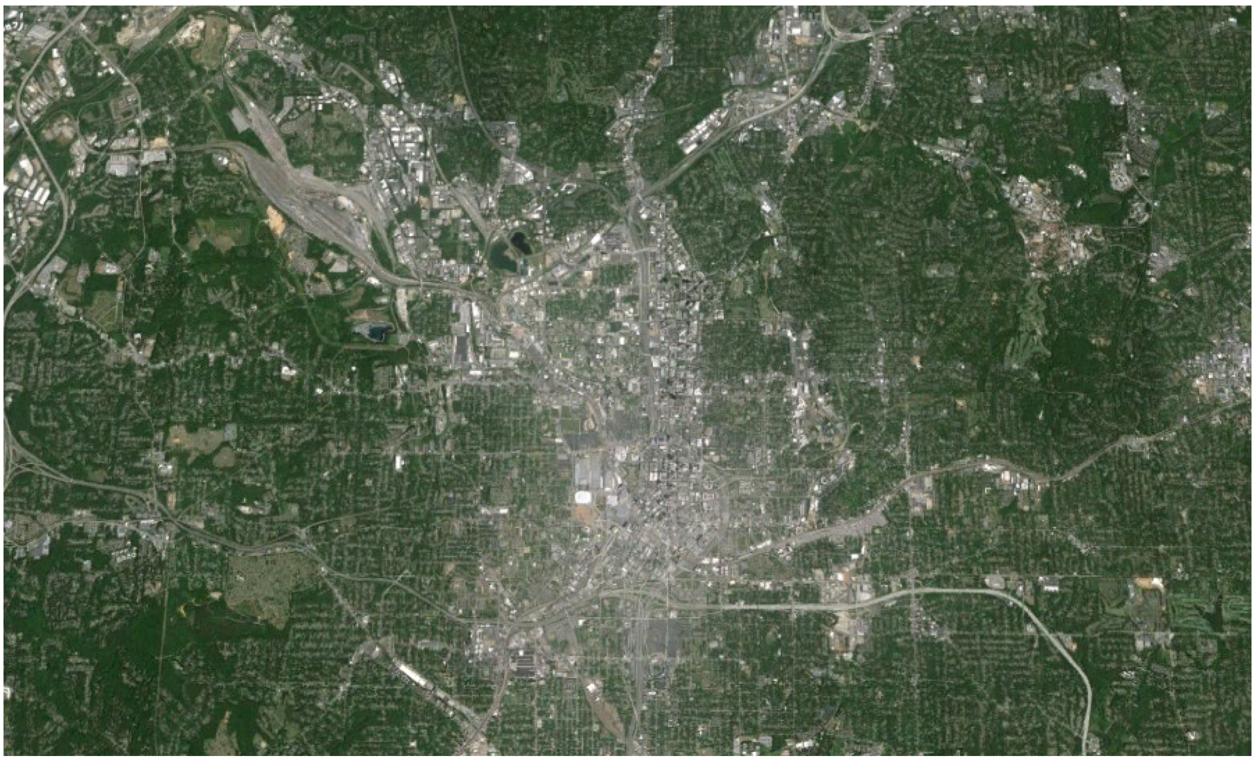
Evaluating Market Demand for Density
Against the Constraints of Zoning in Atlanta



(Google Earth, 2014)

Hannah Kates

Final Research Paper

Markets, Design, and the City – Fall 2015

NYU Marron Institute

Introduction

Purpose

Atlanta is well known as the poster child of low density suburban sprawl and suffers from terrible traffic and air pollution. The purpose of this research is to better understand the role that land use regulations currently play in maintaining Atlanta's low density urban form. This research attempts to answer the question of whether Atlanta's zoning is restricting the amount of built floor area or if the market really does not demand higher levels of building density.

Brief History of Atlanta's Zoning

Zoning in American cities was implemented beginning in the early 1900s. These zoning policies were generally justified by protecting residential areas from industrial nuisances, creating orderly design, and ensuring access to light and air flow in downtown areas by controlling the design and bulk of buildings. Although, these kinds of land use regulations were generally well intentioned, they were also quickly manipulated to increase property and land values.

Land use regulations also served a more sinister purpose in many American cities. Some of Atlanta's earliest zoning ordinances were purely driven by racism. These regulations marked districts as either being white only or black only districts. They were considered legally defensible until 1917 when the Supreme Court gave its ruling in *Buchanan vs. Warley*. However, after that ruling, Atlanta (among other cities) devised other ways to control where the black population resided. Racial zoning still operated in practice, even though it was not enforced by law. Comprehensive plans developed during this time, notably Robert Whitten's Atlanta Zoning Plan of 1922, focused on creating a completely separate black community in the west and southwest portions of the city. Atlanta also exemplifies how highway planning was used to reinforce racial barriers (Silver, 1997). Other devices included private deed restrictions and discriminatory real estate and lending practices. To this day, there is a visible racial divide in Atlanta when mapping demographics. This history of segregation has clearly shaped the city's development and the current land values in different neighborhoods.

Current zoning regulations in Atlanta include overlapping regulations on required building frontage, setbacks from lot lines, minimum lot sizes, maximum building footprints and minimum outdoor space as percentages of the lot size, maximum building height, maximum floor area ratio (FAR), and minimum off-street parking. The most recent zoning ordinance overhaul was adopted in 1980, repealing the previous 1976 Zoning Ordinance ("Chapter 1"). There have been several piecemeal revisions since then, notably the creation of various Special Public Interest (SPI) districts (concentrated around the city's core). These SPI districts have different regulations to serve city planning goals.

Scope of Analysis and Approach

The research goal is to identify whether the utilization of building potential increases with the tax assessment value per square foot and then becomes constrained and flattens around a utilization percentage of one hundred percent. This approach is based on the reasoning that households make tradeoffs between the capital costs of construction versus the value of the land; as land becomes more expensive and desirable, people generally substitute capital for the amount of land consumed and increase building density. Land use regulations place an artificial limit on the extent of these trade off decisions.

This research only examined residential parcels within the City of Atlanta. Parcels of vacant land were not included in the analysis. The land value assessment assigned by tax appraisers (normalized by the lot size) was used as a proxy for the level of market demand for the parcel's location in the city. The total building square footage allowed by zoning was calculated for each parcel, and the percent of the square footage utilized by the actual built structure was then calculated for each parcel. This utilization of building potential was taken as a proxy for market demand for built density. The maximum allowed square footage was calculated only using the lot size, maximum FAR, maximum building footprint, and maximum height. The analysis did not incorporate the required building frontage, setbacks, outdoor space requirements, or parking requirements, due to the lack of necessary data on the parcels.

Methodology

Data Sources

City of Atlanta GIS Data Catalog

Description of all files: http://gis.atlantaga.gov/apps/gislayers/

Zoning Base. 2014

Download:
http://gis.atlantaga.gov/apps/gislayers/download/layers/ZoningBaseUpdated082014.zip

City of Atlanta Parcels. 2014

Download:
http://gis.atlantaga.gov/apps/gislayers/download/layers/COA_Parcels_2014.zip

Strategic Community Investment Report Data (SCI). 2013

Produced by APD Solutions. Contains lot size, land value assessment, and building square footage. Description: http://www.atlantaga.gov/index.aspx?page=1070
Download: http://ditweb.atlantaga.gov/sci/sci1.xlsx

Atlanta Zoning Ordinance

https://www.municode.com/library/ga/atlanta/codes/code_of_ordinances?nodeId=PTIIICOORANDECO_PT16ZO

Analysis

The entire reproducible methodology is available in an iPython notebook that has been shared on GitHub: https://github.com/hannahbkates/Atlanta_FAR_Utilization.

First, the centroids of the parcel shapefile features were spatially joined with the zoning base shapefile to assign the appropriate zoning designation to each parcel. Next, the SCI data was joined onto the parcel data. All parcels with null values for building square footage and parcels with a building square footage of less than 400 square feet were excluded from the dataset. Parcels with lot sizes smaller than 400 square feet were also excluded; many of these actually a had an assigned lot size of zero square feet. All excluded parcels were considered to be cases of data errors, unit inconsistencies, or special exceptions.

A summary table of zoning requirements was compiled from the Atlanta Zoning Ordinance. The full listing of zones and subareas analyzed for this research and their respective requirements is provided in Appendix 1. Only parcels with entirely residential development were analyzed. Parcels in some SPI districts were excluded due the the complexity of their zoning. For example, there were many site-specific conditions like FAR bonuses and transitional height planes. Parcels within the generic residential zones that were marked with a '-C' for a conditional zoning exception were also excluded from the dataset due to the complexity of their individual circumstances.

The zoning requirements were joined onto each parcel based on its respective zoning designation. Using the parcel lot size and the zoning requirements for the parcel, the maximum allowed square footage allowed by zoning was calculated for each parcel. The calculation of the maximum allowed square footage incorporated the lot's size, maximum FAR, maximum building footprint, and maximum height. The height of a single story was assumed to be 12 feet. The ratio of the actual built square footage over the maximum allowed square footage was then calculated for each parcel to determine the percent of building potential that was utilized. The value of land per square foot was calculated using the tax assessment value and the lot size. The land value was used as the independent variable for ordinary least squares linear regression in order to evaluate the relationship between demand for a piece of land and the utilization of building potential.

Condominiums were excluded from the dataset due to complications caused by how they were enumerated in the GIS and SCI data. Each condo unit was included as an individual parcel and the unit's square footage was entered as the parcel's lot size. Given the data available, it would be impossible to analyze the multi-unit condominium buildings without making significant assumptions about the aggregated building size and shared common space. Excluding condominiums, the total number of parcels analyzed was 63,495.

Results

Before discussing the results of the analysis, it is important to acknowledge the limitations of the data available for the city. A surprising 18% of the original SCI parcel dataset had null values for the building square feet and 22% of parcels had a lot size recorded as zero. There was no detailed explanation for why so many parcels were missing data, besides a disclaimer that some parcels lacked digital records. The parcels with lot sizes of zero were severely clustered, leaving several neighborhoods completely excluded from this analysis. The parcels with lot sizes of zero are shown to the right in Figure 1.

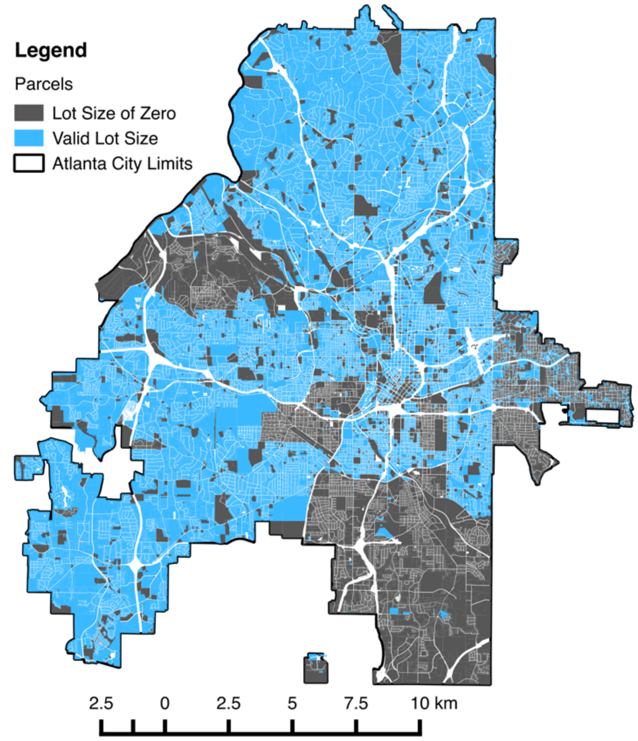


Figure 1. Map showing distribution of parcels with invalid lot sizes

Figure 2 shows a frequency distribution of the building potential utilization ratios from all the parcels analyzed. The vast majority of the parcels have utilization ratios less than 1, and the median utilization ratio is 0.28. There are parcels with a utilization ratio of over 1; these could be buildings that were built before zoning regulations changed or were special granted exceptions. Additionally, the ratios of building potential utilization are mapped in Figure 3 showing their spatial distribution.

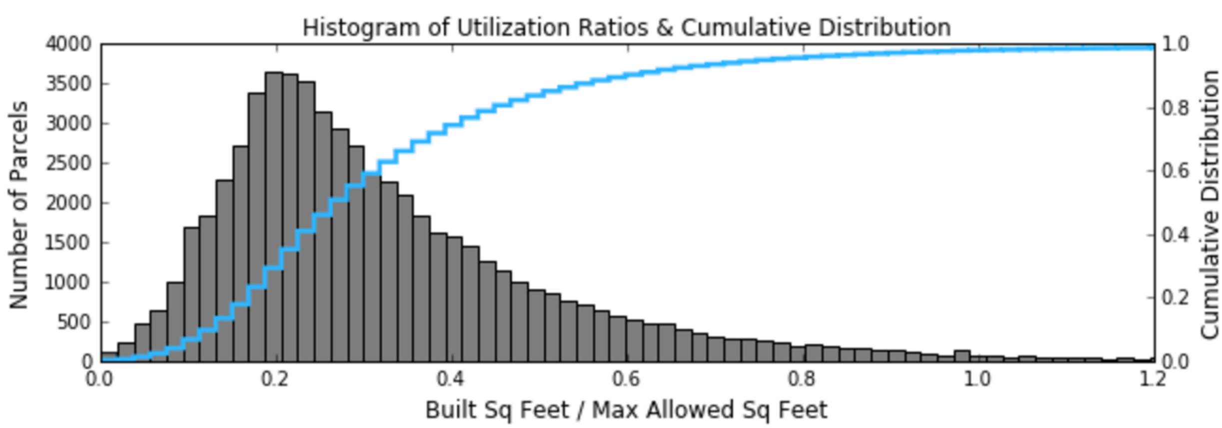


Figure 2. Frequency Distribution of Utilization Ratios

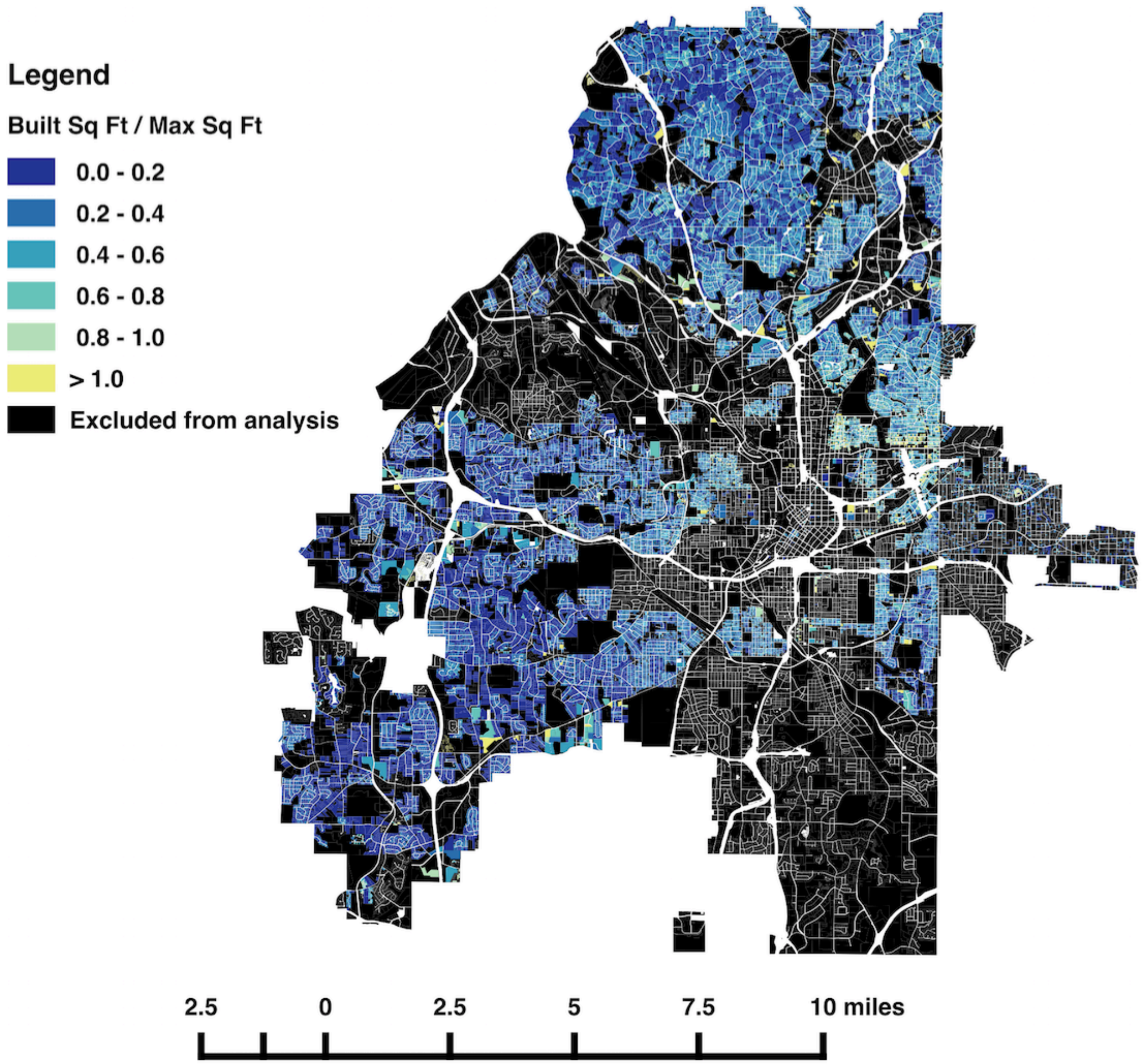


Figure 3. Map of Utilization Ratios for Parcels that Could Be Analyzed

The results show that the utilization does clearly increase with land value. However, since most utilization ratios are less than 1, additional development does not appear to be constricted by the current zoning requirements. An ordinary least squares linear regression was used to examine the relationship between the two variables, with the best fit line shown in Figure 4. The R^2 value showed that only 21% of the variance in the utilization data was explained by the linear regression with land value.

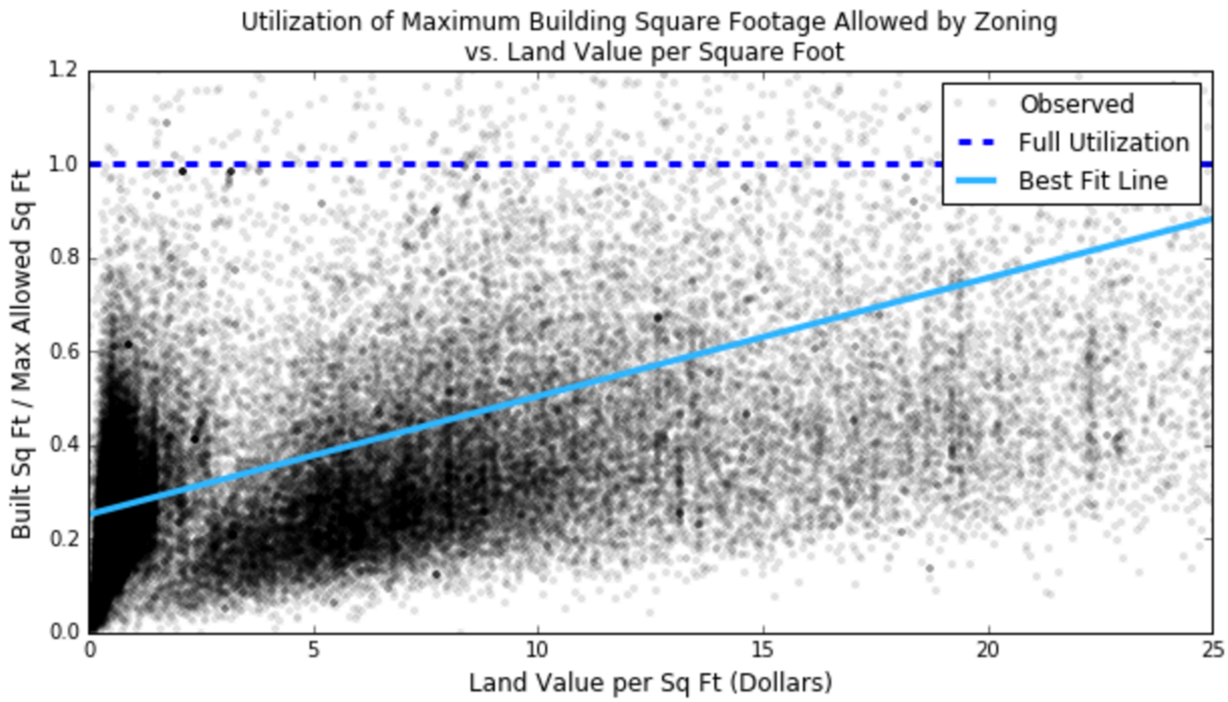


Figure 4. Plot of Utilization Ratios versus Land Value

When plotting the utilization of building potential versus the land value per square foot, there are two apparently distinct clusters of data with different distributions. This is most likely due to the spatial distribution of land value per square foot. Figure 5 illustrates the extreme disparity of land value between different parts of the city. Future research should involve investigating the differences between the two distributions.

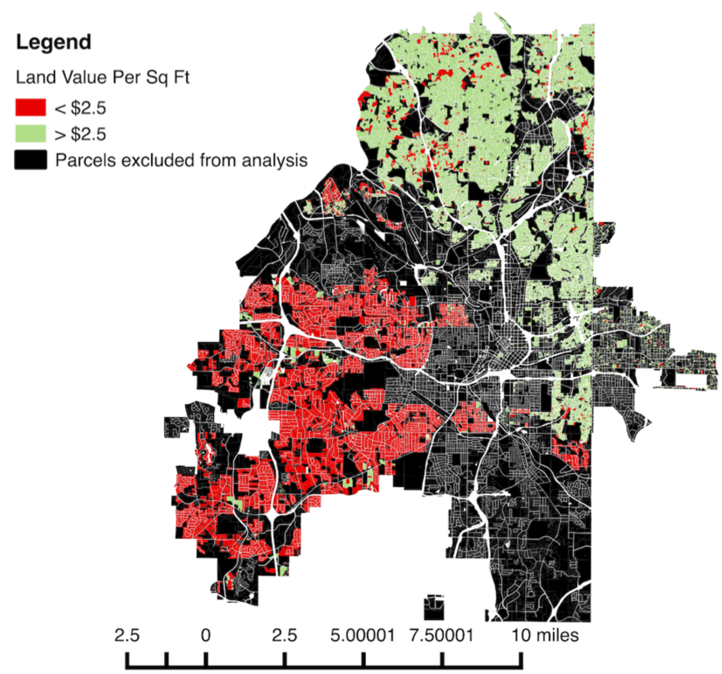


Figure 5. Land Value per Square Foot

While analyzing this research question, it is also important to consider the context of historical zoning and economic trends that have impacted new construction. In order to gain a better understanding of their impact, the utilization based on current zoning was plotted as a function of the year the building was constructed. This is shown in Figure 6 and helps illustrate development trends in the City of Atlanta over time.

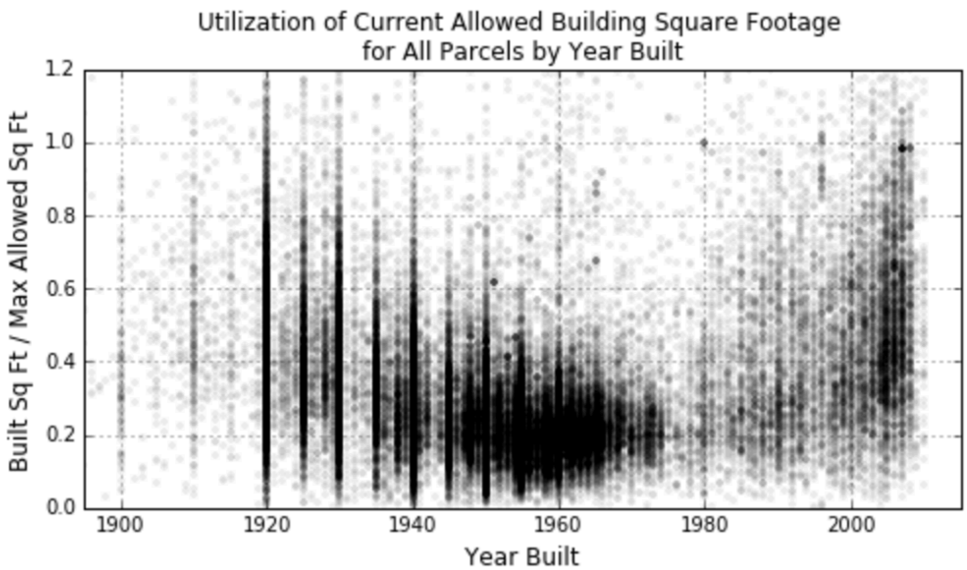


Figure 6. Utilization Ratios Grouped by Year Built

Although there is noise in the data (and noticeable rounding of years in the older records), the data points in Figure 6 help explain development trends in the City of Atlanta since the 1910s. Beginning in the mid-1960s, it shows the impact of white flight, stagnation of new construction as suburban development increased outside the city's boundary, and then a more recent resurgence of development. Since 2000, there has been an increase in new construction and the new development has had a higher utilization of building potential. Older construction before the 1930s also appears to have higher utilization ratios, although zoning was surely different during those decades. The age distribution of the housing stock and these building trends that are driven by socioeconomic factors must be considered before drawing any unqualified conclusions from the data. A histogram of parcels by year built is shown in Figure 7. The median year built is 1953.

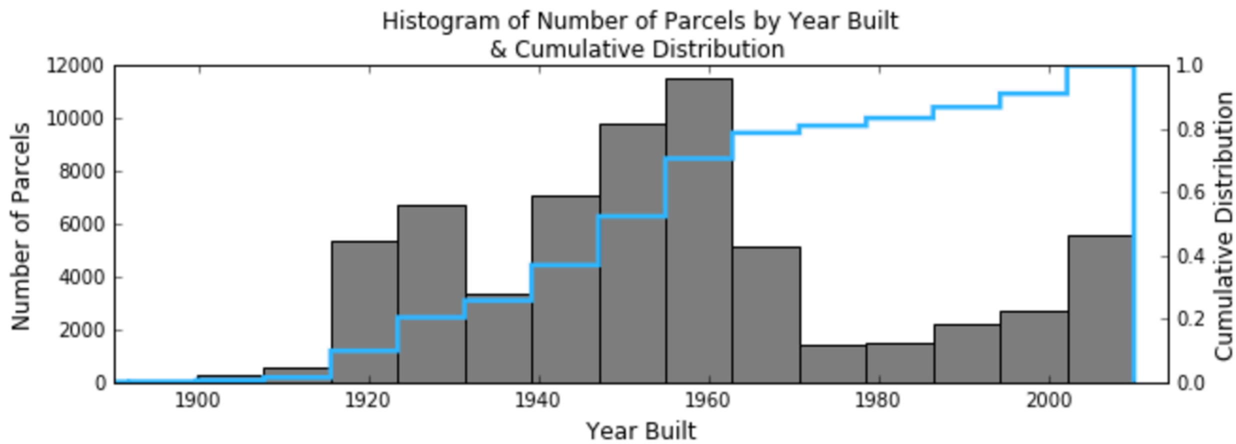


Figure 7. Histogram of Parcels by Year Built to Illustrate Age of Housing Stock

Conclusions

Implications

Based on the results of this analysis, current zoning is not limiting the City of Atlanta's level of built density. For advocates who want to see a denser, less dispersed Atlanta, this signals that they do not need to expend energy promoting the increase of maximum FARs. Although increasing FAR has been a successful strategy for increasing density in other cities, looking at the low utilization of the building potential that is already allowed, the results of this analysis do not demonstrate an unmet market demand for higher FAR in Atlanta. Instead, advocates should explore other policies that will discourage the negative externalities associated with living in low density neighborhoods far from the core and commuting long distances.

The best option is to implement congestion pricing and taxes based on road miles traveled. This would make long commutes more expensive, reduce congestion at peak times, and internalize the costs of Atlanta's terrible traffic and expensive road infrastructure maintenance. Another possible solution would be to impose an urban growth boundary to force urban infill and prohibit the supply of new low density development at the fringe. In the very distant long-term, this could raise density to a level where alternative transportation options would be more feasible. However, a growth boundary would not directly impact commuting decisions, and therefore, it would not be as effective as taxes for making Atlanta commuting more sustainable. Growth boundaries also make housing more expensive; the potential impacts of implementing a boundary would need to be studied critically. Considering that the City of Atlanta is only one municipality at the core of a much larger agglomeration of other municipalities, any solution will be politically difficult to implement and will require a lot of regional coordination.

There are several notable complications in the case of Atlanta which should be considered along with any policy decision. Atlanta has clearly been shaped by a history of segregation and racial discrimination, and that legacy is still felt today. There are still stigmas and safety concerns associated with using public transportation and with living in some urban neighborhoods. This mentality is changing, but it has surely played a role in older generations' housing location decisions. Most recently, the housing bubble also had a big impact on Atlanta's housing development. Some of the low market demand for new development can be attributed to the losses people experienced from the bubble collapse and the recession. Home prices in the Atlanta metropolitan area are significantly lower today than they were in 2000; only three other major U.S. metropolitan areas have prices below their 2000 prices. Due to losses and foreclosures, 12.3% of all the parcels in the City of Atlanta are vacant lots or vacant structures (APD Solutions, 2013). These points highlight the complexity of analyzing a city's current development potential and the variability of market demand.

Future Research

As noted throughout this paper, there were limitations in the data available. Roughly a fifth of the parcels in the SCI data were missing both building and lot square footage. If possible, data on these parcels should be acquired so they can be included in the analysis. Additionally, the data did not provide the granular details necessary to incorporate the effect of required building frontage, setbacks, outdoor space requirements, and minimum off-street parking. Future research should also examine those variables, although they will likely have less of an impact on the maximum building square footage calculation than the combined maximum FAR, maximum height, maximum building footprint, and minimum lot size. Additionally, future research should examine the entire metropolitan area, including parcels within the metropolitan area that are outside the City of Atlanta's boundary. This would provide a more complete perspective on development and market demand within the entire labor market.

This analysis only examined structures against current zoning regulations. While this is the best way to evaluate the current state of market demand and utilization of building potential, it would be valuable to look at historic zoning requirements from when buildings were constructed. This would help illuminate the utilization of building potential over time and how that relates to economic trends. It could also help identify whether there is a consistent time lag between when a zoning change occurs and when significant changes in the housing stock are realized as a result of the change.

To complement this research, it would help to examine recent trends in land area per capita. Despite the lack of widespread change in the built environment, existing structures could be being utilized at a higher or lower intensity. This would help explain other important aspects of market preferences.

References

APD Solutions. (2013). Creating Linkages and Eliminating Barriers: The Strategic Community Investment Report Executive Summary http://www.atlantaga.gov/modules/showdocument.aspx?documentid=10663

Bertaud, A. (2002). Clearing the Air in Atlanta. http://alain-bertaud.com/images/AB_Clearing_The_Air_in%20Atlanta_1.pdf

"Chapter 1." Atlanta Zoning Ordinance. City of Atlanta, Georgia. https://www.municode.com/library/ga/atlanta/codes/code_of_ordinances?nodeId=PTIIICOORANDECO_PT16ZO_CH1IN

Silver, C. (1997). The racial origins of zoning in American cities. *Urban planning and the African American community: In the shadows*, 23-42.

Appendix 1. Summary Table of Residential Zoning Requirements

Summarized from criteria detailed in the Atlanta Zoning Ordinance:

Zone	Min Lot (SqFt)	Max Height (Ft)	Max Bldg Footprint	FAR Residential	FAR Conditional	FAR Duplex	Conditional Max SqFt	Conditional Min SqFt
R-1	87,120	35	25%	0.25	-	-	-	-
R-2	43,560	35	35%	0.3	-	-	-	-
R-2A	30,000	35	35%	0.35	-	-	-	-
R-2B	28,000	35	40%	0.4	-	-	-	-
R-3	18,000	35	40%	0.4	-	-	-	-
R-3A	13,500	35	45%	0.45	-	-	-	-
R-4	9,000	35	50%	0.5	-	-	-	-
R-4A	7,500	35	55%	0.5	0.65	-	3750	-
R-4B	2,800	35	85%	0.75	0.9	-	2100	-
R-5	7,500	35	55%	0.5	0.65	0.6	3750	1800
RG-1	5,000	-	-	0.162	-	-	-	-
RG-2	5,000	-	-	0.348	-	-	-	-
RG-3	5,000	-	-	0.696	-	-	-	-
RG-4	5,000	-	-	1.49	-	-	-	-
RG-5	5,000	-	-	3.2	-	-	-	-
RG-6	5,000	-	-	6.4	-	-	-	-
MR-1	2,000	35	-	0.162	-	-	-	-
MR-2	2,000	35	-	0.348	-	-	-	-
MR-3	2,000	80	-	0.696	-	-	-	-
MR-4A	2,000	40	-	1.49	-	-	-	-
MR-4B	2,000	52	-	1.49	-	-	-	-
MR-5A	5,000	150	-	3.2	-	-	-	-
MR-5B	5,000	150	-	3.2	-	-	-	-
MR-6	5,000	225	-	6.4	-	-	-	-
SPI-1 SA1	-	-	-	10	-	-	-	-
SPI-1 SA2	-	-	-	7	-	-	-	-
SPI-1 SA3	-	-	-	7	-	-	-	-
SPI-1 SA4	-	-	-	7	-	-	-	-
SPI-1 SA5	-	-	-	10	-	-	-	-
SPI-1 SA6	-	-	-	7	-	-	-	-
SPI-1 SA7	-	-	-	7	-	-	-	-
SPI-5	-	-	-	0.5	-	-	-	-
SPI-6 SA1	7,500	35	25%	0.25	-	-	-	-

SPI-6 SA2	43,560	35	35%	0.348	-	-	-	-
SPI-6 SA3	43,560	35	35%	0.348	-	-	-	-
SPI-6 SA4	9,000	35	50%	1.49	-	-	-	-
SPI-11 SA1	-	60	80%	1	-	-	-	-
SPI-11 SA2	-	40	-	2	-	-	-	-
SPI-11 SA3	-	52	-	3.2	-	-	-	-
SPI-11 SA4	-	35	50%	0.5	-	-	-	-
SPI-11 SA5	-	35	50%	0.5	-	-	-	-
SPI-11 SA6	-	35	50%	0.5	-	-	-	-
SPI-11 SA8	-	40	-	1.49	-	-	-	-
SPI-11 SA9	-	35	85%	1.696	-	-	-	-
SPI-11 SA10	-	35	70%	0.696	-	-	-	-
SPI-11 SA11	-	35	85%	1.49	-	-	-	-
SPI-11 SA12	-	84	85%	2.696	-	-	-	-
SPI-17 SA1	-	-	-	0.696	-	-	-	-
SPI-17 SA2	-	-	-	1.49	-	-	-	-
SPI-17 SA3	-	35	85%	1.49	-	-	-	-
SPI-17 SA4	-	35	50%	0.696	-	-	-	-
SPI-22 SA1	-	28	85%	4	-	-	-	-
SPI-22 SA3	-	24	85%	2.5	-	-	-	-
SPI-22 SA4	-	24	85%	2.52	-	-	-	-