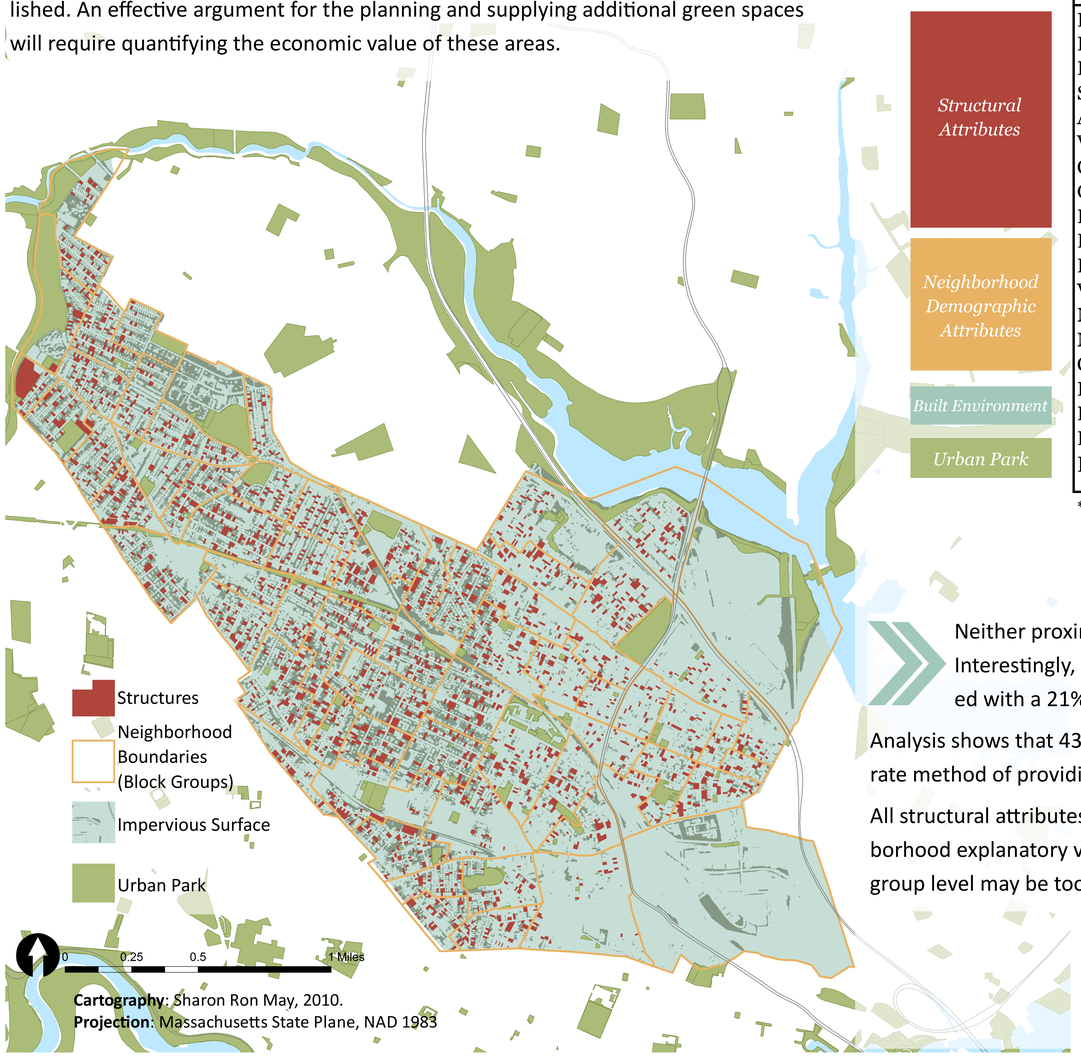
GROUNDWORK SOMERVILLE

Background

From serving as spaces that bring people together, to providing environmental and health benefits such as purifying the air we breathe and filtering pollutants from contaminated storm water, open spaces—particularly open green spaces — play a vital role in improving urban livability. Yet, in the absence of government policy, urban parks are at risk of being under-provided or over-exploited.

Recent demographic trends indicate that America's population as a whole is becoming increasingly urban. With greater density comes greater housing prices. It is therefore critical that access to the valuable services provided by urban parks is secured before it becomes prohibitively expensive to do so.

In order to assure that green space creation is a municipal priority, a clear understanding of the amenity value and societal demand for urban parks must be established. An effective argument for the planning and supplying additional green spaces will require quantifying the economic value of these areas.



Methods

A Hedonic Price Model is a method of relating the market price of a certain good (in this case, housing in Somerville) with the characteristics that define it, thus enabling the monetary value of each attribute to be estimated.

Together with the structural variables, the neighborhood demographics, and the built environment attributes conventionally used to explain housing prices, two variables related to urban parks were considered; the distance from the dwelling to its nearest open space and the size of that open space. The inclusion of these hedonic variables allow us to estimate the influence of parks on housing sales value.

Only at arms-length sales since 9/31/2009 with complete attribute information were considered in this analysis. A regression model was used to estimate the influence of each attribute on housing sale price. Since the distribution of housing sale prices was positively skewed, a semi-logarithmic model was used as follows:

$$\ln(Price) = \beta + \beta_S Structural + \beta_D Demographic + \beta_{BE} BuiltEnvironment + \beta_{UP} UrbanPark + \varepsilon$$

Where β is the marginal willingness to pay for each attribute, and $\mathcal{E}$ is the error term.

Results

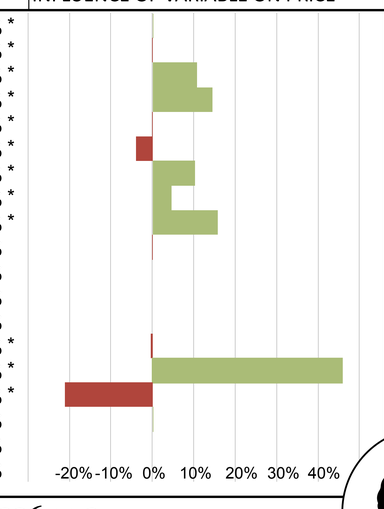
Structural Attributes

Neighborhood Demographic Attributes

Built Environment

Urban Park

VARIABLE	DESCRIPTION	β
Living area	*Square footage of living area in house*	0.006% *
Parcel area	*Square footage of the parcel*	-0.001% *
Bathrooms	*Number of bathrooms*	10.741% *
Stories	*Number of stories in the house*	14.449% *
Age of house	*Age of house in year 2016*	-0.076% *
Vinyl siding	*Dummy variable, 1 if exterior is vinyl, 0 otherwise*	-3.927% *
Central AC	*Dummy variable, 1 if the house has a central AC, 0 otherwise*	10.273% *
Gas fuel	*Dummy variable, 1 if the house has gas fuel, 0 otherwise*	4.541% *
Local historical	*Dummy variable, 1 if a registered local historic house, 0 otherwise*	15.775% *
Population density	*People per square miles in the census block*	0.000%
Poverty	*Percentage of householeds below poverty line in census block group*	-7.112%
Vacancy	*Percentage of vacant houses in the census block group*	-9.938%
Minority	*Percentage of non-white population in the census block group*	-9.601%
Median age	*Median age of the residents in the census block group*	-0.355% *
College degree	*Percentage of residents with bachelor degree or higher in the census*	45.845% *
Impervious surfaces	*Proportion of census block impervious surface*	-21.239% *
Highway proximity	*Distance in feet from house to the nearest highway*	0.002%
Park size	*Size in square footage of the nearest open space*	0.000%
Park proximity	*Distance in feet from house to the nearest open space*	-0.003%



* *Significant at the 5% level*

Starting with an average home value of $326,550....

A 1% increase in the block's ratio of **pervious** surface can ***increase a home's sale price by $68,000***, holding all else constant.

Neither proximity nor the size of the nearest open space — our hedonic variables — were found to have a significant influence on housing sale price (p-value<.05). Interestingly, the impact of percent impervious surface per census block was found to be significant, with a 1% decrease in the block's paved surfaces being associated with a 21% increase in price (p-value<.05).

Analysis shows that 43% of open space in Somerville is impervious. Since these urban parks are not necessarily green, measuring their influence on price may not be an accurate method of providing an economic value for green space. Our results indicate that for Somerville, ratio of pervious to impervious surface may be a better measure.

All structural attributes were found to have statistically significant influence on price in the expected direction at the 5% value. However, with 2 exceptions, none of the neighborhood explanatory variables were found to be significant. This may be a limitation of our data. For an area as small as Somerville, looking at these attributes at the block group level may be too rough of a grain to estimate effects.

Sources

City of Somerville, MA: Tax Assessors' Extract (1/5/2016), FY2016 Assessor Parcel Layer, OpenSpace Layer (2016)
MassGIS: Impervious Surfaces (2005), Mass DOT Roads (2014), Protected and Recreational OpenSpace (2015)
US Census Bureau: Cartographic Boundary Shapefiles –Block Groups, Blocks (2015).