

# The Economic Viability of Micro Units in New York City:

## *When the Market Wants to Build Big*

By

Rebecca L. Disbrow

B.A. in Environmental Psychology  
University of Michigan  
Ann Arbor, Michigan (2010)

Submitted to the Department of Urban Studies and Planning  
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Author \_\_\_\_\_  
Department of Urban Studies and Planning  
May 23, 2013

Certified by \_\_\_\_\_  
Associate Professor Albert Saiz  
Department of Urban Studies and Planning, Center for Real Estate  
Thesis Supervisor

Accepted by \_\_\_\_\_  
Professor P. Christopher Zegras  
Committee Chair  
Department of Urban Studies and Planning

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### ABSTRACT

Micro-Units are tiny apartments which are currently being discussed, developed, or prototyped in several major American cities. This thesis examines the assumption underlying the push to change regulations to allow micro units: developers will want to build them. To do this it looks at how price/square foot changes with unit size across New York City. Two data sets are used: NYC Multifamily Building Sales Transactions from 2003-2012 and Condo Sales data from 2003-2012. Together there are 69,976 usable data points. Linear regression analyses find, unsurprisingly, most Manhattan neighborhoods place a significant premium on large units. It does not find a parabolic shaped function either; there is no premium also placed on small units in most Manhattan neighborhoods. There is, however, such a premium in many Brooklyn neighborhoods, suggesting some neighborhoods in the outer boroughs may be a more economically viable location for micro units. It also cautions an as-of-right allowance of small units could spur these developments in unanticipated neighborhoods, with unintended or possibly unsafe results. Last, and perhaps most significantly, it plainly captures the runaway trend of luxury building in Manhattan that has been spurred primarily by global, second home, and investment buyers. The demand for micro-units will probably be ubiquitous; the problem will not be finding people to live in the apartments, but rather finding somewhere they will not be outbid by luxury developers. If policy changes are not made, Manhattan and perhaps all of New York may not be attainable to any but the richest of residents.

Thesis Supervisor: Albert Saiz

Title: Associate Professor of Urban Studies and Planning

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## Overview

Today's major cities are changing. Immigrant populations are rising, center city housing costs are sky-rocketing, globalization and speculation are skewing housing markets, baby-boomers are hitting retirement age, and young people are living alone well into adulthood. But cities have always changed; the success of a society depends on its ability to weather the changes and adapt effectively to new needs.

This thesis is about one such "adaptation"; the micro-unit. It explores this new mini-apartment typology, which is intended primarily to provide market-rate affordable units in high cost urban markets. It looks at the demographic and political forces behind these units; the neighborhoods that would be most and least economically conducive to them; and the building amenities/neighborhood features likely to be most valuable by dwellers of micro units. Most importantly it examines the crucial assumption that there is a price/square foot premium on small units.

While several major cities in the U.S have taken steps to explore the idea of micro-unit development, New York City has created the most energy regarding it. The Big Apple, led by Mayor Bloomberg and City Planning Director Amanda Burden, has aggressively explored alternative market rate affordable housing options, particularly for the city's growing single population. The city hosted a conference on new housing typologies and a design competition specifically for a building of micro-units, offering the winning team a piece of city owned land at a reduced cost and a waiver of the regulation banning apartments below 400 square feet. Mayor Bloomberg's competition is intended to fuel conversation about such development. His competition, appropriately, is called adAPT NYC. This thesis also looks at the proposals from this competition, comparing finance and design data to gather market assumptions about the typology and its viability.

Micro units are only possible as a market driven typology if the common real estate assumption that price per square foot has an inverse relationship to unit size holds; that small units command a premium over larger units. In Manhattan we know large, luxurious units are in hot demand, but the push across the country for small units implies there will be at least some premium also placed on the far other side of the market, as very small units increase density and allow entry into the housing market at lower prices. New York City, with all of its regulation, speculation, and housing challenges is the focus of this study. While much about New York is highly unique, such as the entry of foreign and super-rich buyers into the housing market, many findings can still be extrapolated from it to other cities.

Are micro-units really the right (or a right) adaptation? Can they command a high enough price/square foot to outbid Manhattan luxury buyers? In which neighborhoods are they most likely to be economically viable?

## Micro Units

Micro Units are small studio apartments, generally less than 400 square feet and in many cases less than 300 or even down to 200. They usually have a full but small kitchen, a full bath, and a convertible entertaining/work/sleeping area. The new units are close to a modern variation on the old SRO (single room occupancy, or boarding house), meeting a slightly different need and in a considerably different city than New York was a century ago. Some believe such a living arrangement is sorely needed and will relieve pressure in several aspects of the housing market. Others think they will lower living standards and fear conditions reminiscent of the old tenement buildings -- the ones we created the regulations to avoid in the first place.

In the past several years cities including New York, Boston, and San Francisco have had serious conversations about allowing and promoting this type of housing. Last year Boston lowered its minimum apartment size from 450 to 375 square feet. San Francisco also recently voted to change their minimum apartment law from 290 to 220 square feet. (Romney, 2012) Last year, New York hosted the innovative housing conference mentioned above and additionally held a related micro unit design competition, awarding the winning team a subsidized piece of city land on which to build the city's first micro-unit building - waiving specific regulations as necessary for the new prototype. The winner of this competition was recently announced and the building is expected to be open for habitation by fall of 2015. (Rosenfield 2013)

While certainly a hot topic, motivations for this new typology are contested and affordable housing advocates have come out on both sides of the argument.

Proponents believe allowing smaller units reflects a real change in demographics that we need to accommodate. They believe it will fill an unmet housing need, reduce the number of illegal and/or dangerous apartments, provide lower cost housing for single people, increase density, promote community, and potentially also relieve pressure from other parts of the market as singles vacate apartments better suited for families.

Opponents fear the loosening of some regulations is a step backwards and may promote less humane living conditions. Some believe the trend will make expensive cities only more elite and exclusive and criticize the proponents for targeting well-off, relatively high-earning, young people; perhaps at the expense of lower-income residents or families.

Built into these arguments are two assumptions: 1) that these developments are meant to provide affordable housing for at least some segment of the population and 2) that developers will want to build these units if allowed to. While discussion has centered on affordability, the units and plans being proposed currently are not what many would consider “affordable”. San Francisco is the only city in which there have been proposals for unsubsidized units coming close to \$1,000/month in rent. In Boston and New York the common average is around \$1,600 to \$2,000. In a 300 square foot unit that is over \$5.00/sq ft for a rental. The units are being built or proposed in high cost areas, highly desirable (Manhattan’s Kips Bay, Boston’s Seaport or “Innovation” District) and many of the early renderings have luxury finishes and impressive architecture.

They do not seem to be targeting struggling singles who need affordable housing in the city; at first blush to many they appear to be filling a profitable market gap - studio apartments in the city center for single, relatively high earners, willing to pay around \$1,500 - \$2,000+ a month for such a unit. This is more affordable than the average studios and 1-bedrooms in these markets, but an important question is to what will these be an alternative? Is it an alternative to a studio or 1 bedroom, or rather to roommate share situations? This is important in estimating whether this will increase or decrease density and housing costs. Many argue the proposed micro units are still unattainable to the majority of the young population.

So are micro-units actually a form of affordable housing? Could they ever be? This thesis seeks to explore the feasibility of these developments: the economic conditions in which such buildings are viable, who is promoting them and why, where they would be developed if allowed as-of-right, and whether or not it is possible for such a project to actually provide reasonably priced housing options to low to medium income single people. It will do this by examining the housing markets of neighborhoods across New York City, looking at which areas might place a premium (in price/square foot) on small units and generally how the price/square foot function changes with unit size in each of these areas. It will identify neighborhoods that are likely to provide a premium to developers for building small as opposed to areas in which price per square foot rises with each additional bedroom.



## Datasets and Methods Overview

The research starts broadly, on the current trends affecting the New York City housing market. It explores the micro unit concept in general and some of the common regulatory barriers blocking their development. Then it goes into the demand drivers and demographic trends that have led to the purported need for micro units. Who are they designed for? What in a market economically or demographically indicates demand?

Following this, New York City Finance Department's annualized sales data is used to compare sales prices for multifamily residential buildings across neighborhoods. This data includes gross square footage and thus, an average unit size can be extrapolated from each sale. The averaging of unit size by building did not prove to be an issue with the results; comparative data confirmed the findings and the large data set provided sufficient statistical significance. There were roughly 40,000 data points on sales in Brooklyn and Manhattan over the last ten years, from which 27,220 are used in this study, after cleaning the data and removing outliers.

The data set was sorted into a hierarchy of geographic groupings from borough to neighborhood level so that various analyses could be done retaining statistical significance. Appendix I shows the breakdown of neighborhoods into the groupings. Both linear and quadratic regressions were run for the different neighborhood groups, creating equations which indicate how demand shifts with unit size. Additionally, in the qualitative demand section, neighborhoods were examined by community board groups, which differs slightly from the original classifications, because this is the smallest level of distinction census data makes.

Then a second data set, Manhattan condo sales data, was used as comparative data and to examine how the value of amenities such as a high floor number, proximity to transit, and additional bedrooms changes based on apartment size and neighborhood. This information can be used to help developers identify what potential residents in a specific neighborhood would want in very small units as well as serving as a corroborating data source to the original findings. For this dataset, similar sorting and cleaning was done by neighborhood, leaving the usable dataset with 42,756 individual unit sales transactions. This second dataset produced nearly identically shaped demand equations to the first, verifying the accuracy of the data and findings.

Additionally, interviews with a handful of developers, city officials, and affordable housing advocates informed and rounded out the data.

# Part I: Why Do We Need Micro Units?

“New York’s ability to adapt with changing times is what made us the world’s greatest city – and it’s going to be what keeps us strong in the 21st Century... The growth rate for one- and two-person households greatly exceeds that of households with three or more people, and addressing that housing challenge requires us to think creatively and beyond our current regulations.”

–New York City Mayor Michael Bloomberg (NYC 2013)

“In a metropolis where 41% of residents live solo, the units would fill a niche by allowing people to stay who might otherwise have to take on roommates or leave town.”

- San Francisco City Supervisor Scott Weiner (Romney 2012)

“The whole idea is to make housing units reachable so young people working in the innovation economy can afford to rent them,”

-Kairos Shen, Chief Planner for the Boston Redevelopment Authority. (Ross 2011)

“We have a housing affordability crisis here; rents are through the roof,” says Scott Wiener, the [San Francisco] city supervisor who introduced the legislation and who says tiny apartments will help provide affordable housing to single people, students and the elderly. (Wollan 2012)

***“It is about creating housing for working folks in our city, for young people who want to come to Boston, also executives. It is a multi- year housing program.”***

– Boston Mayor Tom Menino (CBS 2013)

*“To confront San Francisco’s rising housing affordability crisis, we must be creative and flexible... Allowing the construction of these units is one tool to alleviate the pressure that is making vacancies scarce and driving rental prices out of the reach of many who wish to live here”*

-San Francisco City Supervisor Scott Weiner (Riley 2012)

# 1. Trends, Demographics, and Market Conditions

The push in several major cities to develop micro units reflects changes in cities and housing markets across the US. Many of these trends are also global; in many countries apartments of this size or smaller are quite common. In order to understand where (or if) these units should be developed as well as how to do so most effectively, it is important to understand who we are building them for and what market trends are driving their development.

To begin with, single person households have been on the rise since the first time they were measured in the U.S. Census. (Klinenberg 2013) In New York, this issue is compounded by a development environment that is ultimately an uphill battle for the young, single person: the market is heavily pressuring developers to build large luxury units, due in large part to extraordinary land costs driven up by global and super-wealthy buyers – who are often purchasing second, third, (fourth) or speculative properties. For “normal households”,<sup>1</sup> housing cost is a major barrier to remaining in the city. (O’Leary 2013) This is true of other major cities as well, as center cities have become highly desirable again in recent decades, both for families who are choosing to stay as well as young people. As a result of rising housing costs, illegal housing solutions have become a crisis in many cities, particularly New York, with unregulated apartment subdivisions causing fire hazards and other safety concerns. (Zraick 2011) The competition among an entire globe for the real estate on a small island has driven up housing prices, potentially skewing the market far away from an average consumer who is looking for an affordable, permanent residence.

This section details these demographic trends that create a need and effect the demand for small dwelling units - and the way these trends have been framed by policy makers and politicians.

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<sup>1</sup> A recent New York Times article cheekily asserted that middle class in New York is now a household earning \$235,000 a year. But actually, the original article says, to live a middle class lifestyle in the city a household needs to make between 80 and \$235,000. (O’Leary 2013)

## 1.1 Politician's Statements

Reading through statements made by city officials can begin the discussion about what is motivating the creation of these tiny apartment units from a city perspective. In each of the three cities considering changing a major law to promote these buildings, there is a political actor or advocacy group pushing the movements. Since the removal of prohibiting regulations is essentially the removal of a standard of living regulation, it is important to carefully examine who is intended to be the beneficiaries of these units and what economic forces have changed sufficiently for the regulations to now cause more harm than good. Chapter 5 discusses the regulations specifically and the various positions on keeping them in place. The politicians advocating most publicly for the changes are New York City Mayor Michael Bloomberg, City Supervisor Scott Weiner, and Boston Mayor Tom Menino.

Their reasons include:

- A gap between existing housing units and modern living habits / households;
- A need for affordable housing;
- A need to provide adequate and desirable housing for young people, singles, and elderly;
- A shortage of studio and 1-bedroom units.

In New York, the focus is on the disparity between the current housing stock and the rise of smaller households as well as on what the city believes to be outdated and detrimental housing regulations. In Boston, the discussion is about retaining young talent and filling Mayor Menino's "Innovation District" with recent graduates. San Francisco's rhetoric has centered on general housing affordability and the need to provide creative, market rate solutions.

Micro units do, I believe, have the potential to be diverse housing that fills many niches. I think demand among young people will certainly exist, if they can pay for it. I also think the elderly are a good market for this typology, as many couples and/or widows are choosing to retire in cities and could benefit from reduced housing costs and more social living conditions. Further, many immigrants or foreign workers might be eager to take such housing, if it can reduce costs, or to live at higher densities in them than is intended. Another demographic could include single parents, either for cost saving purposes or the potential social support that a building such as this could foster. Last, buildings of this type and SRO's currently serve special needs populations such as the disabled, the mentally handicapped, homeless, or recovering substance

abusers, in a housing type called supportive housing, but which is much like micro units in physical form.

For the purpose of this research, this thesis will examine micro units as a housing solution only in the way city officials are currently discussing it; cheaper housing for young single people. It will not go far into the normative questions associated with providing this type of affordable housing or if it is being targeted at those who are most deserving. It will, however, speculate on what types of market demand different neighborhoods across the city could expect to see if the regulation is removed.

## 1.2 More People Are Living Alone

*“Human societies, at all times and places, have organized themselves around the will to live with others, not alone. But not anymore. During the past half century, our species has embarked on a remarkable social experiment. For the first time in human history, great numbers of people - at all ages, in all places, of every political persuasion - have begun settling down [alone].” –Eric Klinenberg, Going Solo*

This paragraph comes from the introduction of “Going Solo”, a book dedicated to documenting a new, and to many an alarming, trend: the growing number of Americans who are choosing to live alone. The book’s tagline, however, is “the extraordinary rise and surprising appeal of living alone.” As someone who has studied “community” for the past half-decade, the trend does worry me, as does our cities’ and infrastructures’ ability to accommodate it effectively.

In 1950, 22 percent of American adults were single and four million people lived alone, roughly 9 percent of all households. Today, more than 50 percent of American adults are single and 28 percent of all U.S. households are people living alone. A single person household is now tied with childless couples as the most common residential type, more common than the nuclear family or any other arrangement. This trend has grown steadily since 1940, the first time this question was asked on the U.S. census. (Klinenberg 2013, 2-3)

Additionally, 32 percent of all New Yorker’s currently live alone and in Manhattan, 76 percent of all people live either alone or with just one person. (Gross 2012) Only 15.9% of NYC households are currently nuclear families, husband and wife with children under 25. (US Census 2009) In San Francisco, 38.6 percent of residents live solo and just 11.8 are nuclear households. In Boston, those numbers respectively are 37.1% and 10% .

Most U.S. cities, however, do not have housing stock to match this trend. In New York, as Mayor Bloomberg as routinely pointed out, there are just 1 million studio and 1 bedroom units, to accommodate the 1.8 million one and two person households. <sup>2</sup> (Dirken 2012) This mismatch is partially due to regulations in many cities that prevent the construction of smaller, denser, or more efficient apartments. Many of the regulations are outdated though, created at a time when we were concerned primarily with health concerns that are now no longer as pressing. Today, in many central cities we have an extreme housing shortage - especially of

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<sup>2</sup> Mayor Bloomberg repetitively asserts that there are not enough studio and one bedroom units for the number of 1 and 2 person households in New York City. I believe this assumption is not wholly appropriate; what about 2 person households composed of roommates, who would desire a 2 bedroom unit? Or a two person household composed of a young couple who desires a guest room, office, or bedroom in anticipation of having a child? I think this argument, while powerful and useful in promoting micro units, is not exactly correct.

affordable, small units - as well as sky-rocketing housing prices and a lack of flexibility in housing choices.

*“Developing housing that meets the needs of how New Yorkers live today is critical to the City’s future economic success. Currently, the City’s housing stock is misaligned with the changing demographics of its population. There are 1.8 million one- and two-person households (more than 60 percent of New York City households) and only one million studios and one-bedrooms to meet this housing demand. According to the 2010 Census, the growth rates of the one- and two-person household populations exceed the growth rate of households with three or more people. AdAPT NYC seeks to create additional choice within New York City’s housing market.”*  
(HPD 2012)

In response to growing concerns over housing practices and the increasing trend toward small and single person households in major cities, many officials have been considering changing zoning laws to allow the development of safe but smaller (and in some cases, truly teeny) units.

An often sidelined but important benefit of small dwellings is the social interaction it encourages. As amenities such as entertainment space, quality TV watching space, kitchens and even bathrooms are taken out of individual units, residents gain opportunities to interact with their neighborhoods and to sustain a level of community through communal amenities. In the winning adAPT competition the building contained a wealth of shared spaces, including a gym, common room on ground floor, roof terrace, and a sitting room on each floor. More radical proposals such as the “aPod-ments”<sup>3</sup> in Seattle are closer to the old single room occupancy buildings (SROs) or boarding houses: residents of up to seven units share a kitchen. While this style of housing may be suitable to a smaller range of ages and residents, there is a need for economized and communal living that has been effectively regulated out of the U.S. housing market. Richard Sennett, in his newer book “Together: The Rituals, Pleasure, and Politics of Cooperation”, calls for living with people who differ and learning to cooperate as a vital and waning tenant of society.

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<sup>3</sup> “aPodment” is a brand given by Calhoun Properties to their small apartments in Seattle, WA  
<http://apodment.com/>

### **1.3 Illegal/Unsafe Housing**

The mismatch between supply and demand has put pressure on the housing market, creating a black market and swelling of illegal housing practices. Jerilyn Perine, executive director of the Citizen's Housing and Planning Council (CHPC), led the group's project "Making Room", which began in 2011 as a way to spark discussion around the topic.

*"Our diverse households – predominantly single people – are trying to fit themselves into homes and apartments not designed for their needs. And our housing is unable to evolve because the size, shape, and even occupancy requirements of our homes are governed by old-fashioned laws and codes." (CHPC 2012)*

Ms. Perine has been a vocal advocate for a revision of the city's housing codes, arguing that minimum apartment sizes and archaic codes are actually making the housing market more dangerous, causing people to put up after-market room divisions and to create living spaces without basic access to egress, light, and air. One such law that is part of the City's Housing Maintenance Code, for instance, states that it is illegal for more than three unrelated adults to live together in an apartment or house. (Buckley 2010) This law not only drives the common practice of roommates in New York City underground, raising safety and legal issues, pointed out Ms. Perine, but it also stifles what might be innovative market driven solutions to create better housing options for single adults. CHPC and the City of New York hosted a conference, inviting architects to come up with creative solutions to the city's current housing needs, designing hypothetical / prototypical safe buildings but disregarding codes they deemed to be out of date or unnecessary.



## 1.4 Large and Luxurious: Global Buying, Vacation Homes, and the “Super Wealthy”

*“Bolstered by the recovery of the condominium market, with developers tripping over one another to build ever taller and more luxurious residential towers, air-rights deals are buzzing again.” (Finn 2013)*

New York City, and in particular Manhattan, has experienced enormous growth of the super-high end, luxury condo market following the 2008 recession. Competition, fueled by the global class of super wealthy, has led to outrageous bidding wars and an extremely high cost of land in most of the island. Speculation hit record highs in 2007 and 2008, with the cost of a square foot of some pieces of land hitting numbers in the 10’s of thousands.<sup>4</sup> (Haughwout 2013)

The cost of land in 2010 in Manhattan surpassed its 2008 high of \$321 average per buildable square foot up to \$330. (Haughwout 2013) A map showing land value distribution is included in Appendix H. The skyrocketing cost of land, and with it of both rents and condo prices, means huge numbers of the city are “rent-poor”, or spending too much of their income on housing. In 2000, the percent of renters who spent more than 30% of their income on housing was 53.5%. The percent of renters who spent more than 35% was 44.1%. (U.S. Census Summary 2010) This trend is seen in other major urban centers as well, including the cities considering micro units. In Boston 51.9% of renters spent more than 30% of their income on housing. In San Francisco that number was 46.2%. (Eastern 2011) Sadly, the more modern measure of the percentage in a city rent poor is those who spend more than 50% of their income on housing. In New York, more than a third (33.1%) of rental households pay more than a 50% of their household income on rent. (NYC Rent 2012)

The sale of air rights also points to the frenzy to purchase all developable land (space). 20 years ago the sale of air rights might have cost around \$45 a square foot. Now, that number is closer to \$450 per square foot, driven mainly by the condominium market. (Finn, 2013)

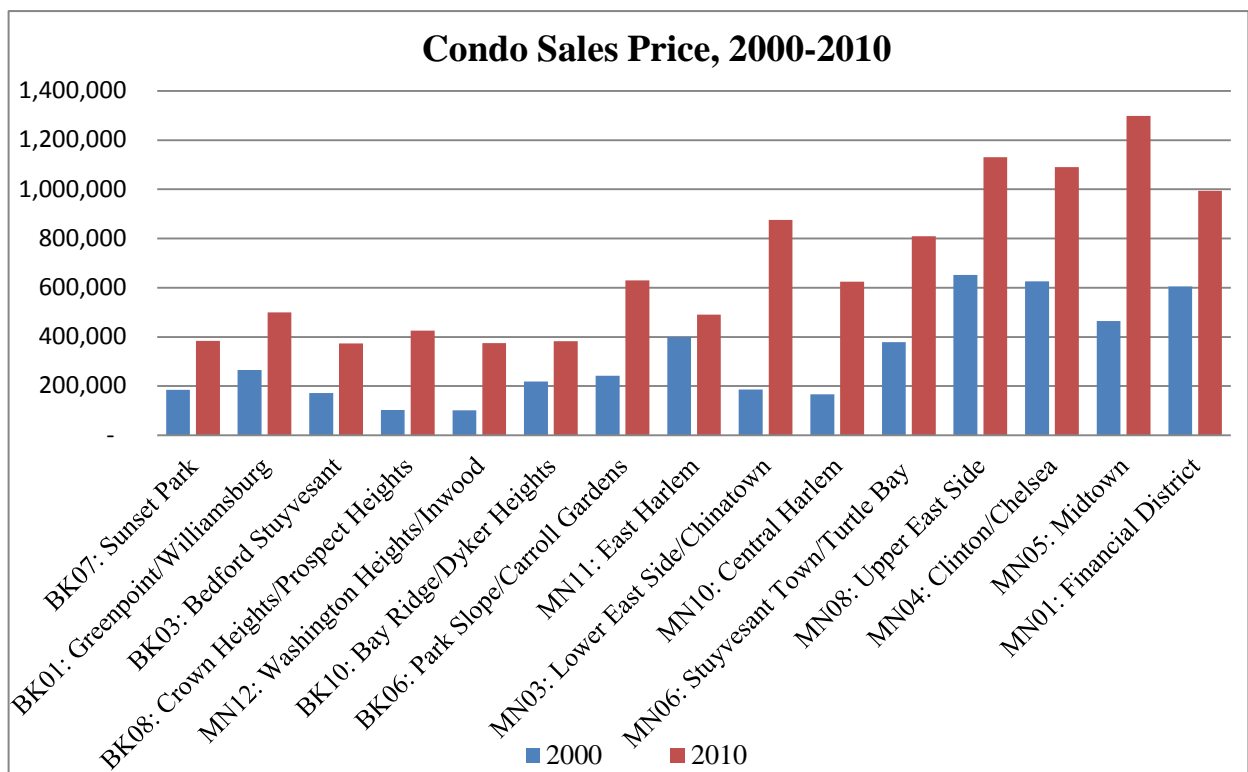
*“[The discrepancy between mean and median rental prices] lends credence to a trend brokers have repeatedly described to The Real Deal: **the luxury rental market is white hot.**” (Voien 2013)*

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<sup>4</sup> Land speculation in New York is not new; it began in 1626 when Peter Minuit bought the island for 60 guilders, or \$25, from the Canarsee Indians. (Haughwout 2013)

One dimension to this trend that is particularly troubling is that many of the buyers of these luxury units are not spending much time in them. From 2000 to 2010, Census data shows that in Manhattan there was a 70% increase in absentee owned apartments. Furthermore, in 2011 a New York Times Article reported about 30% of more than 5,000 apartments in a neighborhood in the Upper East Side are vacant more than 10 months a year. (Roberts 2011) (Goodyear 2013) In a new luxury tower at 432 Park, developed by Harry Macklowe and his partner CIM Group, only about one quarter of the units are expected to be occupied at any one time, which is not unusual for buildings such as these. (Bagli 2013) This, when combined with the high rate of foreclosures in Queens, the fact that the median income in New York City has dropped by 8%, and the high rate of homelessness in the city, speaks to how truly uneven the recent housing recovery has been in New York. For a map of vacant units in New York, see Appendix F. The map shows some of the highest vacancy rates in highest cost areas.

Condos in general have seen a huge surge in price. Comparing Census data from 2000 to 2010, the demand for condos becomes evident. The graph below shows this data for selected neighborhoods, by community board. The Lower East Side / Chinatown (369%), Crown Heights/Prospect Heights (313%), Central Harlem (276%), Washington Heights/Inwood (269%), and Midtown (179%) have seen the largest percentage jumps in the median sales price of condominiums since 2000. (U.S. Census 2000, 2010)



*"When I tell people outside of New York that I'm buying air from other building owners, they look at me as if I've lost my mind," said Kenneth S. Horn, the president of Alchemy Properties. (Finn, 2013)*

Another indicator of the way the top fraction of the market has taken off is to compare the average rent to the median rent. In year-over-year change, the median rent rose only 0.8%, according to Douglas Elliman's December 2012 Rental Report. The mean, however, rose a full 10% over last year, indicating a large skew in the top part of the market. Furthermore, while the median rent did not rise in studio, one-bedroom, or two-bedroom units, the median rose more than 21 percent in three-bedroom units from December 2011 – December 2012. (Voien 2013)

*"Household incomes in Manhattan are about as evenly distributed as they are in Bolivia or Sierra Leone — the wealthiest fifth of Manhattanites make 40 times more than the lowest fifth, according to 2010 census data." (O'Leary 2013)*

The demographic research from this study, elaborated below, suggests that there actually may not be a huge demand for micro units in Manhattan. Or, more accurately, however large the demand for such units is, the likely residents of these units would not be able to outbid wealthier residents who desire large, luxurious apartments. This contradicts much of the discussion among those in public policy, development, and affordable housing advocacy. To test these assumptions, before running regressions I performed several basic analyses.

## 1.5 Under-Building of Small Units

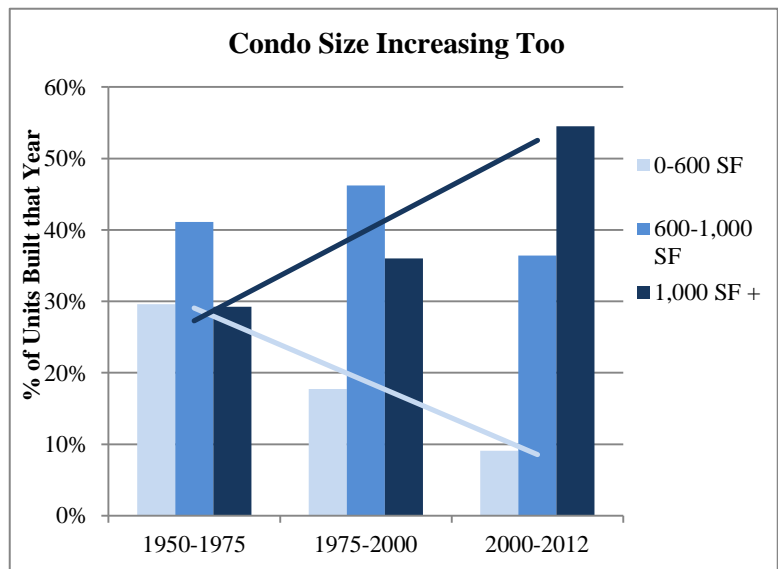
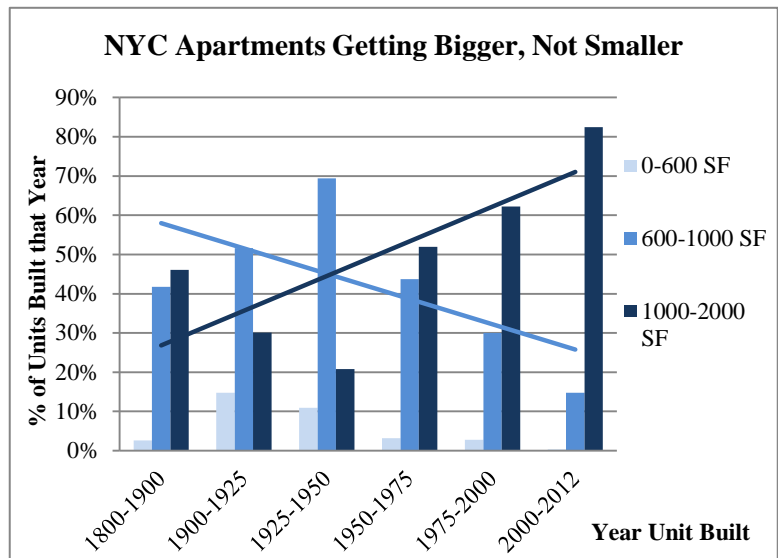
First, I looked at how average unit size has changed based on when the unit was built, using the NYC Finance Department's data on sales transactions in the city over the last ten years. Looking at city-wide data, which is likely to diminish any neighborhood level trends which could be more significant, it is apparent that in recent years apartments are being developed at larger sizes.

While development of really large units, 2,000 SF and over, has not changed drastically over the years, the distribution of units in the smaller sizes has. The 600-1,000 square foot unit size (which ranges from a studio to a big 2 or average 3 bedroom unit) has been sharply decreasing since the early to mid-1900's, when this size made up nearly 70% of all development. In the last 12

years, units of this size are only 15% of the total developed multi-family units in New York City. Furthermore, 0-600 square foot units have been declining since 1900, from around 15% of development during the early 1900's to 0.29% in the last twelve years. It appears new construction is not building small.

An analysis of the condo data reveals a similar trend since 1950, and one which is even more striking in the

smallest unit size, 0-600 square feet. I broke up apartments into three sizes: 0-600 SF, 600-1,000 SF, and 1,000+ SF and just looked at the last 60 years. What becomes evident and is easily seen with the linear trend lines, small apartments have been built less and less frequently as apartments larger than 1,000 SF have become much more prevalent among new buildings.



Even relative to 1950-1975 (the post-war, nuclear family boom), the numbers are staggeringly different. For buildings built between 1950 and 1975, 29.6% of the units from my dataset<sup>5</sup> were less than 600SF. That is almost 1/3 of all construction. Between 2000 and 2012, only 9.1% of new condos were that size. Between 1950-1975, approximately 1/3 (29.2%) was larger than 1,000 SF. After 2000, the 1,000+ SF units accounted for 54.5% of all developed units.

Developers do not appear to be attempting to butt up against or get around the 400SF minimum regulation; it appears new construction wants to build comfortably sized 2-4 bedroom units. If there were a pressing market demand for small units, I would expect to see a surge in the building of units just above the regulation, in the 400-600SF range. This has not happened. A few conversations with developers in the New York City market and who were involved in the AdApt competition support this trend.

*"In the past few years the highest \$/SF have been in larger units which is why people have been focused on creating that type. One would think that if smaller units were super desirable then people would have made a lot of 400 SF units (the current minimum), but this has not been the case. There must be other reasons people don't make small units..."*  
-Timothy Dumbleton, Minetta Partners<sup>6</sup>

A brief scan of recent Wall Street Journal, Crains, and Forbes articles seconds this notion, with a wealth of articles bemoaning the conversion of a once diverse, residential city into an increasingly exclusive enclave of second home buyers and the super-wealthy. As New York City has become a highly and globally desired city, many of the richest people around the world are purchasing apartments here, often as second or third homes, and even more worrisome: often sitting vacant for months or years at a time.

Mayor Bloomberg discusses the need to provide affordable housing to everyone around the world who wants to come to New York:

*"Developing housing that matches how New Yorkers live today is critical to the City's continued growth, future competitiveness and long-term economic success. People from all over the world want to live in New York City, and we must develop a new, scalable housing model that is safe, affordable and innovative to meet their needs."*  
-Mayor Bloomberg (NYC DCP 2012)

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<sup>5</sup> This is the condo sales dataset, consisting of 47,000 condo sales transactions from Manhattan between 2003 and 2012. The rental sales data used in the first graph is from sales of multifamily rental buildings, in all of New York, between 2003-2011.

<sup>6</sup> From an email conversation with Timothy Dumbleton of Minetta Partners on 4/23/2013

The people from all over the world that Mayor Bloomberg is talking about – the ones who need safe, affordable housing – are not the foreigners who are impacting the city’s economy most significantly today. The foreigners who are accomplishing that are the “super wealthy”,<sup>7</sup> like the mother who purchased a \$6.8 million condo for when her daughter goes to school in New York. Her daughter, at the time of purchase, was two years old. (Goodyear 2013)

The globalization that has destabilized and/or infused massive amounts of money into various global markets has also had an enormous impact on the New York City.

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<sup>7</sup> There are also plenty of American super wealthy contributing to this trend as well.

## 1.6 Density & Affordability

One important consideration in evaluating the goals and drivers of this housing product is from what living situations are micro unit residents likely to come? Will it be someone who was previously (or would have been) in a three bedroom share or is it more likely to be someone coming from or considering a studio or 1 bedroom on their own? If one of the goals is to increase density and decrease housing costs, both of these are important considerations. Some simple calculations show the density of micro unit buildings is likely to be lower than a building of two bedroom units, given a few assumptions:

Lot Size: 4,725 (adApt lot)

FAR: 6.02

Gross Buildable Square Feet: 28,444.50

Percent of Building Residential: 87%

Residential Square Feet: 24,804.50

Residential Efficiency: 70% (micro units), 80% (One-Bed Units), 85% (Two-Bed Units)

Net Residential SF: 17,363 (Micro Units), 19,843 (One Bed Units), 21,083 (Two Bed Units)

Unit Size: 300 (Micro Units), 450 (One Bed Units), 550 (Two Bed Units)

Total Number of Units: 58 (Micro Units), 44 (One Bed Units), 38 (Two Bed Units)

Average # Residents / Unit: 1.25 (Micro Units), 1.75 (One Bed Units), 2.25 (Two Bed Units)

**Total # of Residents:** 72 (Micro Units), 77 (One Bed Units), 86 (Two Bed Units)

**Total Res SF Per Resident:** 342 (Micro Units), 321 (One Bed Units), 287 (Two Bed Units)

This quick analysis shows that micro units might not be likely to produce much more dense housing, in fact may create less dense buildings, depending on the neighborhood.

Additionally in terms of affordability, if residents are moving from a roommate-share situation, they are likely to be spending more on housing rather than less. If it is anticipated that most residents will choose micro units over other studio or one-bedrooms, then this housing type will create more affordable and dense housing.

## 1.7 Housing Market Summary

As far as trends go in New York City, here is what a summary of the housing market looks like, specific to the development of micro units:

1. Single person households are a ubiquitous and growing phenomenon. New York's housing currently does not offer options to accommodate them.
2. Housing costs are very high everywhere in the city, with 53.5% of New York City renters paying more than 30% of their income on rent.
3. Illegal housing practices are attempting to skirt regulations and alleviate some of the housing cost, creating dangerous living situations.
4. Foreign buyers and the super-wealthy have increased the demand for large, luxurious apartments in Manhattan.
5. The cost of land is high; in Manhattan it is extremely high.
6. Developers are interested in building large and luxurious condos in Manhattan; and they're building large everywhere else, too.
7. Micro units will likely struggle as a housing typology in environments demanding and paying top dollar for luxury condo development. There is, however, a real need for an innovative, cheaper form of housing as single and young people seek relief from very high housing costs.



## 2. Arguments for and Against Micro Units

**Proponents of these units say** they add smaller units to a housing market that has a shortage of studio and one-bedrooms. Additionally, it will create more market-affordable housing, adding lower cost units without requiring government subsidies. They create higher density buildings and higher return per square foot for developers, while offering individual living spaces at a lower cost than one can find currently in the city. The higher density fits within smart growth principles and these buildings are generally being considered for transit-serviced areas and marketed to a population without cars.

Smaller units that include more amenities, such as a gym, laundry, entertainment space, living room space, kitchens, and even baths outside the apartments promote community living and a level of social interaction that many believe is missing from American housing and neighborhoods today. One caller into NPR's special on "Tiny Living" even went so far as to say he believed living in tiny spaces promotes community that will decrease gun violence. Another said the tiny (3'x2') space he was required to inhabit while in the army actually prevented him from committing suicide – from, he believes, the sense of community the forced shared spaces provided. (Conan 2013)

Additionally, it is possible that providing small, more affordable units for single occupancy will also relieve pressure from larger apartments, in which families are often unable to compete with groups of roommates.

Lastly, the most expensive cities worry about an inability to retain young people, creativity, and talent if affordable housing for young single people continues to disappear. Patrick Kennedy, a San Franciscan developer who advocates for building small, is one of the leading proponents of micro-units. He is targeting the same age group and potentially also young people just starting out as a couple or about to build a family.

*"What I want to do now is build the urban equivalent of Levittown – entry level, urban housing for about \$200K each".*

*- Patrick Kennedy (MIT SA+P)*

In Clarifying the Federal Fair Housing Act's Exemption for Reasonable Occupancy Restrictions, Tim Iglesias argues that reasonable governmental occupancy standards have been misinterpreted by numerous courts and undercuts the protection from housing discrimination

for families, particularly families of color. In the case of many Asian or Hispanic families, Iglesias argues that the law does not take differing cultural norms into consideration and regulations requiring apartment larger than a certain size may be more discriminatory towards families who would prefer to live closely.<sup>8</sup>

Opponents to this view believe overcrowding creates many problems, primarily those of public health and safety including safe egress, transmission of disease, psychological stress as well as external effects such as noise, traffic, and parking congestion. Housing providers usually give reasons for supporting occupancy standards including avoiding higher management and insurance costs as well as extra maintenance and repair.

*"Small rooms or dwellings set the mind on the right path, large ones cause it to go astray."  
- Leonardo da Vinci (Dirksen 2013)*

**Opponents see the units as** a way to make cities even more exclusive and elite, catering to the young and upwardly mobile at the expense of long-time residents or families. In San Francisco, opponents of the idea have begun referring to the micro units as “Twitter apartments”. (Wollan 2012) The regulation concessions, some fear, could also lead to a slippery slope of exemptions that could negatively impact livability, including changes in regulations governing light and ceiling height.

*"What San Francisco really needs is affordable family housing, this is not family friendly. This is aimed at tech workers and those who need a crash pad."  
-Ted Gullicksen, director of the San Francisco Tenants Union (Wollan 2012)*

Historically, such smaller units have faced these concerns, which motivated many of the original regulations. In New York City, single room occupancy buildings, historically boarding houses for single young people, women coming to the city to work, and male immigrant workers, eventually fell into disrepair and were partly responsible for inspiring a generation of

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<sup>8</sup> Iglesias points out the cultural differences that exist in what is “too crowded” and cautions against the segregating effects of such laws if certain families will only live where they are able to live together. Asian and Latino families in particular, Iglesias points out, tend to have larger families and cultural tendencies towards larger, close households. “Choosing to live all together makes financial sense for many low-income workers and their families. There is also clear evidence that many households living closely do so based upon enduring cultural preferences and non-economic interests. In short, living closely produces substantial economic, psychological, and social benefits for many households.”

regulations aimed at protecting city residents' health and quality of life through minimum housing standards. (Wollan, 2012)<sup>9</sup>

*"We were trying to prevent cholera from spreading, families from living in a dark apartment with a coal stove. So our sense of housing became big and airy, that bigger is better." —Jerilyn Perine*

Furthermore, some fear that the significantly increased return per square foot for developers is driving this interest, rather than a genuine need for affordable housing and some argue that the units do not provide "affordable" housing, but "it's just that you get significantly less space" (Said 2012). Such arguments reflect worries that the increased return per square foot could price affordable housing builders out of the real estate market. In San Francisco, the proposed "Shoebox" apartments developed by Patrick Kennedy would rent at \$5.91-\$6.82 per square foot, as opposed to the current city wide average for studios at \$4.21 per square foot. (Niesner, 2012)

Additionally, opponents fear the high-turnover rate likely to come with such tiny (or according to one critic, "inhumane") living spaces. At worst, the units could be rented as hotel rooms on the black market. At best, opponents fear, they would attract one or two semester long stays by students – often at the cost of losing SRO buildings and truly low-cost units. (Hogarth, 2012) In Boston and other cities the minimum square footage sizes were often put in place in part to prevent developers from meeting their required affordable housing targets exclusively with tiny units. (Casey 2011)

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<sup>9</sup> It has been illegal to build SRO buildings since 1954 under Administrative Code Section 27-2077 (Local Law 24). In 1995 the city provided incentives to convert SRO buildings to other uses (J-51). However, in 1985 the city instituted a moratorium on the conversion or demolition of SRO buildings; in 1987 Local Law No. 9 made it permanent, prohibiting "the demolition, alteration, or conversion of single room occupancy (SRO) properties" and guaranteed SRO owners an 8.5% rate of return. (SHNNY) (Weithman, Lebovits 2008)

### 3. Micro Units in Other Cities

San Francisco recently voted to reduce minimum apartment size, taking the most dramatic step yet in favor of tiny apartments. Supervisor Scott Wiener proposed cutting the size of the smallest allowable apartment from 290 to 220 square feet total, including kitchen and bath – or 150 without. The city expects the 41% of San Franciscans who live alone to support this type of housing, and to provide “flexibility to affordable and market-rate developers who produce all sorts of housing.” One developer, Patrick Kennedy of Panoramic Interests, is hoping to build a 160-unit building of 220 square foot units. (Dawid, 2012) The proposed building, says Kennedy, will have lots of common areas including “a huge lobby, a lounge on every floor and a rooftop deck.” Housing rights advocates are on both sides of this decision, some fearing it is not truly affordable housing and that it could lead to other exemptions that will impact quality of life. Others are in favor of adding units that rent at a lower-price point than most units on the market in San Francisco. (Said, 2012) Kennedy is also building, with the help of prefab building specialist Zeta Communities, is building a 23-unit building of about 300 square feet each in San Francisco’s South of Market district. (Defendorf, 2012)

Boston’s Mayor Menino was one of the first city leaders to come out in strong favor of “micro-units”, hoping they will attract the demographic he is looking to fill the newly coined “innovation district” in the South Seaport area. (Loth 2012) Menino is targeting young workers who are likely to want to live an “urban lifestyle” and won’t spend too much time at home. A prototype was designed in conjunction with Menino’s ONEin3 initiative, which references the 30% of city residents between the ages of 20 and 34. (Loth 2012) The Mayor has pushed through regulation changes, bringing the minimum apartment size from 450 to 375 square feet and has been loud about his desire to bring small apartments to the area, which reportedly has attracted some big names and a flurry of commercial and residential development interest. (Acitelli 2011) What he and others are calling “innovation housing” is defined by some as “compact sleeping units that open to shared living and dining space, which encourages collaboration and innovation.” (Grillo 2012) Ground breaking on one of the first projects with micro-units took place on July 26th, with many other developers lining up behind. (Ross, 2012)

Seattle has also been a site of recent controversy regarding micro units. One developer has coined the term “apod-ments” and has exploited a loophole in the city’s zoning regulations to slip micro units through without regulating them as what they are. According to the city’s zoning code, a dwelling unit is considered to be a unit with 1 kitchen with a stove, up to and

including 7 individual leases/bedrooms. The law was originally written to encourage community living in some of the older buildings but in recent interpretation has been used to build micro units in neighborhoods they are not very well suited, primarily neighborhoods of single-family homes where they are upsetting neighbors. A moratorium was placed on building these units recently, with the intention of clarifying the city's zoning code so that micro can be properly, legally, and transparently developed. (Conan, 2013)

Santa Cruz and Santa Monica have gone further in their encouragement of small units; both cities allow the development of market-rate single-room occupancy buildings (although the definition of such a building varies). (RBC 2008) Developers in Santa Monica are eager to take advantage of the incentives the city is offering to build housing for students and young professionals. There are purported to be 750+ SRO units currently pending approval. (Fogarty 2007) Some fear, however, the large influx of a homogenous population that will result from so many tiny apartments.

Vancouver has had a surge of interest by real estate developers in single-room occupancy hotels for conversion to higher-end small apartments and micro-units. Housing advocates are concerned that the city is losing some of its cheapest housing as these apartments which previously housed the very poor are now becoming housing for the working-class and upwardly mobile young people. Vancouver has, however, received a good share of publicity for the design and appeal of some of these remodeled micro-units. One building in particular, the once condemned Burns Block building on West Hastings Street, is home to 30 units between 226-291 feet. The developer, Jon Stovell, said all the units were leased within days. (Wintonyk 2012)

Motivations have been diverse; in all three big cities (Boston, San Francisco, and New York), it has been discussed as a way to retain and provide an alternative and less expensive housing option for young people who are being priced out of the city. In New York, a central push for the Making Room project is safety; because regulations prevent the market from supplying the type of housing demanded, people are creating illegal and unsafe shares, resulting in worse living conditions and in some cases fires, deaths and other tragedies. New York's rhetoric has also centered primarily on a discord between the housing supply and the type of existing households. In Boston, Mayor Menino has been straightforward about trying to provide housing for young people, particularly tech-industry entrepreneurs and recent graduates. San Francisco has echoed this, but with a focus on providing more affordable housing in general. San Francisco is also the first with developers building these units not just for rent, but also for sale.

## 4. What Do We Hope Micro Units Can Achieve?

Micro units have a tough challenge facing them. In many cities, the price per square foot for these teeny units will be higher than for other housing types, naturally providing incentive to developers to build them. Ideally, the highest price/square foot for tiny units will be found in the dense and expensive city core and city officials will not need to worry that it will become modern day tenement housing; the exorbitant rents – even on tiny units – in the best locations will keep the units from being used as a low-income housing alternative. San Francisco may be one such city. In this case, the city simply needs to remove the regulations and monitor where development happens.

In New York, this is unlikely to be the case. It is more likely that a demand for small units will exist in the less “white hot” areas: some of the outer parts of Manhattan, Brooklyn (although big developments have begun changing this landscape as well), or the other outer boroughs. This could pose a problem, potentially being an attractive but less appropriate housing option to different populations than originally intended. While micro units might be a good alternative for a single mother currently living with her sister, or for immigrant working men who are saving money to send back home, these conditions are not what city officials have intended or for which they have encouraged architects and developers to design.

In terms of accomplishing what they are intended to, the goal is to find a way to offer single young people appropriate, safe and affordable housing. Small units make sense because there are not enough living options for the growing number of single person households. Furthermore, young people (and single New Yorkers in general) are not home very often and shared common spaces make sense to provide social opportunity and supplement small spaces.

In Manhattan, micro units are up against people with much deeper pockets: the entire globe’s wealthiest citizens. Everyone who can afford to do so wants an apartment in Manhattan – for their kid to go to college, as a “safe” investment while their own economy is risky, as a second (third, fourth) vacation home, or as a rental income-generating investment. It looks like any unsubsidized, moderately priced development in Manhattan is going to face an uphill battle. Locating these units in Manhattan might not be the best idea, but it also might not be necessary.

The next part of this paper looks at whether or not this typology is feasible and if so, how and where?

## **PART II: Are Micro Units Feasible?**

*“Even though it’s the size of a shoe box, it’s their own apartment,” Rothstein said. “They don’t have a roommate situation where somebody ate their yogurt.” (Sit 2013)*

I tried to answer this question qualitatively last summer, while working for NYU’s Furman Center. In this research, I have tried to answer in quantitatively. In both cases the answer is complicated. The short answer is they are definitely feasible. The longer answer includes normative questions (Will they serve the right population?) as well as economic questions (In which neighborhoods is the demand likely to be strong enough to make this among the ‘highest and best uses’?) This research shows that in much of Manhattan, they are not a housing product that will be competitive on the open market. That does not, however, mean they could not work in Brooklyn or other boroughs. It also does not mean they could not be done successfully (albeit on a smaller scale) on city owned land under city picked projects. For this research, however, I will look into how to best get micro units built in open-market conditions – in which they would be scalable, attractive to developers, and potentially make the most impact on filling a gap in the housing market.

This part of the thesis gives you the long version of the past year of my research: the economic, demographic, regulatory, and financial considerations behind the development of micro units.

## 5. Regulating Micro Units

*“Our diverse households – predominantly single people – are trying to fit themselves into homes and apartments not designed for their needs. And our housing is unable to evolve because the size, shape, and even occupancy requirements of our homes are governed by old-fashioned laws and codes.” (CHPC)*

Micro-units are currently illegal to build in most cities due to various zoning or housing codes. In New York, the two regulations waived for Mayor Bloomberg’s design competition were density limits and minimum apartment size. (adAPT 2012, 11) In San Francisco, the minimum living space was just reduced from 220 to 150 (total from 290 to 220 square feet including bath and kitchen). (Neisner 2012) Boston’s was recently reduced from 425 to 375 square feet. In New York, the regulation sits at 400 right now and reducing it to 300 has been discussed. Other regulations to which developers of micro-units must pay special include caps on the number of units, floor-to-area ratios (FAR), setbacks requirements, contextual zone designations, lot coverage, parking, building height, minimum unit height, locked interior door regulations, square footage per room minimums, and size of largest room minimums. (CHPCb) The specific within-building issues the adAPT NYC competition pointed out to prospective developers are:

- Room size minimums (currently 150 square feet)
- Room width minimum (currently eight feet)
- Requirement of a kitchen within the unit
- Rules regarding the proximity of sleeping areas to kitchen / kitchenette
- Accessibility requirements
- Light and air requirements
- Common bath and toilet allowance
- Common kitchen allowance

The competition stated that changes to the first four regulations may be considered while changes to the last four (accessibility, light and air, common bath and kitchen) will not be. (adAPT 2012, 28)



As discussed above, the regulations banning micro units (more specifically, setting an apartment minimum square footage) have been argued on both sides. The arguments against them are both normative and objective, ranging from fear of negative externalities and excessive developer gains at the cost of humane living, to assertions that they are only catering to single, wealthy, young professionals.

There is a body of research from the field of urban economics which addresses very similar topics to this. Classically, the problem of optimizing profit on a unit level basis (price per square foot, or price per acre) has been applied to subdivision developments in order to determine the optimum number of lots for a particular development. In subdivisions, the economic condition that occurs when developers make a greater profit per square foot from combining land parcels is called “plottage” (people want big lots). The opposite effect, when subdividing lots creates more value, is called “plattage” (people want small lots).<sup>10</sup>

The theory for apartment size can be thought about in the same way; there is an optimal size at which developers receive the most revenue on a per square foot basis. Take the following example: if a developer has a building envelope that is 2,000 square feet, will he make more money from building one 2,000 SF unit, five 400 SF units, or ten 200 SF units?<sup>11</sup>

In short, the main question regarding optimal apartment size essentially looks at what is the highest and best use for residential land: will developers have an incentive to build large units for rich people and/or families, or small units for single people and/or perhaps lower income residents?

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<sup>10</sup> For Subdivision Literature See:

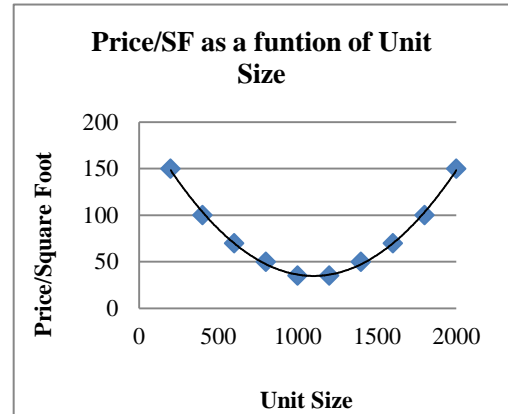
Cannaday, Roger E., and Peter F. Colwell. 1990. “Optimization of Subdivision Development.” *The Journal of Real Estate Finance and Economics* 3 (2): 195–206.

Guntermann, Karl L., Alex R. Horenstein, and Gareth Thomas. 2007. “Parcel Size and Land Value: A Comparison of Approaches.” <http://www.public.asu.edu/~ahorenst/Docs/Parcel%20Size%20and%20Land%20Value%20-%20November%202010.pdf>.

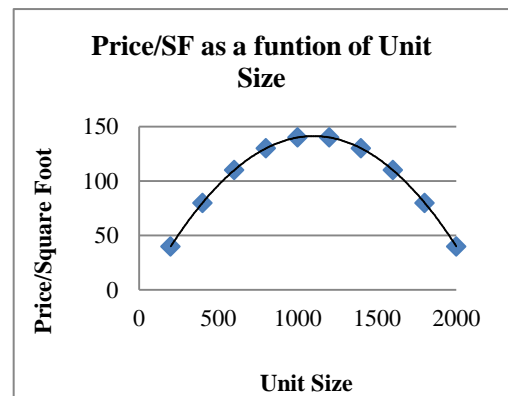
Thorsnes, Paul. 2000. “Internalizing Neighborhood Externalities: The Effect of Subdivision Size and Zoning on Residential Lot Prices.” *Journal of Urban Economics* 48 (3): 397–418.

<sup>11</sup> This example is ignoring the additional square footage required for more units in the form of circulation and common space, the percentage of which increase with a higher number of small units.

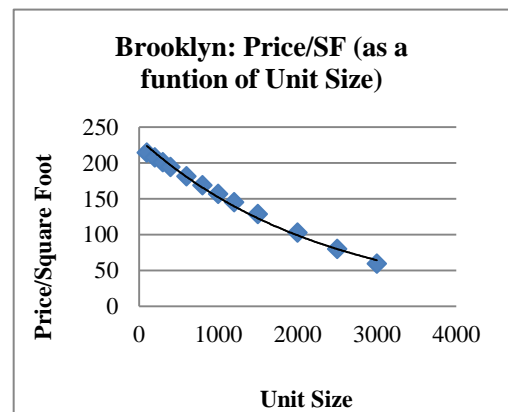
Each market will have its own equation for price/square foot as a function of unit size. Some might be a perfectly parabolic U shape as shown in the top graph; others might be an inverse parabola as shown below. Still others could be linear and flat, or linear with an upward or downward slope. Perhaps a market might even have something that more closely resembles a couple periods of a sine wave.



This study looked at both Manhattan and Brooklyn in New York City, attempting to learn how various submarkets within the city regard small units. If they are parabolic and open upwards (if the coefficient on the quadratic variable for unit size is positive, as in the first graph) then the market rewards both large and small units, but discourages mid-sized units.

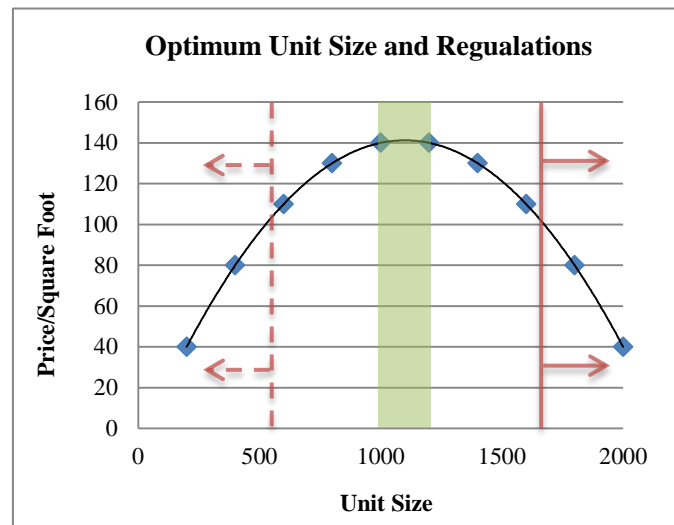


If it opens downwards (thus has a negative variable), the market does the opposite: pays developers a premium for mid-sized units. If the function is mostly linear, a positive slope indicates “the bigger the better” and a negative slope indicates the opposite: that small units command a per square foot premium. The last graph shown is of Brooklyn as an entire borough, demonstrating a slightly concave, downward sloping function. This implies that in Brooklyn, in most areas, developers would want to build as small as they are allowed.



Regulating apartment size manipulates the market in a very direct way. Returning to the earlier example of what to do with a small 2,000 square foot space, consider the impacts regulations would have on such development decisions.

The example at the right shows a graphic display of how a price/square foot optimization function might look. In this instance, developers receive the highest profit (and thus are most willing to develop) when the unit size is around 1,000 to 1,200 square feet, shown in green. Outside of that window, as apartment sizes rise or fall, the price/square foot a developer receives drops off.



Rent regulations, at their most restrictive, could look as the graph at the right does. Here, the red lines represent 1) a minimum unit size regulation (solid red line) that is to the right of the market's optimum unit size, thus requiring developers to build larger than they would choose and 2) a maximum size regulation (dashed line) that is requires units smaller than is optimal. The latter is not so common, but could become a possibility as some cities become increasingly wealthy, they may try to preserve some housing units at an affordable price or scale. This may actually someday be the case in New York, as this thesis will demonstrate in subsequent chapters.

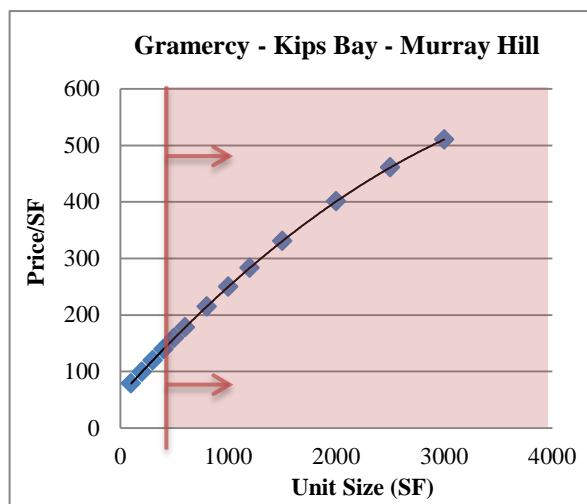
Unit Size	Price/SF	Price/Unit
200	40	\$ 8,000
400	80	\$ 32,000
600	110	\$ 66,000
800	130	\$ 104,000
1000	140	\$ 140,000
1200	140	\$ 168,000
1400	130	\$ 182,000
1600	110	\$ 176,000
1800	80	\$ 144,000
2000	40	\$ 80,000

Today however, the regulation mainly under debate regarding micro units is the solid red line, or the minimum apartment size. The second solid line shows how such a restriction could require developers to build larger than the market wants. In New York City, that minimum is 400 square feet. Reducing this regulation implies there is the assumption of some kind of demand, in some neighborhoods, for units smaller than this.

The hope is that many outdated regulations that city governments are talking about removing look something like the example graph. In this case, removing the regulation would spur

smaller development, allowing developers to achieve a greater profit while providing the city with a product it has decided it has a great need for: tiny, affordable units.

Unfortunately, however, most neighborhoods in Manhattan do not have that shape. Instead, they have an almost linear curve with a positive slope, seemingly demanding ever bigger units in some of the most expensive areas of downtown. This trend is unsurprising, given the steady rise in average rental rates in the city for large units as well as the recent luxury condo building boom.



It also means that for the unsubsidized, market-rate housing market, the dismantling of the minimum

apartment size will not create any real changes in many of the most desirable areas of the city. If the rule is you have to build bigger than 400 SF, but developers are still seeing ever greater profits at 2,000 SF and up, they will not be encouraged to change their building patterns.

This research did not take into account the additional cost of micro units, which is the added cost of more units in the same space. Most important are the extra costs associated with adding more kitchens and baths, which can be around 25% of the total unit cost of construction. This thesis seeks to find a necessary but not sufficient condition for micro units: a development environment that pays a premium in revenue for small units. If this criteria is not met and there is no additional revenue for building more densely, the additional costs of construction of this type of building on top of that are irrelevant.<sup>12</sup>

Unless the government steps in to specifically encourage micro units through zoning bonuses, FAR allowances, or tax subsidies, getting rid of the minimum size regulation is not going to cause many waves, at least not in most central areas of Manhattan. But can we find areas where this is not the case? Somewhere that a negatively sloped function exists or at least where there is a slight upward turning tail on bottom end? To answer this question, a more fine-grained look at both Manhattan and Brooklyn will provide greater insights.

<sup>12</sup> The per unit cost of residential construction for the submissions to the adAPT competition was around \$150,000, ranging from \$100,920 to \$168,243 per unit. On a per square foot basis, cost of total construction was around \$265/SF. The total average cost of development for the project was around \$14 to \$15.5 million. On a per square foot basis that came out to a mean of 455 and median of 439 – or \$230,398 on average per unit.

## **6. Demand: Evaluating the NYC Market for Micro Units**

Micro units are not a universal housing product; they are a very specific housing type that will be demanded only under certain conditions. These conditions can be thought of as the macro conditions necessitating the units. Further, they will only be desired if done well, meeting certain basic needs in terms of amenities, price, and location. These second conditions are the ways to do it right, once we determine there is a need. Here, locating micro units properly, both from a profit-maximizing (or subsidy minimizing) perspective as well as from a market demographics point of view, will be discussed.

In New York City, the demand for micro-units will probably be ubiquitous – the problem will not be finding people to live in the apartments (is that ever the issue in New York?) but rather – finding somewhere potential micro-unit developers will not be outbid by luxury condo developers.

To begin with, there are a number of city level conditions that indicate a need for this type of housing:

1. Illegal subdivisions
2. High number of single person households
3. High number of people between the ages of 20-34, high number of people over 65
4. High number of non-family, non-partner households
5. High percentage of rental population paying a high percent of their income in housing costs
6. More 1 and 2 person households than there are studio and 1 bedroom apartments
7. High housing cost appreciation in recent years
8. High number of student residents, net of university housing

Assuming there are cities which have a demand for small units, picking the right neighborhood for their development can be tricky; there are a variety of considerations:

1. Does the neighborhood currently favor large or small units?
2. Are there amenities nearby that likely residents would desire?
  - a. Public transit, restaurants and night life, cafes and retail, parks, etc
3. Is the social makeup of the neighborhood likely to be attractive to potential tenants?
4. Is the building likely to be offensive to current residents / Would the building blend aesthetically, demographically, and socially into the neighborhood?
5. Would zoning support the development of this type of building?

### *Micro Units and New York City*

The eight criteria identified as key indicators of a market which would benefit from or be receptive to micro units comes from research done on the topic in July of 2012 for the Furman Center, as part of their What Works Collaborative and research on small units. New York City has a great need for such units, as indicated by this list. In the next chapter, on locating micro units, this list will be used to evaluate neighborhoods as potential sites.

New York also, however, has a unique issue: the globalization of real estate and increasing demand for high-end units by the world's wealthiest buyers. This trend, as we will see, has impacted the housing market in such a way that a viably actionable demand for micro units is not so clear. In Manhattan, high land prices, driven by wealthy buyers, has created a landscape in which price per square foot is considerably higher for large units than for small ones.

## 6.1 Is There A Premium on Small Units?

As explained in the regulations chapter, understanding the way regulations will affect the market requires an understanding of the market, and markets vary greatly in New York City from neighborhood to neighborhood. In most of Manhattan, which has been the only discussed location for micro units, getting rid of the regulation that currently bans them could have little effect. In Brooklyn or the other outer boroughs, however, it could have a very large effect on how and what type of development occurs.

*“The remarkable number of high-quality responses to the adAPT NYC RFP validates the position that developing micro-unit living is both financially and physically feasible in the New York City landscape,”*

- Mathew M. Wambua, HPD Commissioner

While this thesis is not directly disputing Mr. Wambua’s assertion, it is picking it apart in several ways. There were a remarkable number of high quality responses to the adAPT competition. The submissions do underscore the belief that micro unit living is physically feasible in New York, as do the projected market rate rents of \$1,800-\$2,200. I do not believe that the submissions necessarily validate the financial feasibility, however, for several reasons. First, the land was partially subsidized by the city at a sales price of \$500,000. Second, the proposals include almost half subsidized affordable units. Third, the project is highly publicized and the winning design is being built as a prototype, in the national and even possibly global spotlight. Mr. Wambua also, however, does not specify Manhattan – in which case it may be market-rate viable financially and physically.

In order to thoroughly examine various potential locations, several levels of analysis are necessary. First, it is important to determine the shape and scale of the price/SF to unit size curve on a neighborhood level. Next, neighborhoods need to be considered in light of their demographic makeup and how such projects might be received in the neighborhood. It is important to ensure there would be enough demand to fill such a development and that a micro unit building would not inordinately disturb a community. Last, a consideration of current regulations including maximum density and building envelope is necessary to get a complete picture of the development environment for each neighborhood.

*NYC Finance Department: Sales of Multifamily Residential Buildings, 2003-2011*

First, to evaluate the effect of unit size (square footage) on price/square foot in various areas of New York City, I used two data sets: NYC Department of Finance Sales data for multifamily residential buildings from 2003-2011 and NYC's history of condo sales transactions from 2003-2012. The first dataset was the primary source as it is better at approximates the rental market, although the results from both came out remarkably similar.

The multifamily residential building sales database includes gross square footage and thus, an average unit size can be extrapolated from each sale. This was less of an issue than originally anticipated; the size of the dataset yielded interesting and significant results. The data was cleaned, taking out 1) all units that didn't report sales price or unit size, 2) were more than two standard deviations from their neighborhood's mean in price per square foot, 3) had any commercial units included in the sale,<sup>13</sup> and 4) had fewer than three residential units in the building. This significantly reduced the number of data points, particularly in Manhattan, where many buildings were listed with a sales price of \$0 and had commercial units on the ground floor. There were roughly 40,000 data points on sales in Brooklyn and Manhattan over the last eight years, from which 27,220 are used in this study. The final data included a total of 202,632 residential units (a little less than 10 units on average per residential building sale).

Then the data was sorted by neighborhood, collapsing neighborhoods that are geographically close as well as similar in average unit size, average unit sale price, and average price/square foot. This roughly cut the number of neighborhoods in half; in Brooklyn reducing 59 distinct neighborhoods into 33 in order to have enough data points by neighborhood to evaluate run statistically significant regression analyses on all of them. The data was sorted into a hierarchy of neighborhood groupings, in order to look at macro trends as well as neighborhood level detail. Three main hierarchies were used, titled "Original Neighborhood", "Neighborhood Group", and "Borough Group", in order of decreasing number of neighborhoods per label. The middle grouping was done to create a manageable number of neighborhoods where adjacent neighborhoods were very similar, and in order to achieve a minimum of 80 observations per neighborhood group. There were 90 original neighborhoods, which I broke up into 48 neighborhood groups and further into 12 borough groups, 6 in Manhattan and 6 in Brooklyn. This final hierarchy has a median number of observations of 1,148 with 204 as the smallest

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<sup>13</sup> This took out a large number of data points from Manhattan, likely also removing the majority of units located along avenues. It was a more accurate \$/SF representation, however, as the percent of residential in mixed-use buildings was not specified.



number of observations per group. The complete breakdown of neighborhoods into distinct levels for analysis, along with the salient features of each, is listed in Appendix I.

Using this dataset segmented by neighborhood it sought to find areas of the city that could support market-driven small unit development. If successful, the goal was to highlight the typical characteristics of areas that are conducive to micro-unit development.

The basic price / square foot equation estimated for multi-family residential units can be expressed as:

$$P = \beta_0 + \beta_1 S + \beta_2 S^2 + \beta_3 N + \beta_4 Y_3$$

where:

$P$  = price per square foot,

$S$  = unit size,<sup>14</sup>

$N$  = number of units in the building,

$Y$  = sale year dummy variable ( $Y_3$  = Year 2003,  $Y_4$  = Year 2004, etc.; reference year is 2011)

### *Results from estimating the price per square foot models*

Tables 1 and 2 on the following pages present the results of ordinary least squares regression analyses, for price per square foot as a function of unit size for both Manhattan and Brooklyn. With the exception of the intercept in the Manhattan data and the YearBuilt<sup>2</sup> in the Brooklyn data (significant at the 0.05 level), all of the estimated coefficients are significant at the 0.01 or 1% level. In Manhattan there were 5,078 observations included in the regression; in Brooklyn there were 22,142.<sup>15</sup>

In the equation of price per square foot for Manhattan, the estimated coefficient on  $S$  (unit size) (0.111) is statistically significant at the one percent level (0.01). The positive sign on this variable indicates that larger apartments yield higher prices per square foot in residential sales. This suggests the best use, in terms of revenue for developers, is not to build micro units in Manhattan. Further, their development may need to be creatively subsidized to be financially viable on the island at all. This data is aggregated at the entire borough level, however, and more suitable markets may emerge upon examination of neighborhood-level data.

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<sup>14</sup> Unit size here is average unit size for the building, as all sales records are at the building level.

<sup>15</sup> The difference between Manhattan and Brooklyn number of observations is primarily due to the high number of \$0 transactions and buildings that included commercial units, which were excluded from the analysis in order to prevent the interference of commercial prices/square foot. Manhattan has a disproportionately large share of mixed-use buildings compared to Brooklyn.

In the equation of price per square foot for Brooklyn, the estimated coefficient on S, unit size, (-0.0697) is statistically significant at the one percent level. The negative sign on this variable, however, indicates that larger apartments yield lower prices per square foot. This suggests the best use, in terms of price per square foot revenues for developers, is not to build as many small units as the market will absorb. This data is aggregated at the entire borough level, however, and more suitable markets may emerge upon examination of neighborhood-level data.

Tables 1 and 2 below show the regression outputs for Manhattan and Brooklyn. Columns 1 and 2 show regression results for the linear variables. Columns 3 and 4 include a quadratic variable (SF/Unit<sup>2</sup>). Columns 5 and 6 show the regression including the quadratic as well as a variable to take into account in what year the unit was built as well as a quadratic version of that variable. Columns 1, 3, and 5 are the intercept values; 2, 4, and 6 are the standard errors and noted levels of significance.

Table 1  
Regression Results for Manhattan

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	369.9316	27.5898**	319.2948	27.7276**	185.39154	167.9657
SF / Unit	0.125766	0.00334**	0.195186	0.00742**	0.1888641	0.00735**
SFUnit2	-	-	-7.145e-6	6.842e-7**	-6.812e-6	6.76e-7**
YEAR BUILT	-	-	-	-	3.6752211	0.34902**
YrBuilt2	-	-	-	-	-0.001882	0.00016**

*N* = 5,078; Assumes Year = 2011

\* Significance: *p* < .05

\*\*Significance: *p* < .10

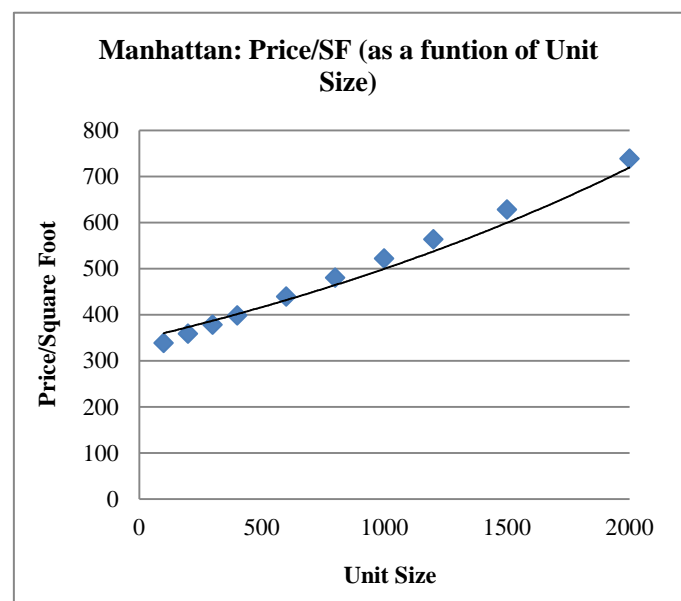
**Manhattan**

$$P = 319.2948 + .195186(S) + 0.000007145(S^2)$$

Unit Size	Price/SF	Price/Unit
100	338.8849	\$ 33,888
200	358.6178	\$ 71,724
300	378.4937	\$ 113,548
400	398.5124	\$ 159,405
600	438.9786	\$ 263,387
800	480.0164	\$ 384,013
1000	521.6258	\$ 521,626
1200	563.8068	\$ 676,568
1500	628.1501	\$ 942,225
2000	738.2468	\$ 1,476,494
2500	851.9161	\$ 2,129,790
3000	969.1578	\$ 2,907,473

Assumes:

Year Built = 2011



The function for transactions in Manhattan has a positive and nearly linear shape: on an aggregate borough level buyers of multifamily rental buildings place a premium on large units, not small units.

Table 2  
Regression Results for Brooklyn

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	251.4028**	3.41002**	261.1820**	3.84509**	196.2526**	20.2921**
SF / Unit	-0.05825**	0.00234**	-0.07546**	0.00391**	-0.06592**	0.00402**
SFUnit2	-	-	6.4074e-6**	1.167e-6**	5.8941e-6**	1.165e-6**
YEAR BUILT	-	-	-	-	0.279629**	0.03047**
YrBuilt2	-	-	-	-	-0.00013**	1.284e-5**

$N = 22,142$ ; Assumes Year = 2011

\* Significance:  $p < .05$

\*\*Significance:  $p < .10$

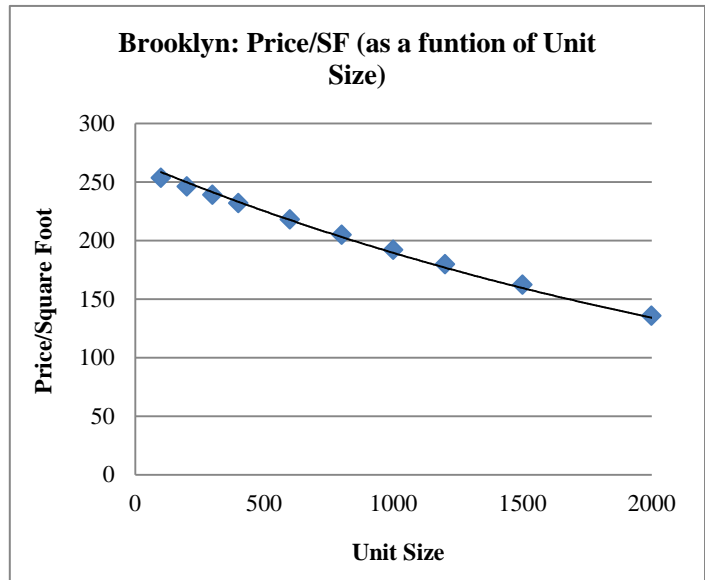
### Brooklyn

$$P = 261.1820 - 0.07546 (S) + .000006407 (S^2)$$

Unit Size	Price/SF	Price/Unit
100	253.7001	\$ 25,370
200	246.3463	\$ 49,269
300	239.1206	\$ 71,736
400	232.0231	\$ 92,809
600	218.2125	\$ 130,928
800	204.9145	\$ 163,932
1000	192.129	\$ 192,129
1200	179.8561	\$ 215,827
1500	162.4078	\$ 243,612
2000	135.89	\$ 271,780
2500	112.5758	\$ 281,439
3000	92.465	\$ 277,395

Assumes:

Year Built = 2011



The function for transactions in Brooklyn also has a nearly linear shape however this one is negative: on an aggregate borough level, buyers of multifamily rental buildings place a premium on small units, as is commonly assumed in most cities.

### *The effect of $S$ , size, on price/square foot*

A negative coefficient on  $S$ , unit size, signifies that a market may be hospitable to market-driven micro unit development. A positive coefficient indicates the opposite, that the market will pay a premium on price per square foot ( $P$ ) for larger units. It is important to understand the many neighborhood characteristics that could cause this coefficient to be positive or negative.

#### *Positive Coefficient on $S$*

In most Manhattan and a few Brooklyn neighborhoods there was a significantly positive coefficient on  $S$  (unit size) indicating the market will pay more for large units. Three main neighborhood characterizations could result in this:

- (1) Very wealthy neighborhoods in which residents want to live in large units and can outbid others to do so; and or neighborhoods attractive to wealthy speculative investors
- (2) Neighborhoods mainly comprised of families, in which 3+ bedrooms are needed
- (3) Neighborhoods comprised of immigrants, roommates, or other groups who may prefer to live in larger households, whether for cultural or financial reasons

#### *Negative Coefficient on $S$*

In most Brooklyn and some Manhattan neighborhoods there was a significantly negative coefficient on  $S$ . There are several reasons why this could be the case:

- (1) Poorer neighborhoods in which households cannot afford higher rents and thus prefer smaller units, even at a higher price per square foot, and may fit larger households into smaller spaces
- (2) Neighborhoods comprised of many single people, who place a premium on living alone. Two main demographic groups who have been leading single-person households are single 20-30 year olds (including students) and single older people.
- (3) Neighborhoods comprised of immigrants who have moved away from their families to work here, thus requiring little space and trying to minimize living costs

The tables below show the regression results by both borough group (larger groups of neighborhoods in order to achieve statistically significant numbers of observations) and neighborhood level.

Table 3

Linear regression by borough group, unit size as only variable

Neighborhood ( $\beta$ : \$/SF)	# of Obs.	Coef.	Std. Err.	t Ratio	Prob> t	95% Conf. Interval	
Brownstone Brooklyn	1,255	0.0008002	0.018474	0.04	0.9655	-0.03544	0.03704
Eastern Brooklyn	14,050	-0.052724	0.002008	-26.65	<.0001**	-0.05666	-0.04878
Harlem	1,609	-0.00678	0.0048	-1.41	.1580	-0.16195	0.00264
Lower East Manhattan	204	0.1478465	0.02223	6.65	<.0001**	0.10399	0.19169
Lower Manhattan	395	0.043878	0.016285	2.69	0.0074**	0.01186	0.07589
Midtown Manhattan	495	0.1013297	0.010928	9.27	<.0001**	0.07986	0.12280
Northern Brooklyn	1,105	-0.045749	0.007477	-6.12	<.0001**	-0.06070	-0.03079
Southern Brooklyn	4,547	-0.064608	0.004224	-15.30	<.0001**	-0.07289	-0.05633
Upper Manhattan	1,371	0.1049629	0.004914	21.36	<.0001**	0.09532	0.11460
Wash Heights-East Harlem	1,004	-0.006837	0.009853	-0.69	0.4879	-0.02617	0.01249
Western Brooklyn	1,185	-0.093022	0.013593	-6.84	<.0001**	-0.11969	-0.06635

\* Significance:  $p < .05$ \*\*Significance:  $p < .01$ 

Table 3, above, shows the strongest support for small units from a market demand by price per square foot perspective in the borough group labeled Western Brooklyn, which includes the neighborhoods of Cobble Hill-West, Gowanus, Navy Yard, Redhook, Bush Terminal, Downtown-Fulton Ferry, Downtown-Metrotech, and Sunset Park. Additionally, Eastern Brooklyn and Northern Brooklyn both demonstrated a statistically significant negative curve indicating potential viability. The neighborhoods on the Upper East and Upper West Sides as well as the Lower East Side of Manhattan had statistically significant positive curves, indicating the opposite.

Table 4

Linear regression by neighborhood, unit size as only variable

*Only showing significant results from select neighborhoods (of 90 total)*

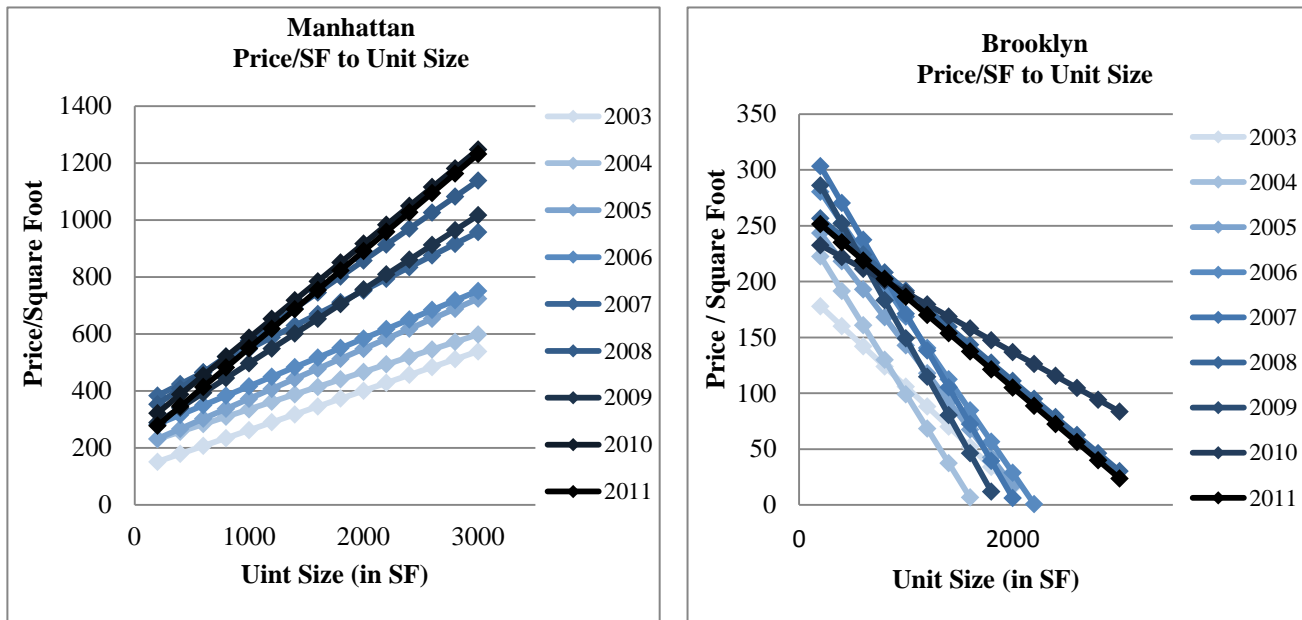
Neighborhood (B: \$/SF)	# Obs.	Coef.	Std. Err.	t Ratio	Prob> t	95% Conf. Interval	
Bedford Stuyvesant	3060	-0.071291	0.00364	-19.57	<.0001**	-0.07843	-0.06415
Borough Park	960	-0.054688	0.00676	-8.09	<.0001**	-0.06796	-0.04142
Brooklyn Heights	101	0.109664	0.06201	1.77	0.0804*	-0.01353	0.23289
Bushwick	2371	-0.014572	0.00359	-4.05	<.0001**	-0.02163	-0.00752
Carroll Gardens	264	-0.149647	0.04140	-3.61	0.0004**	-0.23119	-0.06810
Clinton Hill	262	-0.078782	0.02111	-3.73	0.0002**	-0.12036	-0.03721
Cobble Hill West	48	-0.238388	0.09143	-2.61	0.0130**	-0.42348	-0.0533
Crown Heights	1315	-0.051471	0.00609	-8.45	<.0001**	-0.06342	-0.03952
Dyker Heights	212	-0.110832	0.02014	-5.50	<.0001**	-0.15055	-0.07112
East Village	81	0.1362893	0.0361	3.78	0.0003**	0.06430	0.20827
Gowanus	125	-0.147722	0.06785	-2.18	0.0315**	-0.28214	-0.01331
Gramercy	54	0.209226	0.03659	5.72	<.0001**	0.13547	0.28297
Greenpoint	463	-0.028121	0.01578	-1.78	0.0755*	-0.05914	0.00290
Harlem-Central	1253	-0.01129	0.00582	-1.94	0.0528*	-0.02271	0.00013
Harlem-West	70	-0.121902	0.04787	-2.55	0.0135**	-0.21765	-0.02615
Kips Bay	31	0.1111708	0.05644	1.97	0.0616*	-0.00588	0.22822
Midtown East	77	0.1612596	0.02677	6.02	<.0001**	0.107818	0.21470
Park Slope South	126	-0.140555	0.07256	-1.94	0.0552*	-0.28426	0.00315
Prospect Heights	169	-0.107348	0.04324	-2.48	0.0141**	-0.19275	-0.02194
SOHO	29	0.3556259	0.07165	4.96	<.0001**	0.20565	0.50560
Sunset Park	855	-0.069463	0.01331	-5.22	<.0001**	-0.09560	-0.04332
Upper East Side (59-79)	361	0.0770107	0.00957	8.04	<.0001**	0.058177	0.09584
Upper East Side (79-96)	329	0.1184305	0.01166	10.16	<.0001**	0.095488	0.141373
Upper West Side (79-96)	290	0.060336	0.01209	4.99	<.0001**	0.036536	0.084135
Upper West Side (96-116)	123	0.099855	0.01693	5.90	<.0001**	0.066306	0.133403
Washington Heights Upper	217	-0.110787	0.02480	-4.47	<.0001**	-0.15968	-0.06189
Williamsburg-Central	114	-0.066664	0.01615	-4.13	<.0001**	-0.09869	-0.03464
Williamsburg-East	310	-0.031832	0.01022	-3.11	0.0020**	-0.05194	-0.01171

\* Significance:  $p < .05$ \*\*Significance:  $p < .10$ 

In the finer grained neighborhood analyses, a good number of neighborhoods appeared to be potentially viable, considering only Brooklyn and Manhattan. The neighborhoods with the largest statistically significant negative coefficient on unit size include: Carroll Gardens, Cobble Hill West, Dyker Heights, Gowanus, Harlem-West, Park Slope South, Prospect Heights, and Upper Washington Heights. Also worth exploring include neighborhoods with less exaggerated but still negative coefficients: Bedford Stuyvesant, Borough Park, Bushwick, Clinton Hill, Crown Heights, Dyker Heights, Greenpoint, Harlem-Central, Sunset Park, Williamsburg-Central and Williamsburg-East. The next section of this paper will explore the other neighborhood conditions likely to predicate the success of a micro unit and compare these neighborhoods with those in mind.

## Historic Data

All of these statistics include sales transaction data from the past nine years, from 2003-2011. In order to see if these trends are persistent and consistent, I analyzed the data by borough, by date of sale. The graphs below show the results of this analysis:



The Manhattan graph has a clear indication: every year the preference for large rather than small units has gone up (the price/square foot for larger units is growing relative to small units). The graphs have become increasingly steep every year, including after the 2008 recession. In 2009, you can see the price per square foot dropped, but in the years that followed the prices not only recovered, they made even greater gains in slope, indicating wealthy buyers were undeterred. This is worrisome because it suggests the demand for ultra-luxury buildings for the super-rich is becoming so much more powerful than the demand (or buying power) for small units, that Manhattan is becoming increasingly unattainable to normal segments of the population.

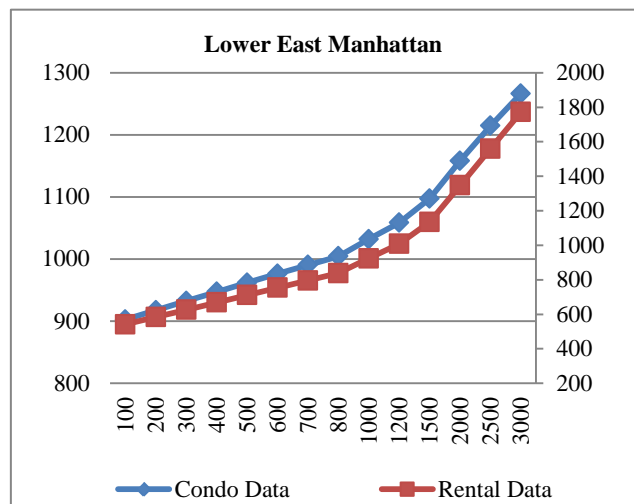
Appendix D shows these trends for several select neighborhoods. Most had some statistical significance, but the borough level analysis is much more reliable. Upper Manhattan, or the neighborhoods on the Upper East and Upper West Sides, were significant at a .05 level for all years and show this ever-steeper trend even more clearly. With each passing year, the demand

curve has become increasingly steep, making the likelihood of land here being developed as micro units increasingly small.

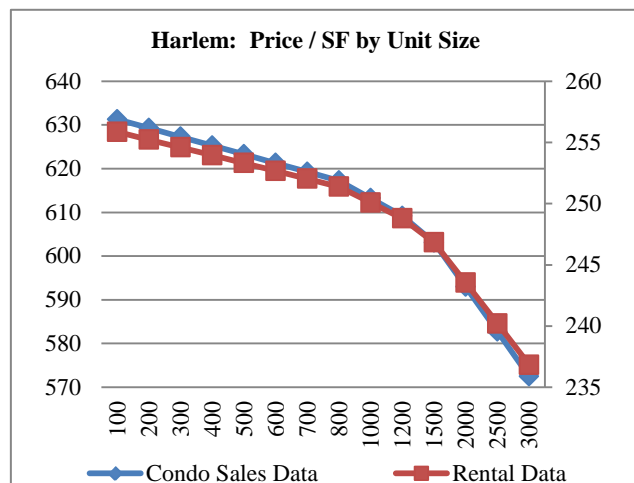
The story told in Brooklyn is a little more haphazard. It is clear that the slope is negative, however it is inconsistent, possibly flattening out over time. Perhaps this indicates a spill over in buying habits from Manhattan, or the influx of wealthier residents, or of families.

*Comparative Data: NYC Condo Sales Data: 2003-2012*

To substantiate the findings of the first data set, the rental building sales data and to get some more fine grained detail, I also used a dataset of New York City condo sales transactions from the past 10 years.<sup>16</sup> I initially thought condo data would be less relevant to micro units as it is rentals not sales. However the data trends are remarkably similar, with equations that produce nearly identically shaped curves for each neighborhood. The agreement between the two datasets strongly substantiates the reliability of these findings.



Comparisons for the two data sets for two of the neighborhoods, the Lower East Side in Manhattan and Harlem, are shown here. Most neighborhoods were this similar in shape of the price curve and all gave the same general trend. Appendix A contains a table showing a comparison of the coefficients, or slopes on  $S$  unit size, from linear regression models. The coefficients from the two datasets are reliably similar.



<sup>16</sup> This dataset was generously provided by Sofia Song at Street Easy.

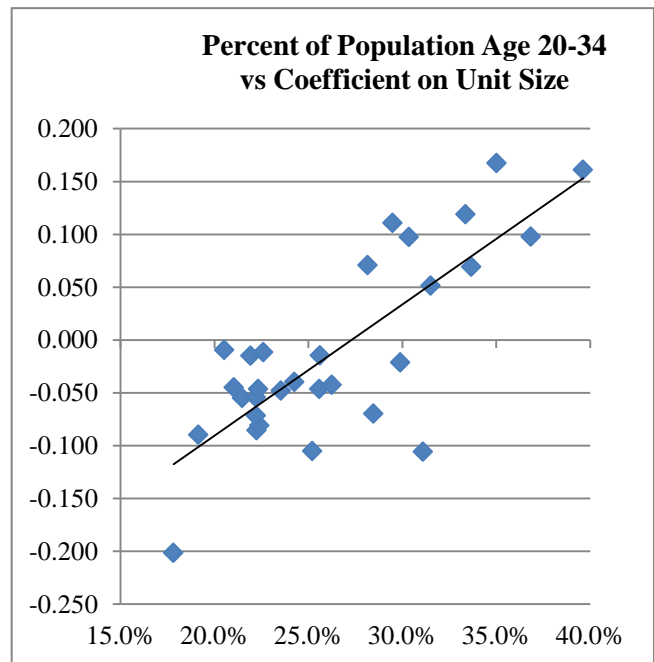
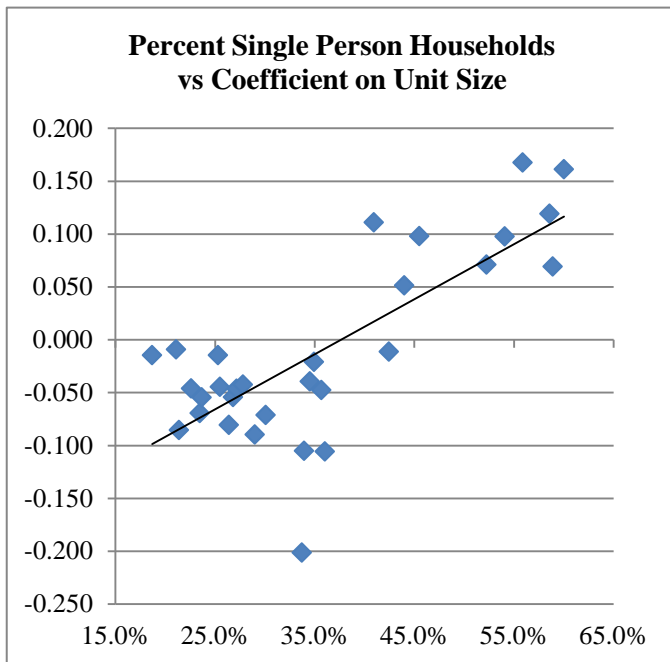
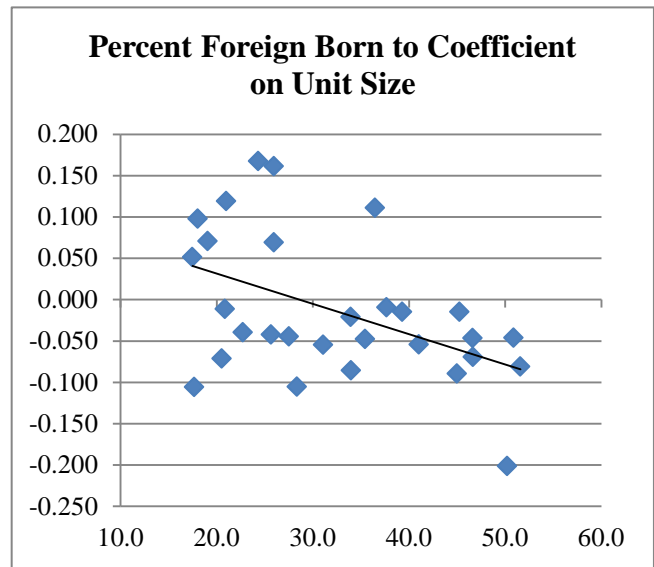


The data presented above not only contradicts the assumptions about how Manhattan will react to this regulation change, it contradicts nation-wide beliefs about how price per square foot changes with unit size in dense urban areas. In San Francisco, for instance, Patrick Kennedy has proposed a building of units at 220 square feet which would rent for approximately \$1350, in a per square foot range of \$5.91 to \$6.82 per unit. The average San Francisco studio apartment is 493 square feet and rents for \$4.21/SF – or \$2,075. (Dawid 2012) In this scenario the developer is able to both undercut the lowest priced units on the market and make a considerable premium on a price per square foot basis. One avenue for further research is to do similar analyses with city sales data for other major cities, starting with Boston and San Francisco.

*Other Factors Related to Coefficient on Unit Size*

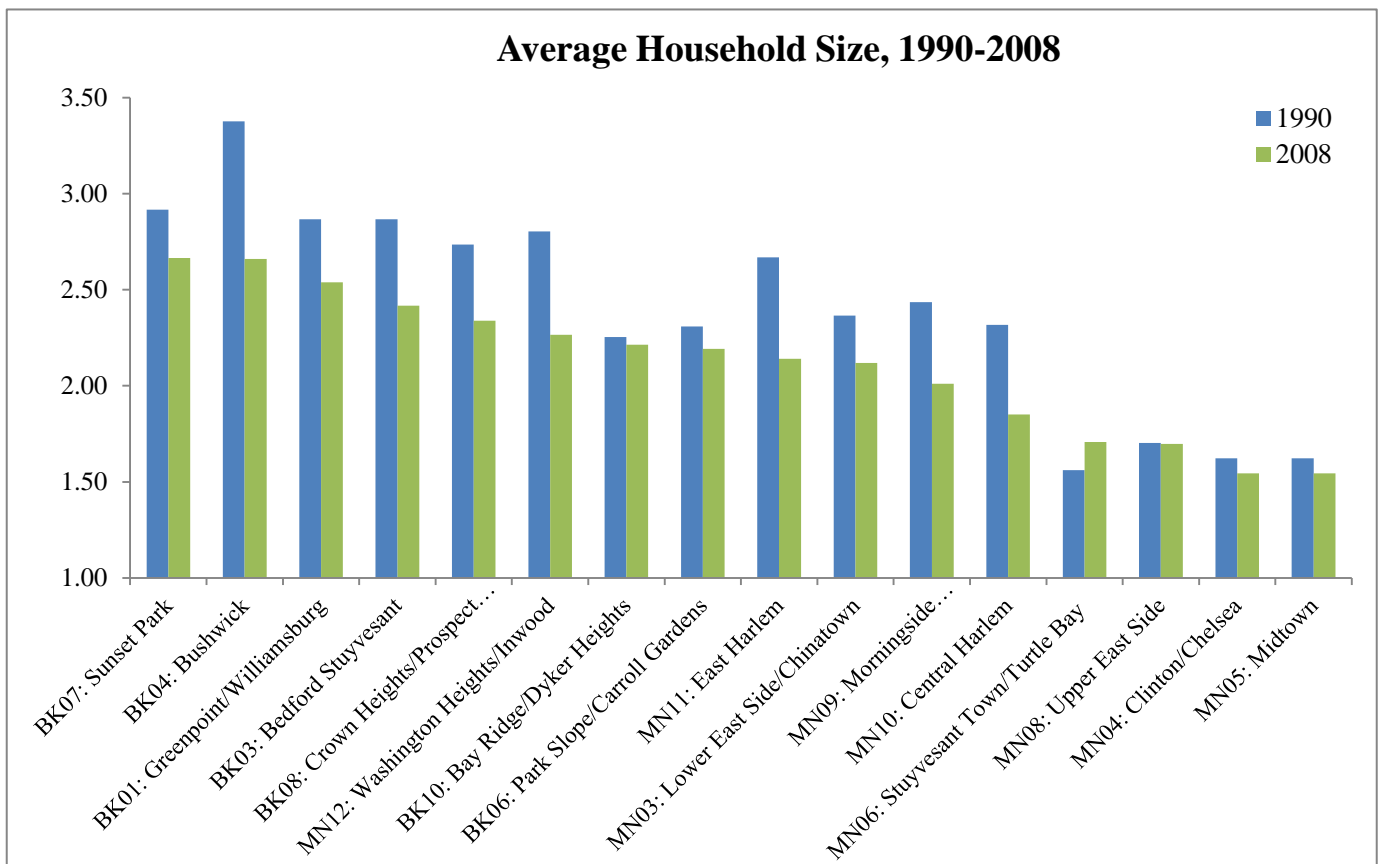
I looked at several other characteristics that might be related to the premium put on small or large units. First, I plotted the percent of foreign born residents with the coefficient and, as expected, a negative relationship between the two exists; as the percent of foreign born residents in a community increases, their likelihood to place a premium on small units also increases.

The percentage of the population between the ages of 20-34 has an opposite effect from what I would expect: as the percent in this age range increases, the premium on smaller spaces decreases. Perhaps this is because many in this age range are either in roommate situations or have started young families. The percent of single person households has a similar trend as well: neighborhoods with greater numbers of single person households tend to be the neighborhoods with a positive sloping curve. This might indicate that it is a luxury to live in single person household situations those doing so are in better financial situations, as they are likely paying a locational premium for it.



## Average Household Size

Another, simpler, way to look at demand for small units is by looking at average household size by neighborhood. This is less likely to give an accurate answer of the incentive to developers to develop small units<sup>17</sup> but more likely to gauge the type of demand Mayor Bloomberg is looking to satisfy, that of an increase in small households. The average household size in New York City is 2.61 persons. The graph below shows average household size by neighborhood from Census Bureau data. The neighborhoods are grouped by community board, and not all neighborhoods are shown.



The neighborhoods with the smallest household size are predictably all in Manhattan; in Midtown, Clinton/Chelsea, Stuyvesant Town/Turtle Bay, Central Harlem, etc. The neighborhoods with the largest change in this number are Bushwick, Harlem, Washington

<sup>17</sup> Analyzing the data this way would make a neighborhood full of crowded apartments (high household size) appear unattractive to micro unit developers when in fact these renters might prefer even smaller spaces and pay a premium for that (a premium for small, low cost housing).

Heights/Inwood, Bedford Stuyvesant, Sunset Park, Crown Heights/Prospect Heights, Morningside Heights/Hamilton, and Greenpoint/Williamsburg. Both of these indicate a pressure that could lead to demand for micro units.

## **6.2 Neighborhood Amenities**

As a housing type currently intended to serve the single young-professional and student demographic, there are certain neighborhood characteristics this group will find desirable. Among them, access to public transit, since young people in cities increasingly do not have private vehicles; restaurants, bars, and entertainment; low cost of land (since this project caters to those who desire affordable housing); proximity to cultural institutions and/or higher education institutions; and relatively attractive shopping and dining venues. The young single people in New York who Mayor Bloomberg is looking to serve are those just starting their careers, those who might choose another city because with low entry level salaries, they can find a higher quality of life. They are not likely to care about public school quality, as they are primarily single people who do not yet have children. This group has been called “class rich but cash poor”, and micro units seem to be a fitting housing type for such a label. The units are clean, new, well-designed, and in desirable locations, but for a lower price point than comparable units for a single person.

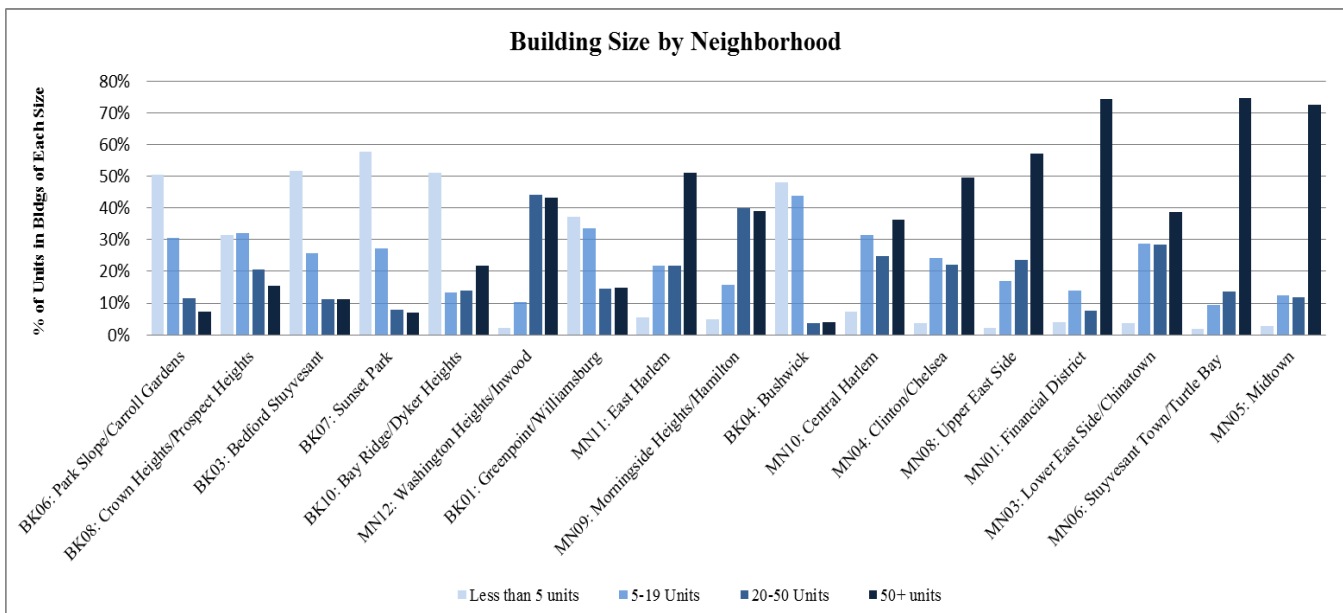
These next parts of the analysis could be better built out and would be a great an avenue for further research, to determine which neighborhoods might be best suited for the potential zoning changes which would allow these units. For now, neighborhoods with amenities such as good access to public transit, a supply of nearby restaurants and bars, proximity to universities, and proximity to other cultural amenities – as well as a negative coefficient on unit size from the preceding analyses - will be prioritized as ideal locations.

### 6.3 Social and Contextual Considerations

There are several social characteristics likely to be desired by the class described above. For one, this is primarily an educated group of young people, and they are likely to be looking to live in areas populated with similarly educated and/or “creative” residents. They also are a group that, generally speaking, values diversity.

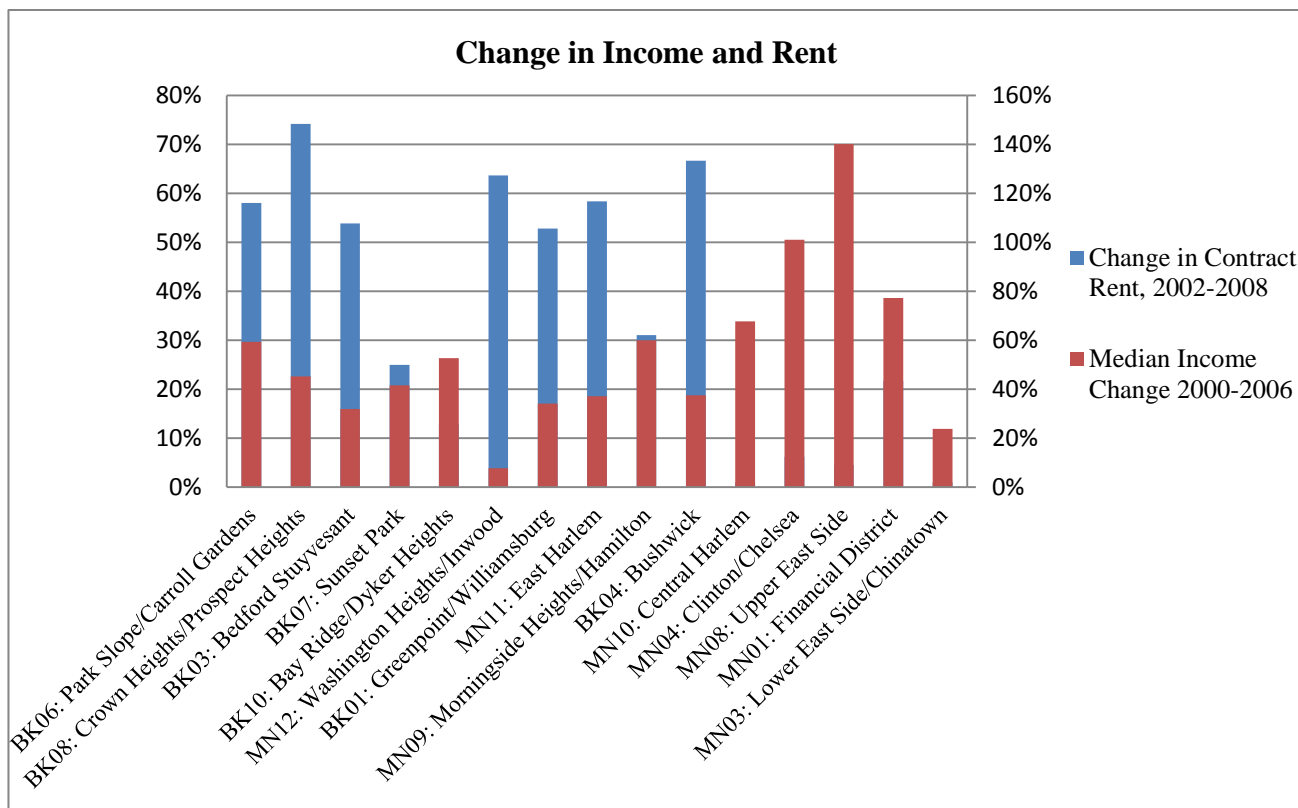
It is important to consider the context into which the building would be placed, both from the perspective of potential tenants and also of current residents. What is the racial makeup likely to be in the building? How does that compare to the neighborhood into which it will be placed? Will it be a catalyst for gentrification? New York City is still an extremely segregated city, as the New York City Race Map in Appendix G shows. Without trying to make normative assumptions about mixed-ethnicity neighborhoods, and with sensitivity to the issues of displacement created by gentrification, it makes sense to locate micro units in neighborhoods where they are not likely to create interest that attracts waves of young people to potentially fragile neighborhoods. What about age – is this a neighborhood of families into which 100 young people would be dropped? This might not be a problem to the tenants, but could be an annoyance to current residents.

How about the aesthetic context – a 12 story glass building would not fit into the context of a block of brownstones. Is it an aesthetically diverse neighborhood? Or, if not, does the architectural style, bulk, and height match the buildings on surrounding blocks? Below, and more complete in Appendix E, is a chart showing the number of units per building for many of the neighborhoods in Brooklyn and Manhattan, by community district. (U.S.Census, 2010)



The chart above is organized from most to least hospitable to micro units, from left to right, based on the coefficient on price/square foot.<sup>18</sup> In considering micro units, neighborhoods that do not contain a high percentage of units in buildings with fewer than 5 units are preferred, as a micro unit building is likely to not fit in this context. Given that, neighborhoods like Sunset Park, Bay Ridge/Dyker Heights, Park Slope, and Bedford Stuyvesant might not be ideal. A closer examination of the development pattern, zoning, and finer grained neighborhoods within each community board will clarify these perceptions.

Implicit in the category of social context, of course, is the issue of gentrification. New York City, and Brooklyn especially in recent years, has seen such incredible waves of gentrification that it often attracts national attention. Brooklyn has always been the outpost of Manhattan, the refugee in home prices from its neighbor across the river. Originally Park Slope and Brooklyn Heights, gentrification has drastically changed neighborhoods like Williamsburg over the last decade and in recent years has spread on to Crown Heights and Bushwick, among other neighborhoods. In some instances the influx of younger, wealthier residents has revitalized



<sup>18</sup> Note this is by community district so, for example, Brooklyn Community District 6 which is labeled Park Slope / Carroll Gardens also includes Park Slope South, Cobble Hill, Cobble Hill West, Gowanus, and Redhook – all of which have significantly varied premiums on small units.

commercial districts and strengthened home prices. In other instances it has severely impacted rental rates and forced current residents and business owners out of their neighborhoods. The rezoning of areas to allow micro units is going to play a part in this trend and it is important to be aware of the full context into which buildings are being placed.

The graph above shows two indicators (among others) of gentrification: change in median contract rent and change in median household income. The Upper East side, Clinton/Chelsea, the Financial District, and Central Harlem neighborhoods have seen the largest increase in median income while a large number of neighborhoods have seen significant changes in contract rent, including: Park Slope / Carroll Gardens, Prospect Heights, Bedford-Stuyvesant, Washington Heights/Inwood, Greenpoint/Williamsburg, East Harlem, and Bushwick.

The examination of neighborhoods will look for neighborhoods not dominated by a single ethnic group, with a relatively low concentration of family households, and without a dominant/restrictive/historic building pattern (defined as not having a “contextual zoning” designation). Of course a high concentration of young, educated, and single people is important, indicating both that the potential future residents could be similarly well-served but also confirms that a demand likely exists from the population micro units are trying to attract.

## 6.4 Zoning

Another challenge in selecting the right neighborhood, after determining a demand and social/political forces is zoning. If the city and public deem a neighborhood appropriate the zoning can be changed to incorporate these units, but for as of right development assuming just the apartment size regulation is changed, the other zoning regulations are necessary to consider.

In some neighborhoods a parking requirement of one off-street spot per dwelling unit hugely limits the ability of developers to build dense, efficient units. R1-R3 Districts are all lower density residential districts which require off-site parking with each unit. (NYC DCPb) The floor to area ratio (FAR), or the amount of square footage a developer is allowed to build based on the size of the lot, is another limitation that will hinder the development of micro-units. The site of the competition has an FAR of 6.02. (adAPT 2012) In the lower-density residential, again, this ratio is low: 0.5-0.85. There are also overall height regulations, regulations on the number of dwelling units that can be on a site, and regulations on required open space which all affect the viability of micro units.

The zoning amendment proposed for the project site is to overlay a C2-5 zone within the existing R-8 district. All of First Avenue along the West side is zoned C2-5, this would just be an extension of that district one half block in, to cover the adAPT lot. A special map for this change is included in the Appendix and can be accessed via the NYC Planning website. (NYC DCPa) An R8 district falls within the moderate- and higher-density districts (R6-R10) and is considered “non-contextual”. This zoning type encourages any height buildings with set back and open space around the buildings and is governed not just by an FAR but by a more complex set of rules including open space ratios, sky exposure planes<sup>19</sup>, and height factors in addition to FAR. Generally, the larger lots permit taller buildings. In R8 districts the Quality Housing Program also applies, which allows for higher lot coverage in exchange for shorter buildings, to be more compatible with the surrounding context.

Regarding zoning, neighborhoods with non-contextual designations, low or no parking requirements, high FAR allowances, and high or no height limits are preferred if not necessary to facilitate micro unit development.

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<sup>19</sup> These are planes sloping inward from a specified base height above the tree line which the building cannot penetrate. Therefore the further a building is set back from the street line, the taller it can be.



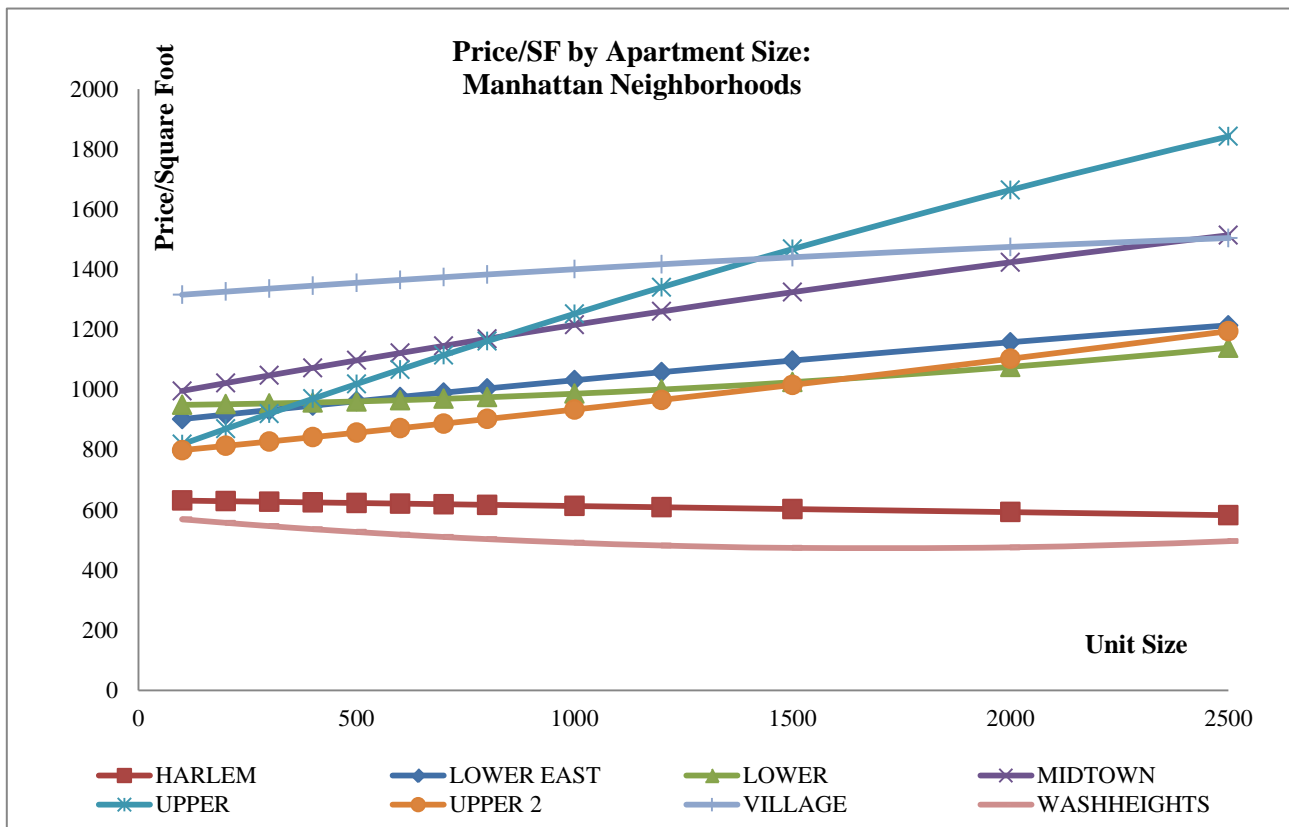
## 6.5 Cost of Land

One crucial consideration in locating micro units is the cost of land. The exorbitant prices paid for land in some parts of Manhattan are due to the returns developers can make from developing luxury towers. Finding a neighborhood with a relatively low cost of land is similar to finding a neighborhood with a low or negative coefficient on  $S$  (unit size) in the analyses above. These are the neighborhoods where either zoning prohibits such large towers or residents of such towers wouldn't want to live. Finding a neighborhood that has a lower cost of land and still meets the preceding requirements would be the first step in effectively locating micro units. A map is attached in Appendix H that shows land value in Manhattan. On it, the adAPT site in Kips Bay is circled, which eventually sold for \$500,000. The offering price for the land was one of the judging pieces for the adAPT competition. Some low-cost neighborhoods, predictably, include Washington Heights, parts of Harlem, the far West side of Midtown and parts of the Lower East Side.

## 7. Locating Micro Units: Neighborhood Level Data<sup>20</sup>

The placement of a new housing typology, particularly one which challenges regulations originally put into place out of living condition concerns, demands extra attention regarding where it should be located. Micro units not only need to be thought of in terms of where they are likely to be most competitive from a price per square foot earning potential perspective, but also where the desired tenants are likely to be the actual tenants. A part of this is knowing what residents of each neighborhood want, as well as knowing what residents of small units want, which will be discussed in the next chapter.

The graph below shows the price per square foot to unit size curve for Manhattan from 2003-2011, by major neighborhood groupings. As you can see here, the neighborhood which is most likely to pay a high price per square foot for micro unit sized apartments is the Village. Price per square foot in the Village is high, however, for all units. Harlem or Washington Heights are the two lowest priced neighborhoods and Washington Heights has the only negative and quadratic



<sup>20</sup> Most of the demographic data referenced in this section, unless otherwise noted is U.S. Census data accessed through the NYC GIS website: <http://gis.nyc.gov/census/>

function of all Manhattan neighborhoods. This flat or slightly U-shaped curve indicates that a micro unit in either of these neighborhoods would sell for approximately the same (on a price/square foot basis) as other unit sizes.

The regression reports below show the eight Manhattan neighborhood groupings and the estimates for a number of variables for each. Columns 1, 3, 5, and 7 show the coefficient estimates. Columns 2, 4, 6, and 8 show the standard error and level of significance. The number of observations, per neighborhood group, ranges from 341 to 8,694.

	UPPER MANHATTAN			UPPER MANHATTAN - B			VILLAGE			WASH HEIGHTS		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Intercept	-2699.27	292.51	<.0001*	4322.36	385.67	<.0001*	-2296.65	285.06	<.0001*	-1522.16	248.70	<.0001*
Sq feet	0.376	0.023	<.0001*	-0.207	0.036	<.0001*	-0.045	0.022	0.0369*	-0.364	0.084	<.0001*
SqFt^2	0.000	0.000	<.0001*	0.000	0.000	<.0001*	0.000	0.000	0.881	0.000	0.000	0.0101*
Floor Number	9.719	0.518	<.0001*	3.835	0.598	<.0001*	11.425	1.161	<.0001*	6.714	1.809	0.0002*
Beds	-72.505	8.945	<.0001*	-2.707	10.012	0.787	80.737	9.736	<.0001*	18.130	10.454	0.084
Baths	144.215	11.413	<.0001*	208.305	15.296	<.0001*	67.991	8.559	<.0001*	67.468	13.902	<.0001*
Year Built	1.559	0.144	<.0001*	-1.775	0.190	<.0001*	1.715	0.138	<.0001*	1.149	0.121	<.0001*
# of subway stations w/in 0.5 miles	88.853	3.108	<.0001*	-39.442	4.366	<.0001*	-10.830	1.562	<.0001*	-35.124	5.103	<.0001*
y 2003	-539.493	88.550	<.0001*	-513.478	103.851	<.0001*	-445.834	126.656	0.0004*	-295.692	94.201	0.0018*
y 2004	-279.403	64.656	<.0001*	-178.822	83.350	0.0321*	-330.785	84.384	<.0001*	-115.255	70.539	0.103
y 2005	-143.700	63.849	0.0244*	-73.041	82.485	0.376	-145.100	83.736	0.083	-96.168	69.307	0.166
y 2006	-72.001	63.772	0.259	-24.523	81.998	0.765	-24.107	83.861	0.774	9.459	70.728	0.894
y 2007	35.613	63.334	0.574	59.798	81.978	0.466	123.362	83.272	0.139	56.140	68.796	0.415
y 2008	126.393	63.380	0.0462*	144.820	82.098	0.078	153.233	83.425	0.066	79.874	67.895	0.240
y 2009	-79.337	63.554	0.212	72.687	81.818	0.374	135.803	83.651	0.105	-22.001	69.113	0.750
y 2010	-59.947	63.274	0.344	-14.557	81.573	0.858	105.830	83.275	0.204	-19.861	68.393	0.772
y 2011	-21.147	63.480	0.739	-52.022	82.339	0.528	112.256	83.690	0.180	-26.853	68.660	0.696
y 2012	0.677	63.349	0.992	25.274	82.390	0.759	230.797	83.355	0.0056*	-8.330	68.263	0.903
	n=7339			n=1783			n=4414			n=476		

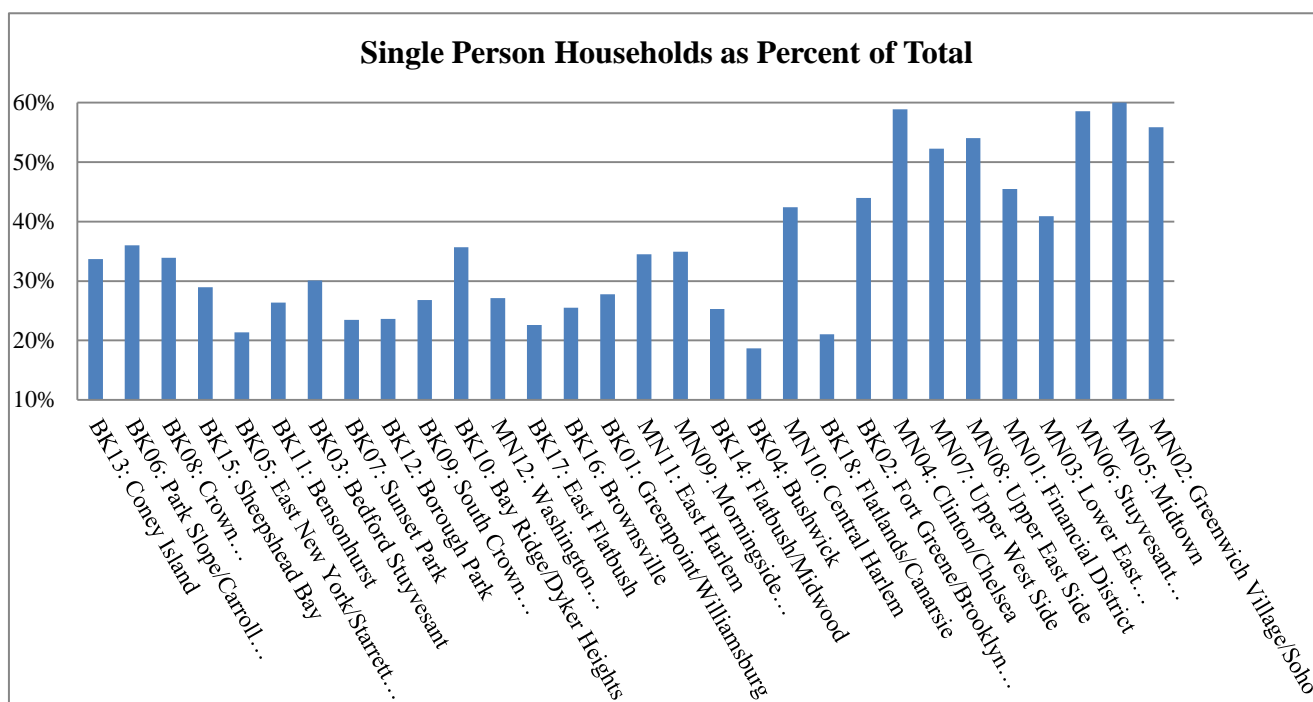
	HARLEM			LOWER EAST			LOWER MANHATTAN			MIDTOWN		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Intercept	546.08	234.04	0.0198*	763.32	522.40	0.14	1101.83	383.34	0.0041*	-487.99	211.59	0.0211*
Sq feet	-0.334	0.042	<.0001*	0.090	0.095	0.344	-0.071	0.049	0.146	0.111	0.021	<.0001*
SqFt^2	0.000	0.000	<.0001*	0.000	0.000	0.493	0.000	0.000	0.309	0.000	0.000	0.0120*
Floor Number	12.982	0.891	<.0001*	7.607	1.925	<.0001*	8.848	0.414	<.0001*	6.340	0.229	<.0001*
Beds	21.993	6.793	0.0012*	-35.716	18.362	0.053	25.686	9.242	0.0055*	-7.416	6.891	0.282
Baths	45.831	10.394	<.0001*	51.988	30.593	0.090	48.092	16.623	0.0039*	105.482	8.703	<.0001*
Year Built	0.043	0.098	0.662	0.000	0.269	1.000	-0.226	0.187	0.229	0.497	0.104	<.0001*
# of subway stations w/in 0.5 miles	8.341	3.909	0.0331*	27.212	4.493	<.0001*	-7.819	1.425	<.0001*	25.838	0.911	<.0001*
y 2003	0.000	0.000	.	0.000	0.000	.	-68.756	140.634	0.625	-331.858	60.460	<.0001*
y 2004	-285.534	114.706	0.0130*	-404.667	91.382	<.0001*	-54.210	87.356	0.535	-157.924	47.383	0.0009*
y 2005	-55.908	114.482	0.625	-289.503	41.527	<.0001*	106.016	86.661	0.221	5.258	47.106	0.911
y 2006	-50.423	114.961	0.661	-164.924	36.388	<.0001*	234.015	85.645	0.0063*	25.617	46.583	0.582
y 2007	74.308	114.070	0.515	-36.947	41.289	0.372	201.304	85.764	0.0190*	133.663	46.777	0.0043*
y 2008	102.217	114.254	0.371	58.524	41.700	0.161	254.165	85.658	0.0030*	215.529	46.630	<.0001*
y 2009	16.665	114.749	0.885	-101.693	63.150	0.108	344.084	86.023	<.0001*	80.513	47.129	0.088
y 2010	-31.961	114.098	0.779	-90.520	39.994	0.0243*	91.330	86.104	0.289	124.920	46.762	0.0076*
y 2011	-31.889	114.027	0.780	-80.804	43.253	0.063	141.668	85.880	0.099	144.217	46.754	0.0020*
y 2012	-29.339	114.069	0.797	0.000	0.000	.	224.023	85.664	0.0090*	188.920	46.641	<.0001*
	n = 965			n = 341			n=2149			n=8694		

The next part of the paper goes through the various neighborhoods with an emphasis on those with a negatively sloped demand curve (premium for small units) and discusses the development landscape as it relates to micro units for each. Unless specified, the data set used in this section is all the multi-family building sales data since this data set contains both Brooklyn and Manhattan and is based on rental units, it is more applicable and useful for comparisons. This next section is working mostly off of census data, which uses community board as the most local, identifiable data division.

## 7.1 Demand by Neighborhood

The graphs in this section show 2000 census data from the nyc.gov website, grouped by Community Board. Neighborhoods are listed in ascending order for the coefficient on unit size; in other words, the neighborhoods to the left show the highest demand for small units.

### *Single Person Households*

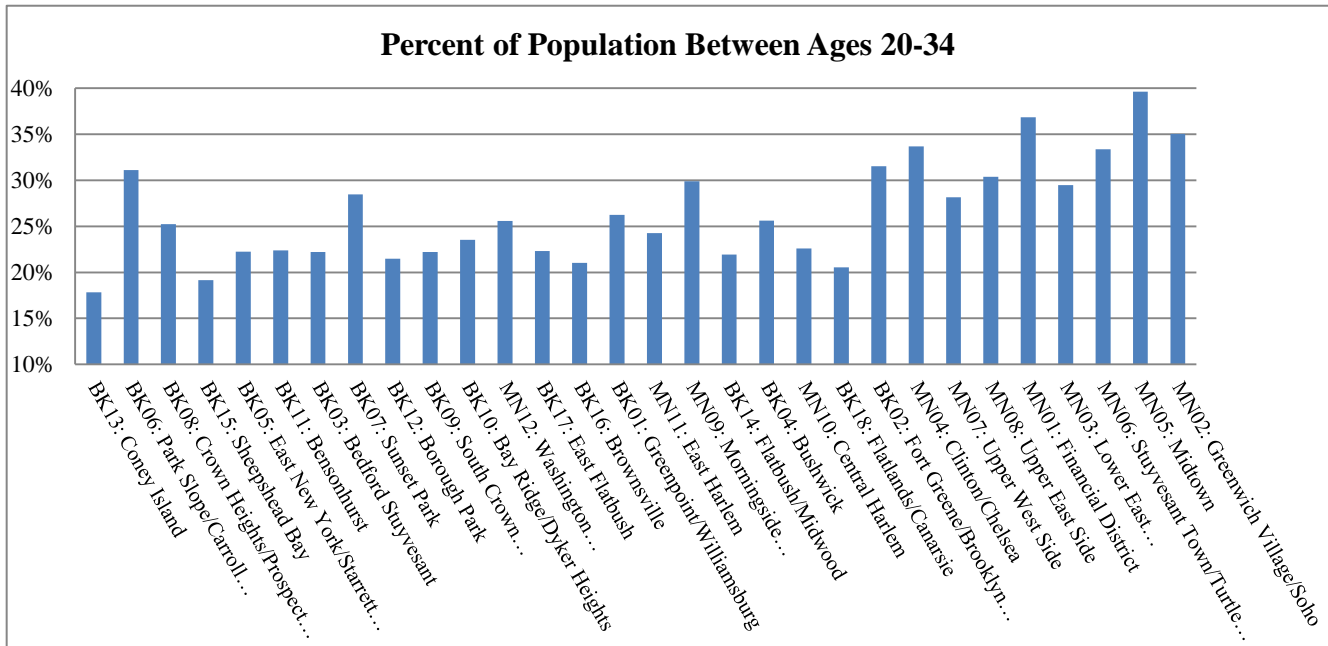


This graph is organized from most to least amenable to small units, so neighborhoods to the left side of the graph which also have a high percentage of single person households are an indicator of micro unit viability. All of these numbers, however, are on the high side – most neighborhoods have more than a quarter, with a half dozen over half, of their households made up of only a single person.

From a brief scan, neighborhoods of note for high proportion of single person households on the left side of the graph include Bay Ridge/Dyker Heights, Park Slope/Carroll Gardens, Crown Heights/Prospect Heights, Coney Island, East Harlem, and Morningside Heights. Neighborhoods that are less likely to demand for micro units based on number of single person households include East New York, Sunset Park, Borough Park, East Flatbush, Bushwick, and Flatlands/Canarsie.

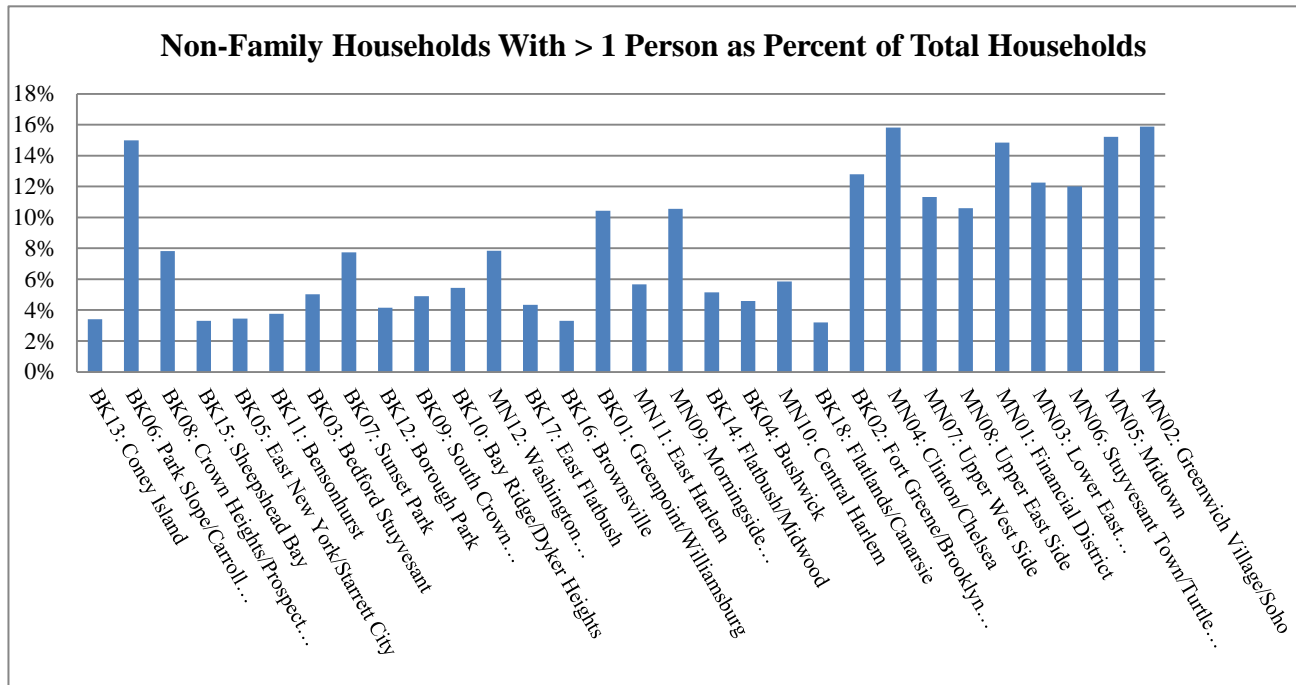
Demand may exist, however, from people who want to move out of share situations and into their own (affordable) place, or from other nearby neighborhoods if the rest of the conditions are right to support this kind of development.

### High Number of Young People



The number of young people in a neighborhood, here defined as 20-34 year olds, is indicative of the area's appeal to this population. Again, the graph is ordered from left to right in terms of the coefficient on unit size, so neighborhoods to the left side of the graph which also have high numbers of young people are desirable: Park Slope / Carroll Gardens, Crown Heights/Prospect Heights, Sunset Park, Washington Heights, Greenpoint/Williamsburg, and Morningside Heights are all among the neighborhoods worth looking into.

## High Number of Non-Family Households

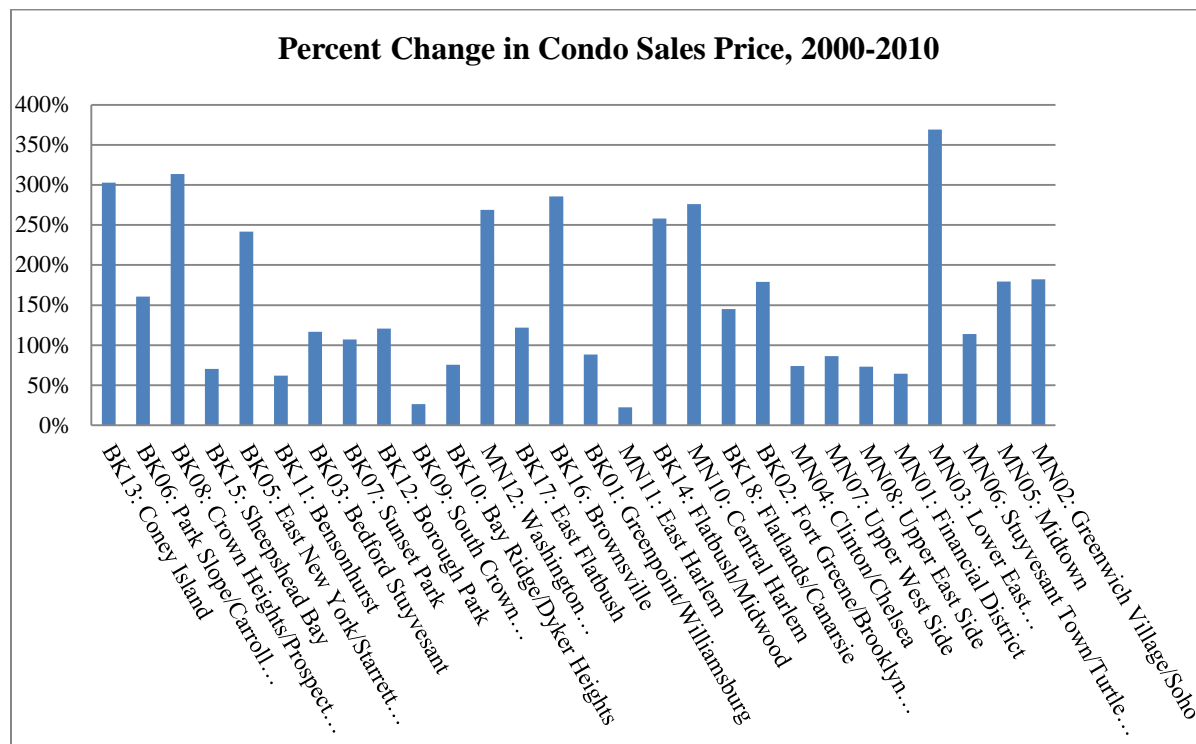
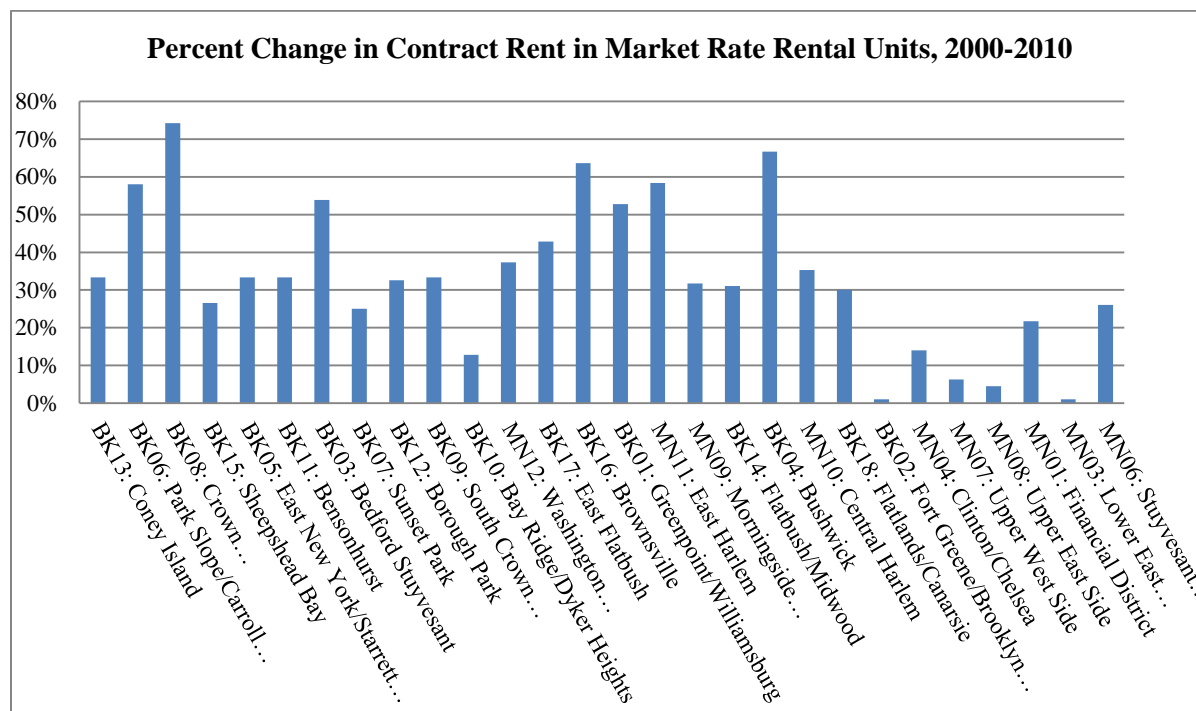


Non-family households composed of more than one person is also a good indicator of a potential existing demand for micro units as it is likely to indicate roommate-share type situations. Park Slope/Carroll Gardens is huge in this category, and Crown Heights/Prospect Heights, Sunset Park, Washington Heights, Greenpoint/Williamsburg, and Morningside Heights are all also notable.

## High Percentage of Population Rent-Burdened

The percent of residents who are rent-burdened is important, particularly the percentage of single-person household occupants of studio and one bedroom units who are rent burdened. This would be a great indicator for demand of micro units that would result in higher density, lower-cost housing (as people would move from larger more expensive units into micro units rather than from roommate situations). I do not have access to data sliced that way, however it would be a great avenue for further research.

## High Housing Cost Appreciation in Recent Years





A group of community boards was selected from these analyses to look into more closely. The neighborhoods that were not included in the analysis are listed below, with the reason for which they were discarded. If they had a negative coefficient on unit size, the most common reasons were distance from Midtown or Downtown Manhattan, which many residents will likely plan to work or inappropriate context, or fitting poorly into either the physical or social context.

**Coney Island** – Too far, about an hour by public transit to Midtown

**Sheepshead Bay** – Too far, 48 minutes by public transit to Midtown

**East New York / Starrett City** – Too far, over an hour by public transit to Midtown

**Bensonhurst** – Too far, 50 minutes by public transit to Midtown.

**Borough Park** – Too far and racially/religiously homogenous; Borough Park is one of the largest communities of Jews outside of Israel. Racial diversity index of 0.43, among the lowest of the neighborhoods being considered. 57% of units are in buildings with less than 5 units and in 2009, 42.21% of households had children under 18, among the highest in the two boroughs. The average household size was 3.10 which is the highest of the two boroughs.

**South Crown Heights / Lefferts Garden** – quiet development environment: only 8 units permitted in 2009; 0.47 racial diversity index

**East Flatbush** – 0.19 diversity index, only 2 building permits in 2009, over an hour by public transit

**Brownsville** – The highest murder (.33), assault (8.97), and violent crimes (16.25) rates in the two boroughs

**Flatbush / Midwood** – Only 1 building permit in 2009, 48 minutes by public transit

**Flatlands / Canarsie** – 85% of units are in building with less than 5 units, average unit size is over 5 rooms (largest in the two boroughs), over an hour to Midtown by public transit

**Fort Greene / Brooklyn Heights** – 0.051 coefficient on unit size (positive, favoring larger units), only 2 new units issued building permits

**Red Hook** – Poor subway access, from center of Red Hook the closest subway is a 21 minute walk. There is bus access but the limited transit network would likely be a turn off to most young professionals who do not have a car and will be looking to work in and/or spend time in Manhattan.

**Sunset Park** – Regression results were not statistically significant and neighborhood is further south (from Manhattan) than is ideal

**Dyker Heights** – Too far from Midtown, over an hour by public transit to the middle of the neighborhood. Also mostly low density, low-rise homes

## Demand Curves for Neighborhoods With Negative or U-Shaped Curves<sup>21</sup>

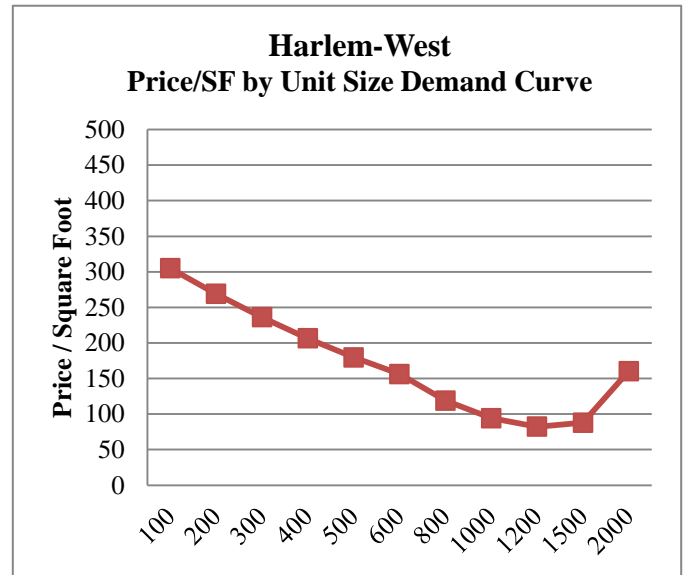
(Indicating Potential Market Support for Micro Units)



<sup>21</sup> From the Multifamily Building Sales Data

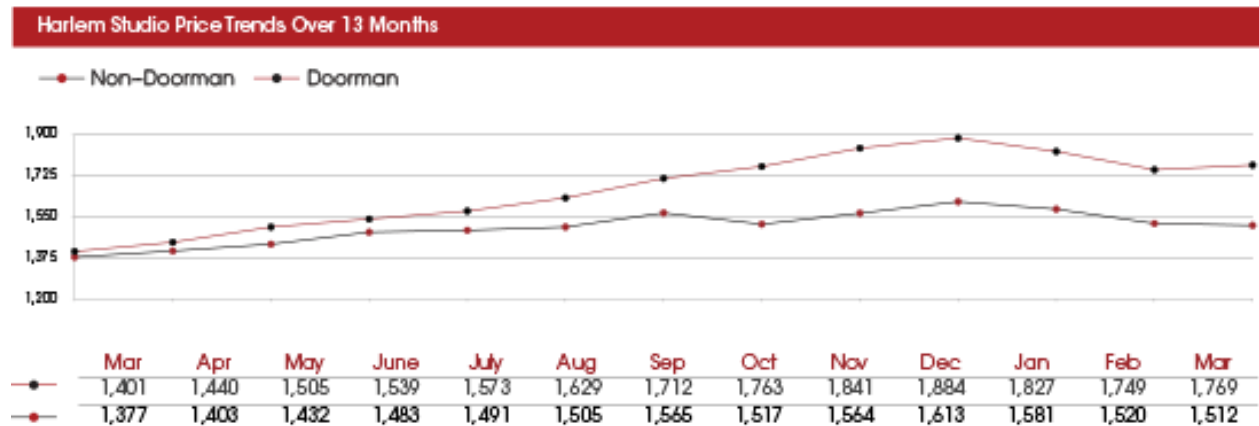
# Harlem

Harlem is a neighborhood in Northern Manhattan, north of Central Park, running from the East River all the way to Morningside Heights on the west and centered around 125<sup>th</sup> Street. It is historically an African American neighborhood, with a rich and storied history. Harlem has undergone massive



## Harlem

Harlem has experienced gentrification in recent years, with academics, policy makers, and advocates on both sides of the development debate. The neighborhood saw the largest year over year change in average studio apartment rental rates in Manhattan, while 1 and 2 bedroom units remained relatively flat. (See figure below. <sup>22</sup>)



Harlem has one of the few downward sloping curves in Manhattan for price/square foot relative to unit size. Smaller units in Harlem command a higher price per square foot than small units, both in rental rates and in condo sales. Among the Harlem neighborhoods, West Harlem has the largest negative coefficient.

The growth in rental rates of studio apartments combined with the negative demand curve indicates a potentially strong market to support micro unit development.

Such a development, however, might act as a catalyst to further gentrification, bringing large numbers of relatively well-off young and likely white people into the area. On the contrary, it could also serve as needed affordable housing in an area with quickly rising rents and/or a lack of small apartments or as an agent of social, interracial housing.

One architect, Lionel Scharly of Scharly Designer Studio, did suggest Harlem as his ideal place to build micro units for several reasons: the area is near universities and students, it needs new investments, it is less expensive than downtown or midtown Manhattan, it is well served by

<sup>22</sup> Brooklyn Rental Market Report (<http://www.mns.com/>) “ The Manhattan Rental Market Report- is based on data cross-sectioned from over 10,000 currently available listings located below 155th Street and priced under \$10,000, with ultra-luxury property omitted to obtain a true monthly rental average. Our data is aggregated from the MNS proprietary database and sampled from a specific mid-month point to record current rental rates offered by landlords during that particular month. It is then combined with information from the REBNY Real Estate Listings Source (RLS), OnLine Residential (OLR. com) and R.O.L.E.X. (Real Plus).”

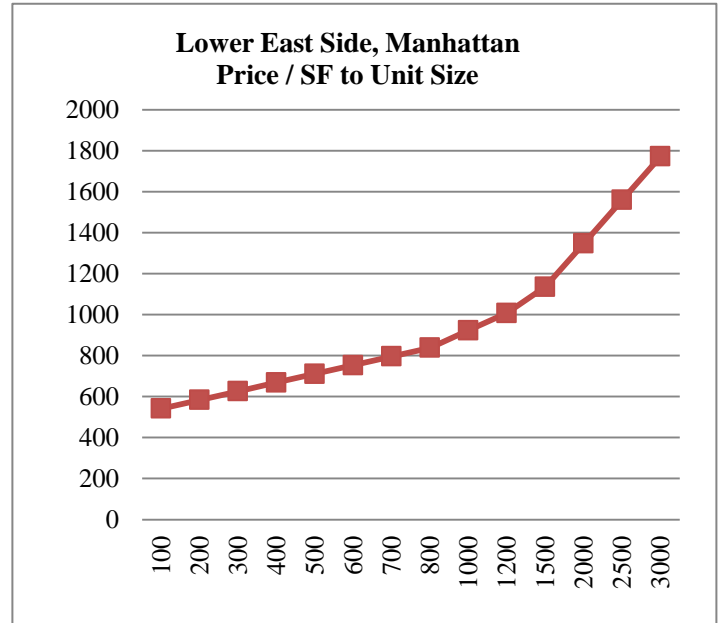
transit, and students are likely to grow in and with the neighborhood.<sup>23</sup> Central Harlem has a high Walk Score of 95; East Harlem's is 93.

<b>Manhattan Community board 10: Central Harlem</b>		<b>Manhattan Community board 11: East Harlem</b>	
Coefficient on Unit Size	-0.011	Coefficient on Unit Size	-0.039
% of Population between 20-34	22.6%	% of Population between 20-34	24.3%
% of Households single person	42.4%	% of Households a single person	34.5%
% of Households non-family > 1 person	5.9%	% of Households non-family and > 1 person	5.7%
% of Households with Children Under 18	30.53%	% of Households with Children Under 18	30.11%
% of units in buildings with < 5 units	7.4%	% of units in buildings with < 5 units	5.4%
% of units in buildings with > 50 units	36.4%	% of units in buildings with > 50 units	51.0%
Median Household Income, 2006	\$33,400	Median Household Income, 2006	\$29,200
% Income Growth, 2000-2006	+67.7%	% Income Growth, 2000-2006	+37.1%
Violent Crimes Rate Per 1,000 Persons	13.21	Violent Crimes Rate Per 1,000 Persons	11.12
Median Sales Price of Condos, 2011	\$568,000	Median Sales Price of Condos, 2011	\$527,280
Change in Condo Median Sales Price, 2000-2010	+276%	Change in Condo Median Sales Price, 2000-2010	23%
Median Contract Rent, 2008	\$1,450	Median Contract Rent, 2008	\$1,375
Change in Median Contract Rent, 2002-2008	+67%	Change in Median Contract Rent, 2002-2008	+53%
Percent of Rental Units Market Rate	20.9%	Percent of Rental Units Market Rate	32.1%
Percent of Pop Foreign Born, 2009	20.8%	Percent of Pop Foreign Born, 2009	22.7%
Percentage White	13.4%	Percentage White	14.2%
Percentage Black	63.0%	Percentage Black	31.9%
Percentage Hispanic	18.6%	Percentage Hispanic	47.7%
Percentage Asian	2.5%	Percentage Asian	5.1%
Racial Diversity Index	.55	Racial Diversity Index	.65
Average Household Size, 2008	1.85	Average Household Size, 2008	2.14
Average Rooms / Unit	3.53	Average Rooms / Unit	3.54

<sup>23</sup> From an email conversation with Lionel Scharly of Scharly Designer Studio on April 23, 2013.

# Lower East Side

The Lower East Side is a neighborhood in southeastern Manhattan, bounded by the neighborhoods of Chinatown, NoLita, and the East Village. It historically was an immigrant, working-class neighborhood, particularly to Jewish immigrants during the early and mid-20<sup>th</sup> century. The neighborhood saw huge gentrification in the 1990's and early 2000's and more recently has seen luxury condominiums and boutique hotels indicating a new phase of development.



## Lower East Side Manhattan

In the lower east part of Manhattan, the curve looks opposite Harlem's; price per square foot rises sharply with size, especially in larger units. This discourages the building of micro sized apartment units, in comparison to other housing types. Again, the shape of the data from the two sources is remarkably similar, indicating apartment renters and condo buyers behave similarly from a location and price premium perspective. This is interesting because this is the lowest earning (income) part of lower Manhattan and otherwise, it appears that most lower-earning neighborhoods also have negative demand slopes; less-wealthy residents will pay a premium for smaller (likely cheaper) places.

The western and southern parts of the neighborhood are well served by transit; the eastern edge can be a far walk to a subway station. The Lower East Side has a Walk Score of 96.

The Lower East Side is composed mostly of larger buildings with more than 50 units (39% of all units). Only 4% of units are in buildings with fewer than 5 units, indicating a large building would not be out of place. The median income in the district rose from \$28,745 to \$35,600 from 2000-2006. The violent crime rate in 2007 was 6.62 per 1,000 persons, which is about average across the city. The murder rate was .02, among the lowest.

The average condo sales price in this neighborhood increased the most of any, from \$186,422 in 2000 to \$1,023,750 in 2010. Interestingly, the median contract rent had one of the smallest increases across the city, from \$2,200 in 2002 to \$2,300 in 2006. This may be due to a large

<b>Manhattan Community board 3: Lower East Side / Chinatown</b>	
Coefficient on Unit Size	0.111
% of Population between 20-34	29.5%
% of Households that are a single person	40.9%
% of Households that are non-family and greater than 1 person	12.2%
% of Households with Children Under 18	19.23%
% of units in buildings with < 5 units	3.7%
% of units in buildings with > 50 units	38.9%
Median Household Income, 2006	\$35,600
% Income Growth, 2000-2006	23.8%
Violent Crimes Rate Per 1,000 Persons	6.62
Median Sales Price of Condominiums, 2011	\$1,023,750
Change in Condo Median Sales Price, 2000-2010	+369%
Median Contract Rent, 2008	\$2,300
Change in Median Contract Rent, 2002-2008	+5%
Percent of Rental Units Market Rate	5.3%
Percent of Population Foreign Born, 2009	36.5%
Percentage White	34.7%
Percentage Black	6.8%
Percentage Hispanic	21.9%
Percentage Asian	33.6%
Racial Diversity Index	.71
Average Household Size, 2008	2.12
Average Rooms / Unit	3.02

number of smaller units being built, or conversions to condos. It also had the lowest number of market rate units in 2002, at only 5.3% of total rental units but by 2008, that number had jumped to 19.2%, a 258% increase.

The percent of the population that is foreign born in the lower east side was 36.5% in 2009. The population was 34.7% white, about 5% higher than it was in 1990 at 29.5%. In 2009 it was also 33.6% Asian, 21.9% Hispanic and 6.8% Black. It is the most diverse of the neighborhoods compared, with a racial diversity index of 0.71. The average household size was 2.12 in 2008, down from 2.37 in 1990 but a bit higher than the 2.08 of 2005. In 2009 19.23% of households had children under 18, among the lowest of neighborhoods compared.

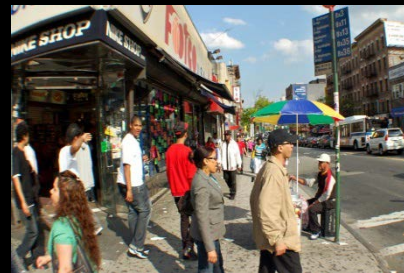
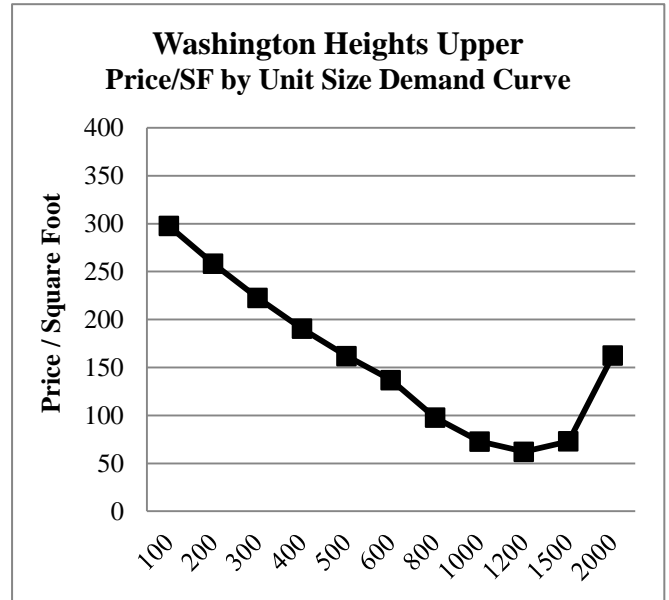
There are a large number of pros for micro unit development in this neighborhood: very diverse, pretty safe, few families, with larger buildings and already a wave of modern building occurring along Houston and Delancey Streets. The neighborhood is filled with young people and one of the most coveted destinations among young professionals in New York City. Additionally, the sharp increase in condo price with a very small increase in median contract rent is an interesting trend to consider.

Cons for micro unit development in this neighborhood: the premium on \$/SF for both condo units and sales of rental buildings.



# Washington Heights

Washington Heights is a neighborhood north of Harlem near the tip of Manhattan. North of Washington Heights is Inwood, a neighborhood that is similar to and often included in the label. Washington Heights is currently a primarily Dominican neighborhood and Spanish is the dominant language in many areas. North of the George Washington Bridge and on the east side of the neighborhood is still a large Jewish population, descendants of immigrants who moved during World War II. Along with Harlem, Washington Heights is among the most affordable neighborhoods in Manhattan.



## Washington Heights / Inwood

Washington Heights is another neighborhood in Manhattan that has relatively reasonable home/land prices and, unsurprisingly, a negatively shaped demand curve. The demand curve indicates that for all reasonably sized units (less than 1,500 square feet), price per square foot increases as unit size decreases.

Washington Heights is grouped with Inwood in Manhattan Community board 12. The neighborhood is higher density, with 87% of units in buildings with 20 or more units.

The neighborhood saw one of the smaller percentage growth in income from 2000-2006, only a 7.7% increase. Condo sales, however, jumped up considerably from 2000 to 2010, with a 269% increase in average condo sale price. The average number of rooms per unit is low, 3.46, and all types of crime rates are low.

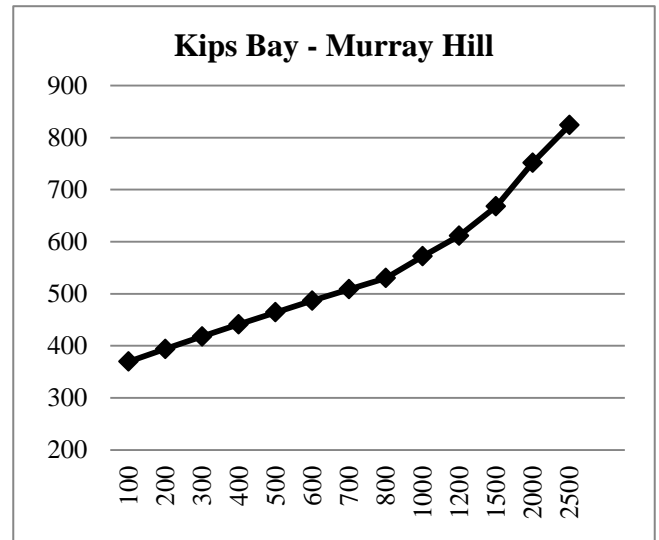
The lower part of the neighborhood, below the George Washington Bridge / 177<sup>th</sup> street, is primarily Dominican, with stable home prices, low crime, families, and a strong and homogenous local community. The buildings are all relatively contextual and historic and a micro unit building might not fit physically or socially.

Above 177<sup>th</sup> is a more diverse neighborhood with students, a large Jewish population, a strong Hispanic presence, and young professionals & families. This neighborhood is well connected to public transit, served by both the A and 1 subway lines. Most of the buildings are contextual, however, and the area north of the bridge is zoned R7-2 with some commercial overlay districts (C1-2 and C2-2 on most Avenues, with one C4-4 and one C8-3 district).

<b>Community board 12: Washington Heights / Inwood</b>	
Coefficient on Unit Size	-0.046
% of Population between 20-34	25.6%
% of Households that are a single person	27.1%
% of Households non-family and > 1 person	7.9%
% of Households with Children Under 18 Years Old	28.12%
% of units in buildings with < 5 units	2.1%
% of units in buildings with > 50 units	43.4%
Median Household Income, 2006	\$31,100
% Income Growth, 2000-2006	7.7%
Violent Crimes Rate Per 1,000 Persons	5.94
Median Sales Price of Condos, 2011	\$278,850
Change in Condo Median Sales Price, 2000-2010	+269%
Percent of Population Foreign Born, 2009	46.6%
Percentage White	19.4%
Percentage Black	10.5%
Percentage Hispanic	66.3%
Percentage Asian	1.9%
Racial Diversity Index	.51
Average Household Size, 2008	2.27
Average Rooms / Unit	3.46

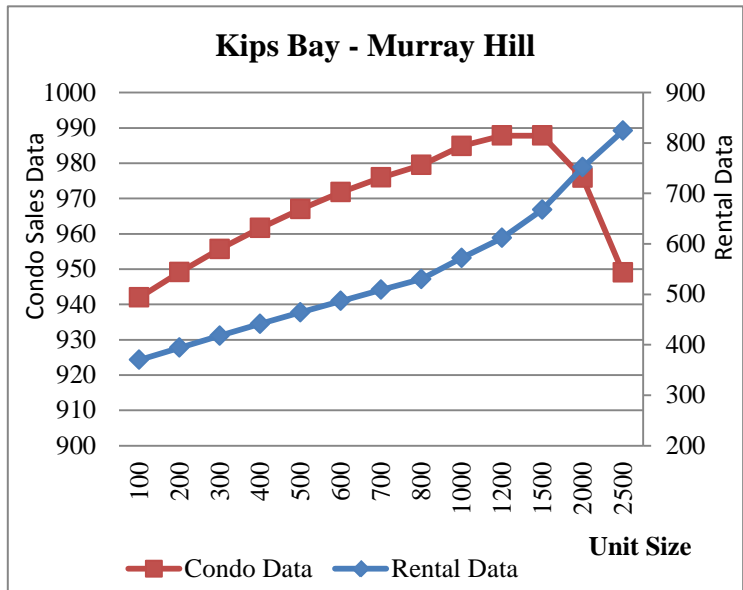
# Midtown East

Midtown East is east of Midtown / Times Square. Depending on the geographic designation, it can include Murray Hill, Kips Bay, Turtle Bay, and Gramercy. Kips Bay is the neighborhood in which the adApt competition site is located. Midtown is New York's largest Central Business District and one of the most densely used pieces of real estate in the world. Midtown East is the neighborhood, mostly residential, just to the east. Parts of the neighborhood have become known for their nightlife and collegial atmosphere, however



## Midtown East

The neighborhood groupings vary slightly between the condo data and the rental data: the condo data includes Kips Bay, Murray Hill, and Turtle Bay and the rental data includes Kips Bay, Murray Hill, and Gramercy. The data sets also differ slightly. The condo units have an inverted-U function to the curve, while the rental data does not. Both, however, slope upward from micro units all the way up to about 1200-1500 square feet (a three+ bed unit). This indicates a preference for larger units among both rentals and condos, as long as they are not extremely large.



Midtown East is the neighborhood in which the City has decided to locate its prototype micro unit building as part of the competition. The data suggests that developers prefer to develop larger in this neighborhood; a 300 square foot unit only commands about a \$418 per square foot, compared to a 2,000 square foot unit which would cost about \$750/square foot.<sup>24</sup>

Data provided supports the luxury trend in Midtown Manhattan, showing an increased

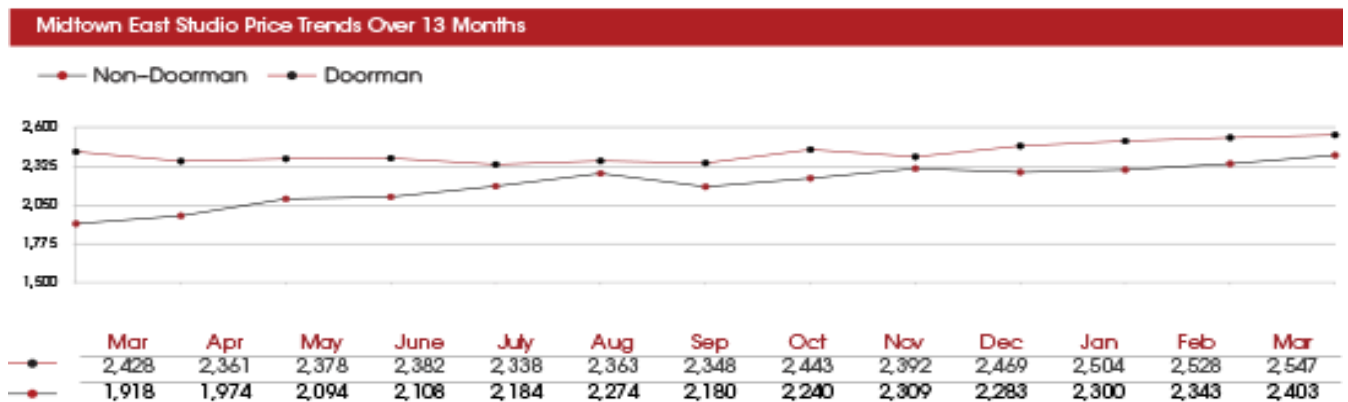


Figure 1: Non-Doorman Studio Prices Rise in Midtown East, March 2012-March 2013

<sup>24</sup> Just as a reminder, these figures are of the sales price per square foot of multifamily rental buildings, not rental rates or condo unit sales prices

demand for doorman two-bedroom units, as well as a slight decrease in demand for non- doorman two bedrooms. It also, however, shows a rise in price and demand for small units that perhaps is being lost in the larger data. Studio prices rose over the past 13 months, for both doorman and non-doorman buildings, however the non-doorman prices (the very lowest cost units available on the market) rose the most sharply.

The most recent studio average rental rates in Midtown East are between \$2,400-\$2,500 a month. The neighborhood is well connected to transit, however with access better on the western side of the neighborhood than the far east. Midtown has an extremely high Walk Score of 99. The neighborhood is very diverse and is not

<b>Manhattan Community board 5: Midtown</b>	
Coefficient on Unit Size	0.161
% of Population between 20-34	39.6%
% of Households that are a single person	60%
% of Households that are non-family and greater than 1 person	15.2%
% of Households with Children Under 18	8.66%
% of units in buildings with < 5 units	2.7%
% of units in buildings with > 50 units	72.7%
Median Household Income, 2006	\$101,700
% Income Growth, 2000-2006	47.2%
Violent Crimes Rate Per 1,000 Persons	12.97
Median Sales Price of Condominiums, 2011	\$1,432,250
Change in Condo Median Sales Price, 2000-2010	+179%
Median Contract Rent, 2008	\$2,500
Change in Median Contract Rent, 2002-2008	1%
Percent of Rental Units Market Rate	11.5%
Percent of Population Foreign Born, 2009	25.9%
Percentage White	63.4%
Percentage Black	5.4%
Percentage Hispanic	15.8%
Percentage Asian	12.5%
Racial Diversity Index	.55
Average Household Size, 2008	1.54
Average Rooms / Unit	2.73

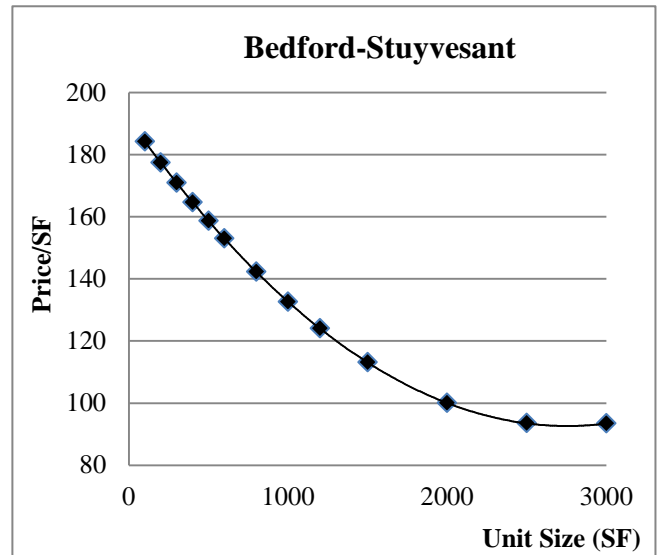
aesthetically homogenous or historically contextual. Additionally, the City has issued a proposal to rezone Midtown Manhattan to allow higher FAR and earned-as-of-right development in certain qualifying sites, and also to set up a District Improvement Fund for transit and pedestrian centered improvements.<sup>25</sup>

This neighborhood, with subsidy or government incentive, could be one of the better locations for micro units in lower Manhattan, despite the market pressure on developers to build large, luxurious towers.

<sup>25</sup> Cite midtown manhattan rezoning documents:  
[http://www.nyc.gov/html/dcp/html/east\\_midtown/east\\_midtown3.shtml](http://www.nyc.gov/html/dcp/html/east_midtown/east_midtown3.shtml)

# Bedford-Stuyvesant

Bedford-Stuyvesant, or “Bed-Stuy” is a neighborhood in the central part of Brooklyn. It is a part of Community Board 3 and has historically been a cultural center for Brooklyn’s Black population, particularly after Harlem and Bedford were connected by subway in the 1930’s. Since the early 2000’s the neighborhood, as with many Brooklyn neighborhoods, has seen an influx of wealthier residents and gentrification. It, however, has seen upwardly mobile and middle-class African-American’s replace the poorer, meaning while there has been class displacement, there has been less racial displacement than in other Brooklyn neighborhoods.



## Bedford-Stuyvesant

Bedford-Stuyvesant is a large neighborhood in Central / Eastern Brooklyn that is composed of two neighborhoods, Bedford and Stuyvesant Heights. It, on first brush, looks like one of the neighborhoods that would be most likely to support micro unit development. The demand slope is negative, it is not too far from Manhattan, is well-connected by public transit, is becoming increasingly demanded by young professionals, and it has a decent Walk Score of an 89. This first opinion may be misleading for a number of reasons however.

Results of a linear regression by neighborhood are shown. Below is the output of the regression including a quadratic variable for unit size (sf/unit<sup>2</sup>):

Table 5

Results for Bedford-Stuyvesant

	Estimate	Std Error	t Ratio	Prob> t
Intercept	191.21183	6.636288*	28.81	<.0001*
SF / Unit	-0.071603	0.010618*	-6.74	<.0001*
SFUnit2	1.3018e-5	4.635e-6*	2.81	0.0050*
y2003	-34.48392	3.747915*	-9.20	<.0001*
y2004	-9.958669	3.742166*	-2.66	0.0078*
y2005	19.22406	3.678911*	5.23	<.0001*
y2006	43.357185	3.73221*	11.62	<.0001*
y2007	40.436606	3.967922*	10.19	<.0001*
y2008	29.430269	4.353898*	6.76	<.0001*
y2009	7.7973099	4.784343	1.63	0.1032
y2010	0.4339852	4.445265	0.10	0.9222
y2011	0	0	.	.

It is apparent that Bedford-Stuyvesant is a neighborhood in which the market would incentivize developers to build smaller, if the demand for them existed and there were no regulations in the way. In terms of transit, the neighborhood is well-connected and has many beautiful, medium density brownstones. Crime has decreased in recent years as well, subsequently seeing an increase in wealthier residents moving into the neighborhood. Bedford-Stuyvesant, however, has undergone significant changes in recent years, with many long-time African-American residents being displaced by younger white residents. Bedford-Stuyvesant, for this reason, may not be best location for a new building of single young-professionals.

<b>Brooklyn Community Board 3: Bedford Stuyvesant</b>	
Coefficient on Unit Size	-0.071
% of Population between 20-34	22.2%
% of Households that are a single person	30.1%
% of Households that are non-family and greater than 1 person	5.0%
% of Households with Children Under 18	
% of units in buildings with < 5 units	51.8%
% of units in buildings with > 50 units	11.1%
Median Household Income, 2006	\$31,000
% Income Growth, 2000-2006	31.9%
Violent Crimes Rate Per 1,000 Persons, 2007	15.4
Median Sales Price of Condominiums, 2011	\$425,800
Change in Condo Median Sales Price, 2000-2010	+117%
Median Contract Rent, 2008	\$1,000
Change in Median Contract Rent, 2002-2008	+54%
Percent of Rental Units Market Rate	38.9%
Percent of Population Foreign Born, 2009	20.5%
Percentage White	14.4%
Percentage Black	58.9%
Percentage Hispanic	21.3%
Percentage Asian	3.8%
Racial Diversity Index	.59
Average Household Size, 2008	2.42
Average Rooms / Unit	4.36



## Bushwick

Bushwick is a neighborhood Southeast of Williamsburg and Northeast of Bedford-Stuyvesant. For the purposes of this analysis it was included in Bedford-Stuyvesant at the neighborhood group level, but it deserves some attention on its own.

Bushwick has been one of the centers of gentrification in the borough for the last several years and is currently in the middle of debate over a rezoning initiative (residents want down-zoning to prevent more development). Bushwick has a walk score of 88 and has seen increasing retail investment.

The majority of Bushwick, however, is currently zoned for manufacturing – preventing the development of more or higher density residential.

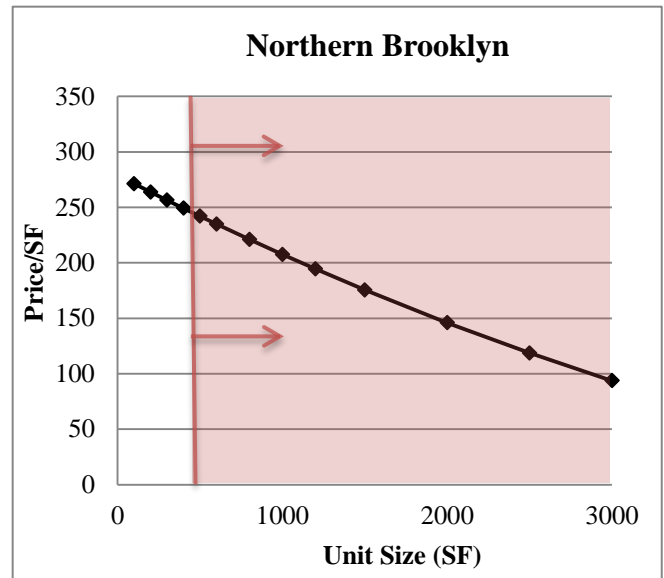
*“From a pro-development perspective, the amount of supply allowed is clearly insufficient to meet demand, evidenced by a near-tripling of housing costs in Williamsburg since 2004 and the wave of gentrification racing across Bushwick” (Smith 2013)*

It has some significant barriers, though, to micro unit development. The neighborhood has a relatively small percentage of single person households (18.7%, the lowest of all community boards in Manhattan and Brooklyn) indicating it might not be the highly demanded area for singles. Additionally, most units are in smaller buildings; a larger new building might be out of context until the neighborhood is built up.

<b>Brooklyn Community board 4: Bushwick</b>	
Coefficient on Unit Size	-0.015
% of Population between 20-34	25.6%
% of Households that are a single person	18.7%
% of Households that are non-family and greater than 1 person	4.6%
% of Households with Children Under 18	43.10%
% of units in buildings with < 5 units	48.2%
% of units in buildings with > 50 units	4.1%
Median Household Income, 2006	\$30,400
% Income Growth, 2000-2006	37.6%
Violent Crimes Rate Per 1,000 Persons	9.78
Median Sales Price of Condominiums, 2011	
Change in Condo Median Sales Price, 2000-2010	
Median Contract Rent, 2008	\$950
Change in Median Contract Rent, 2002-2008	31%
Percent of Rental Units Market Rate	9.9%
Percent of Population Foreign Born, 2009	39.3%
Racial Diversity Index	.49
Percentage White	8.9%
Percentage Black	16.5%
Percentage Hispanic	69%
Percentage Asian	4%
Average Household Size, 2008	2.66
Average Rooms / Unit	4.24

# Northern Brooklyn

North Brooklyn is composed of two main neighborhoods, Williamsburg and Greenpoint, which have become synonymous with the terms “gentrification” and “hipster” over the past two decades. The area is situated along the East River and was traditionally an industrial and working class / immigrant neighborhood. Ethnic groups in the area include Italians, Jews, Puerto Ricans, Dominicans, and Polish. There has recently been rapid development and skyrocketing housing costs in response to the increased demand by young and wealthy residents.



**Northern Brooklyn** is a constructed group of neighborhoods composed of the three Williamsburg neighborhoods and Greenpoint. Of the 12 broad “borough groups”, it displays one of the strongest trends indicating market support for small units. It is also a unit characterized by high desirability among young people, as well as heavy displacement and development in recent years.

There are a high number of non-family households with greater than one person in this area – there are likely to be roommate / share situations.

Table 6.

Regression Results for Northern Brooklyn

$$P = 278.8214 - 0.075959(S) + 0.0000047541(S^2)$$

	<b>Estimate</b>	<b>Std Error</b>
Intercept	278.8214**	15.16514
SF / Unit	-0.075959**	0.013397
SFUnit2	4.7541e-6**	1.752e-6
y2003	-84.49602**	13.62246
y2004	-52.34985**	13.10563
y2005	-13.41834	12.97617
y2006	5.0785645	13.82092
y2007	33.006205*	13.77002
y2008	9.5618212	14.71538
y2009	0.9346627	16.10483
y2010	11.142995	14.46708
y2011	0	0

<b>Brooklyn Community board 1: Greenpoint / Williamsburg</b>	
Coefficient on Unit Size	-0.042
% of Population between 20-34	26.2%
% of Households that are a single person	27.8%
% of Households that are non-family and greater than 1 person	10.4%
% of Households with Children Under 18 Years Old	26.42%
% of units in buildings with less than 5 units	37.2%
% of units in buildings with more than 50 units	14.8%
Median Household Income, 2006	\$35,300
% Income Growth, 2000-2006	34.1%
Violent Crimes Rate Per 1,000 Persons	6.32
Median Sales Price of Condominiums, 2011	\$545,000
Change in Condo Median Sales Price, 2000-2010	+88%
Median Contract Rent, 2008	\$1,350
Change in Median Contract Rent, 2002-2008	+64%
Percent of Rental Units Market Rate	22.3%
Percent of Population Foreign Born, 2009	25.6%
Racial Diversity Index	.53
Percentage White	63.1%
Percentage Black	4.0%
Percentage Hispanic	26.5%
Percentage Asian	5.1%
Average Household Size, 2008	2.54
Average Rooms / Unit	3.93

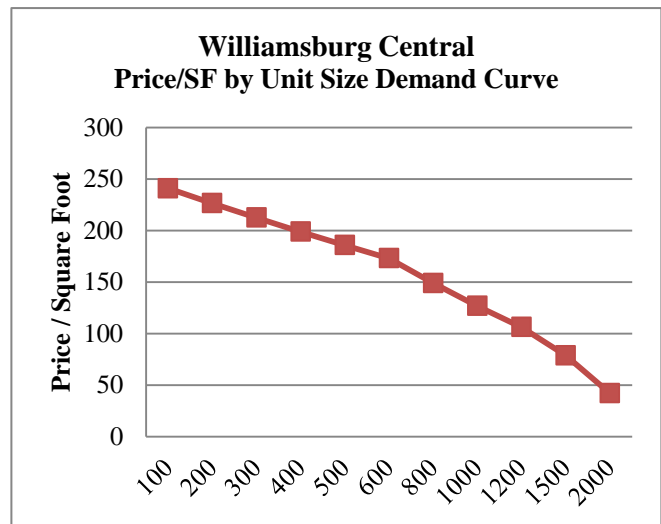
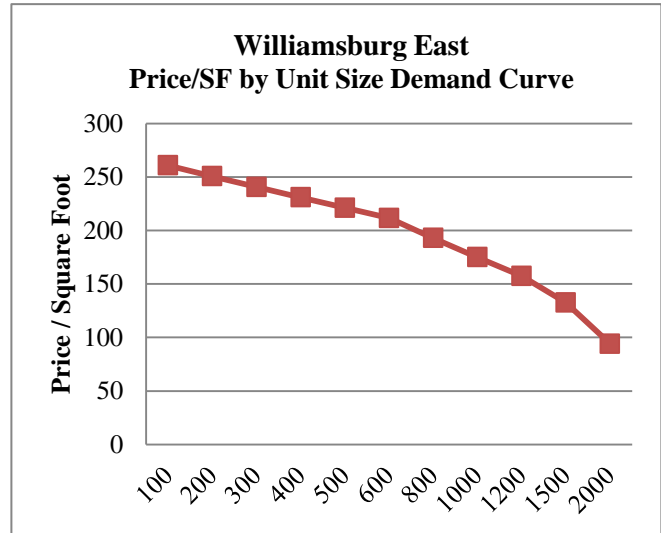
## Williamsburg

Williamsburg has become synonymous with the terms “hipster” and “gentrification” in recent years. Over the past two decades headlines, the world has watched as this once working class and industrial neighborhood became a haven for artists and students, and then turned into a destination for this same group and some of their wealthier friends. Today it has some of the most expensive real estate in the borough. Williamsburg has a Walk Score of 93.

Now, those early pioneers who appreciated Williamsburg for being obscure and affordable have now also been priced out, succeeded by residents paying on average \$3,000+ a month in rents. In a January article in *The Atlantic*, Stephen Smith argues the outdated zoning in Northern Brooklyn is to blame for much of this displacement. The buildings are ugly, he asserts, and the style and density is not worth

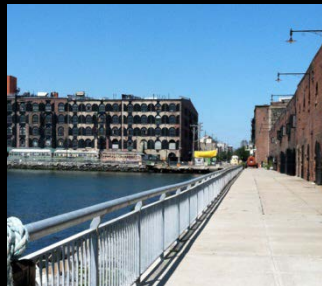
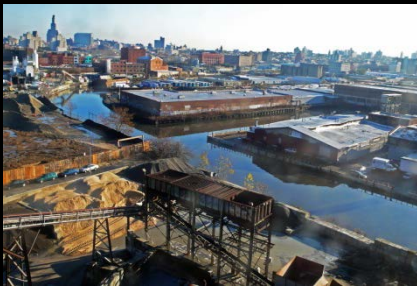
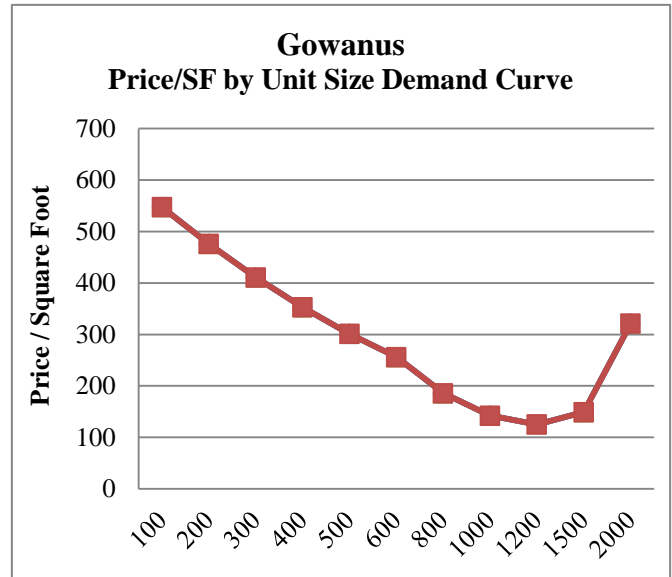
preserving as might be true in neighborhoods like Park Slope. The industrial zoning is out of date and the neighborhoods are underdeveloped. Even in the most “hip” areas the neighborhoods are less than half as dense as other classic Brooklyn neighborhoods. Smith argues these neighborhoods were not allowed to grow with the increased demand and as a result saw huge price increases, displacement, and eventual spill-over of demand into neighborhoods north (Greenpoint), east (Bushwick), and south (Crown Heights).

Williamsburg was re-zoned in 2005 and again in 2009 to allow development along the waterfront, primarily in districts previously zoned for manufacturing. The re-zonings created drastic height differences, however, between the new waterfront districts and the neighborhood immediately behind it. The zoning changes, which were only in a limited area and created stark differences, is a result of the conflict anti-growth attitude of most Williamsburg and Greenpoint residents and the Bloomberg Administration. (Smith 2013)



# Western Brooklyn

Western Brooklyn is a constructed group of industrial neighborhoods composed of Gowanus, Cobble Hill West, Redhook, the Navy Yard, Bush Terminal, and Downtown. The character ranges throughout this area, from brownstones to vacant lots. These neighborhoods are south and west of Park Slope, their gentrified neighbor, but have begun seeing spill over from Park Slope, Williamsburg, and Greenpoint. Speculation and development has begun in most of these neighborhoods, with the Gowanus Canal remediation and several recent large apartment development proposals.



## Western Brooklyn

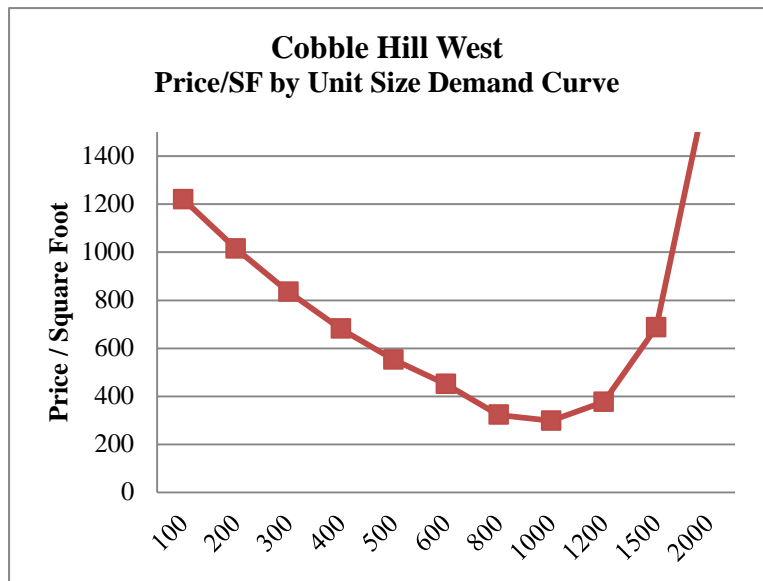
This is one of the most diverse neighborhood groupings but nonetheless yielded statistical significance, suggesting a demand for small units. Even at the individual neighborhood scale many of these neighborhoods showed significant trends.

The community board inclusive of these neighborhoods is Brooklyn Community board 6, which includes Park Slope and Carroll Gardens as well. In the neighborhood groupings for the data analysis, Park Slope and Carroll Gardens were pulled out and lumped into a group called “Brownstone Brooklyn”, reflecting the economic similarity in the inner Brooklyn brownstone neighborhoods.

<b>Brooklyn Community board 6: Park Slope / Carroll Gardens (Cobble Hill, Redhook, Gowanus, South Slope)</b>	
Coefficient on Unit Size	-0.106
% of Population between 20-34	31.1%
% of Households that are a single person	36%
% of Households that are non-family and greater than 1 person	15%
% of Households with Children Under 18	26.96%
% of units in buildings with < 5 units	50.4%
% of units in buildings with > 50 units	7.3%
Median Household Income, 2006	\$84,600
% Income Growth, 2000-2006	59.4%
Violent Crimes Rate Per 1,000 Persons	5.28
Median Sales Price of Condominiums, 2011	\$646,589
Change in Condo Median Sales Price, 2000-2010	160%
Median Contract Rent, 2008	\$1,650
Change in Median Contract Rent, 2002-2008	58%
Percent of Rental Units Market Rate	36.9%
Percent of Population Foreign Born, 2009	17.7%
Racial Diversity Index	.50
Percentage White	68%
Percentage Black	5.8%
Percentage Hispanic	18.1%
Percentage Asian	5.3%
Average Household Size, 2008	2.19
Average Rooms / Unit	4.17

## Cobble Hill / Cobble Hill West

Cobble Hill is a neighborhood northwest of Prospect Park and Gowanus and south of Brooklyn Heights. Cobble Hill West has one of the most U shaped demand curves, with tiny and large units both commanding a premium \$/SF. Units between 600-1,200 square feet are valued least highly, while those smaller than 400 and larger than 1,500 are valued more highly.



The character of Cobble Hill is mostly attractive mid-rise brick buildings and brownstones – a modern or larger structure would be out of context here – however West Cobble Hill, just beyond the Brooklyn-Queens Expressway (Highway 278), the character is more varied and some of the land is under-utilized.

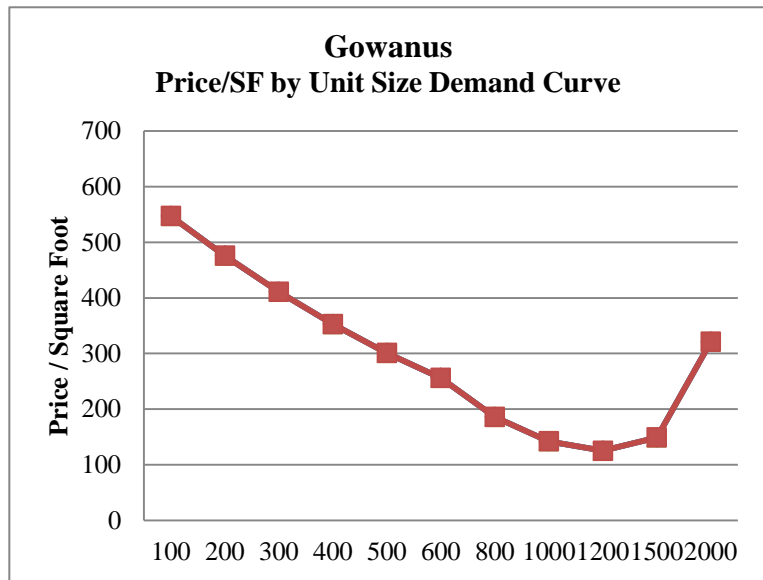
Cobble Hill West	Estimate	Std Error	t Ratio	Prob> t
Intercept	1451.0762	368.7863**	3.93	0.0004*
SF / Unit	-2.4398	0.913119*	-2.67	0.0111*
SFUnit2	0.0011287	0.000466*	2.42	0.0205*

N = 48

It is served well by transit, with most parts of the neighborhood within a 10 minute walk of the F and G trains. Cobble Hill has a very high walk score of 98.

## Gowanus

Gowanus is a neighborhood that was originally built around a canal (the Gowanus Canal).<sup>26</sup> The Gowanus Bay was the site of the first settlement of Dutch farmers in Brooklyn. In recent years there has been a resurgence in interest in this neighborhood as well as an effort to clean up the canal. It has seen a wave of young adults, priced out of Williamsburg and Greenpoint and other hip Brooklyn neighborhoods. Additionally, the demand curve from 10 years of sales transactions in the neighborhood indicates a negatively sloped curve all the way through units of 1,200 square feet. This could be an ideal neighborhood for young people in small units.



Last month the City Planning Commission approved a 700 unit apartment complex<sup>27</sup> along the canal, which increased its number of units recently from 447 to 700. A Whole Foods is also set to open shortly. In

Gowanus	Estimate	Std Error	t Ratio	Prob> t
Intercept	625.28826	145.4544**	4.30	<.0001*
SF / Unit	-0.814103	0.295229**	-2.76	0.0068*
SFUnit2	0.0003311	0.000143*	2.32	0.0223*

*N=125*

2010, the Canal was added to the EPA's Superfund National Priorities List and in January of this year the proposed remediation plan was presented to the public, but met with some concerns.

Gowanus is well served by public transit, accessible to the F, D, G, N, and R lines, bordered by a train line on either side. It has a very high walk score of 96.

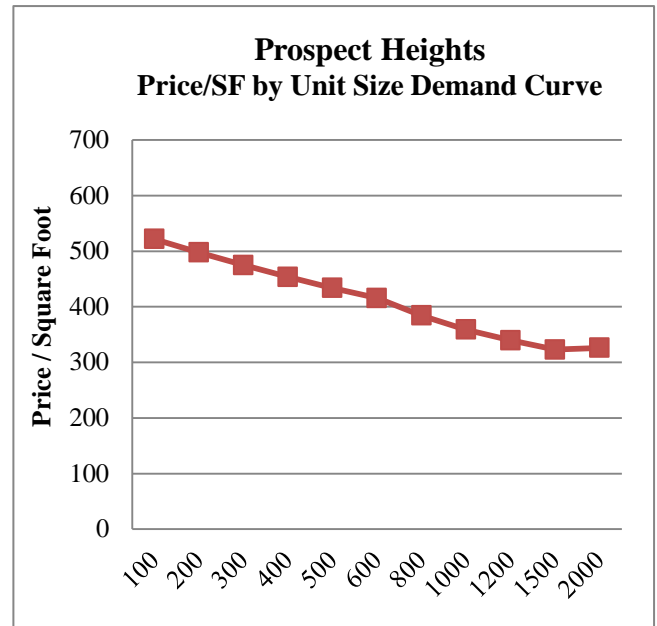
<sup>26</sup> There is an urban legend that the canal served as a dumping ground for the mafia.

<sup>27</sup> Lightstone Group Development, at Bond and Carroll Street.



# Crown Heights / Prospect Heights

Crown Heights / Prospect Heights is a district made up of two neighborhoods to the north and east of Prospect Park in Brooklyn. They have seen some of the spillover from Park Slope in recent years, with gentrification and the accompanying race and income changes. Prospect Height near the Grand Army Plaza has a higher price/square foot on residential buildings and has had a number of luxury condominiums built lately while Crown Heights has gotten more of the young / hipster crowd. Historically these are both primarily African



## Crown Heights / Prospect Heights

Crown Heights and Prospect Heights jointly make up Brooklyn Community board 8. This district has a strongly negative coefficient on unit size, indicating a premium on small units.

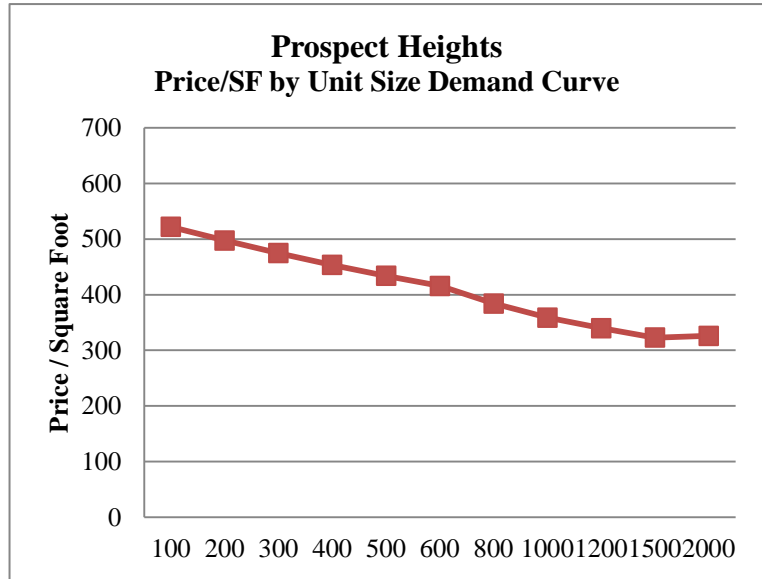
Condo sales prices have seen a huge increase, of 313%, from 2000-2010 which is the second highest of any district in Brooklyn or Manhattan after the Lower East Side. Rental rates have also seen the largest jump of any district in the two boroughs.

This district has a high percent of non-family households as well as of single person households and young people, relative to other neighborhoods with a similar coefficient on unit size. Both indicate a potential suitability to small units. A closer analysis of each neighborhood is worthwhile.

<b>Brooklyn Community board 8: Crown Heights / Prospect Heights</b>	
Coefficient on Unit Size	-0.105
% of Population between 20-34	25.2%
% of Households that are a single person	33.9%
% of Households that are non-family and greater than 1 person	7.8%
% of Households with Children Under 18	30.76%
% of units in buildings with < 5 units	31.6%
% of units in buildings with > 50 units	15.5%
Median Household Income, 2006	\$41,800
% Income Growth, 2000-2006	+45.2%
Violent Crimes Rate Per 1,000 Persons	9.72
Median Sales Price of Condominiums, 2011	\$515,000
Change in Condo Median Sales Price, 2000-2010	+313%
Median Contract Rent, 2008	\$1,350
Change in Median Contract Rent, 2002-2008	+74%
Percent of Rental Units Market Rate	20.8%
Percent of Population Foreign Born, 2009	28.3%
Racial Diversity Index	.50
Percentage White	16.7%
Percentage Black	67.8%
Percentage Hispanic	10.7%
Percentage Asian	2.7%
Average Household Size, 2008	2.34
Average Rooms / Unit	3.98

## Prospect Heights

Prospect Heights is just north of Prospect Park, north of and between Park Slope and Crown Heights. The main avenues do not have a dominant architectural style; there are multi sub-neighborhoods that range from historic buildings and brownstones to ultra-modern (“fishtank”) condos. There has been a boom in recent years here in luxury condo building, but the data indicates the area still places a



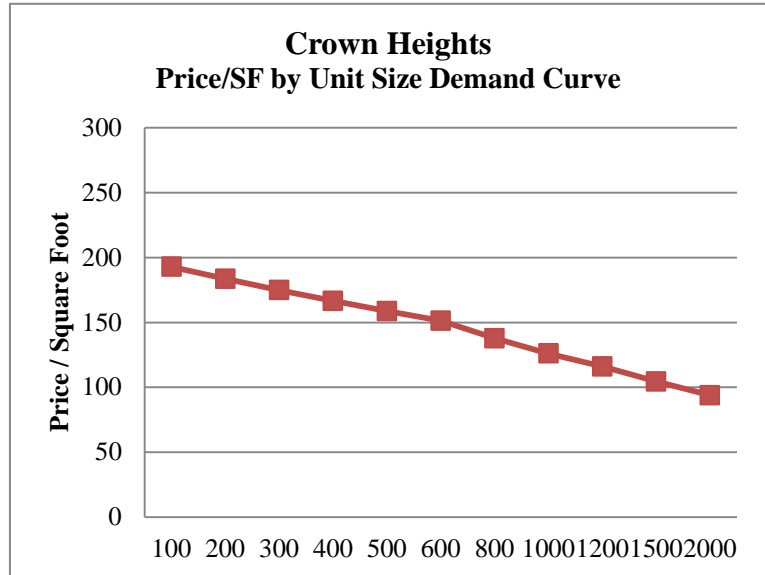
premium on small units. This is also a diverse neighborhood, in terms of population as well as aesthetics. Larger avenues such as Atlantic, Washington, Flatbush, and Vanderbilt Avenues, closer to the Grand Army Plaza, or near Atlantic Ave, might be somewhere a micro unit could be feasible.

Prospect Heights is well-served by public transit with three train lines lining its borders. Commute time to Midtown is 34-50 minutes, via several different train line combinations. Additionally there is a wealth of cultural institutions in the area including the Brooklyn Museum, the Brooklyn Public Library, and the Brooklyn Botanic Garden, among others. The neighborhood’s Walk Score rating is a 94.

The demand curve indicates small units could be successful here, as do the demographic and physical neighborhood characteristics.

## Crown Heights

Crown Heights is to the east and north of Prospect Park. It has also seen racial change in recent years, as those searching for affordable housing spill out further East from Manhattan and Park Slope, although it is further east and also less far along the gentrification path. Crown Heights has also been a receiving neighborhood to residents priced out of the now-expensive neighborhoods of Williamsburg and Greenpoint.



The majority of Crown Heights is zoned R4 - R7 with a couple of small R2 districts and C1 and C2 commercial overlays on the larger avenues.

Crown Heights has a Walk Score of 87 and is just a bit longer in commute time to Manhattan than Prospect Heights.

While the data presented here lumps the two neighborhoods together by community board, a qualitative assessment suggests Prospect Heights might be better suited to micro units than Crown Heights. Crown Heights has a more residential character and is less diverse than Prospect Heights. It is a little bit further and the social implications of gentrification and displacement are a bit more pronounced. Between the two, Prospect Heights is more likely to absorb and satisfy a building of micro units and residents than Crown Heights.

## **Conclusion: Where to Locate Micro Units**

From an economic perspective, micro units are not likely to be the highest and best use in most parts of Manhattan. Midtown East, while expensive, would certainly be a desirable place to locate housing for young people. Unfortunately the market there is demanding large units. Some areas of Harlem as well as the upper part of Washington Heights might be economically conducive to small units as well as practically viable, but these neighborhoods aside, Brooklyn is likely to provide a more economically conducive environment.

Among the neighborhoods in Brooklyn, several might make sense.

Northern Brooklyn, if ever rezoned to allow higher density, would provide an ideal setting. Williamsburg, Greenpoint, and East Bushwick are all neighborhoods with low density and under-utilized land. They are also, already, hot spots for young people.

Working with current zoning, Prospect Heights is a neighborhood that might be a good fit. Currently it is a diverse mix of residents, building styles, and land uses. Just north of Prospect Park has seen a lot of new development and the Park, the nearby cultural institutions, and the retail/restaurants/amenities of nearby Park Slope would support the lifestyle demands likely to come from residents of small units.

Additionally, Cobble Hill West and Gowanus could be viable.

## 8. Design, Management, and Prototypes

As mentioned above, if micro units are to be developed successfully, the developer needs to choose not only the correct location, but also the correct unit size and amenity mix. Do residents of small units prefer a parking space or proximity to a subway station? Proximity to a subway station or to a park? Would they choose a roof deck or an exercise room? Cheaper rent or a larger apartment? This section details the research that has been done to date on how to best design micro units. It also conducts original research from condo sales data, using regression analyses to get an approximation for how the value placed on certain features changes for this specific product type.

Condo sales data was used to examine the added value per square foot of small apartments by several features. It examined various neighborhoods identified above as well, looking for differences in amenity value by neighborhood. This type of information can be used to help developers identify what potential residents in a specific neighborhood would want in very small units.

As micro-units are a recent trend in a few major U.S. cities, appropriate design has not yet been fully fleshed out and refined. There are quite a few architects across the country who have experience in smaller units and a number have now also designed prototype plans for self-sufficient units of under 500 square feet. In Boston, ground was just broken on the Boston Wharf Tower, which will include 50 units of less than 500 square feet and 27 units are planned across the street at 63 Melcher Street that are just 330 square feet. (Ross 2012) In San Francisco, developer Patrick Kennedy and Naomi Porat of Zeta Communities are developing a building with 23 units of 300 square feet each. (Said 2012) Among design concerns for such buildings are: amenities and common spaces, size, height, sufficient access to light and air, and multi-functional furniture/space. Additionally, the management of these units will need special attention, as residents are likely to be more transitory and to depend more heavily on common spaces.

*“The small units are meant to cater to a distinctly urban lifestyle, with the apartments used for little more than sleeping. Residents could entertain in lounges and work areas incorporated into the buildings, or at the many restaurants and bars expected to open along nearby streets. For transportation, residents can rent Zipcars, use public transit, or ride bicycles.” (Ross 2011)*

Patrick Kennedy of Panoramic Interests in San Francisco built a model unit and had an MIT graduate student live in it to help him improve the design. From this experiment, he learned the following:

- “Eurobaths” don’t work – the units should have a regular shower, larger sink, storage and countertop
- Have a convection oven ; the experimental unit had toaster oven and microwave and stove top/hot plate
- There should be a decent sized kitchen sink, it needs to at least be big enough for a large pasta pot
- The units should include as many amenities as possible, including furniture
- Moving air is important to make the space feel bigger and more comfortable
- Use high quality materials (such as the solid bamboo door)
- A way to provide privacy to dress (such as a sliding shaded glass door)
- At least 9 foot high ceilings
- The width is important, it should be at least 10’, 11’ if possible
- The bathroom needs to be big enough for two people to turn around in it

Additionally, ADD Inc out of Boston researched what young professionals would sacrifice to afford downtown living. They found that luxury finishes and extra space were expendable in exchange for a shorter commute and living in a hip urban area. (Loth 2012)

Some of the more detailed early wisdom on designing these units includes the following:

### *Size*

The definition of “micro” varies across municipalities. In Boston, the term micro-unit has applied to units of 500 square feet, although the mayor encouraged a regulation change allowing for 375 instead of 450 square foot minimum size apartments. In San Francisco that number is lower: the city is considering cutting the minimum from 290 to 220 square feet. (Clowney 2012) New York is requesting proposals for a building with units as small as 350-250 square feet. (Rayman 2012) The conversation sparked by these potential changes has elicited comments from residents of even smaller, once legal to build, units – in some cases as small as 78 square feet. (Anand 2011) The appropriate size will depend heavily on the design, the market, and the expectations of residents in each city.

*“What was your secret to being rich?” “Two things: always have a suntan and always have an address in the best part of town, even if it’s a broom closet” -Aristotle Onassis*

## *Height*

Unit height is important for several reasons. Height can directly affect light and air quality, including through the use of tall windows. The minimum height of habitable spaces is dictated by building and zoning codes, which can limit designers who may want to include a lofted sleeping space. Last, a tall unit can make a small space seem significantly more spacious and comfortable, which could make them easier to market. Multiple designers stressed unit height in the design proposals at the Citizens Housing & Planning Council's Making Room Conference (CHPC b) and Patrick Kennedy corroborated the importance of ceiling height – of at least 9' – after designing his micro-unit prototype. (Dirksen 2012)

## *Green Design*

Many of these buildings are being proposed with green ideals in mind – for instance, with bike parking rather than car parking, assuming the targeted demographic will not need or want a car if located close to public transit. In conjunction with transit-oriented development, increased lot density and infill building, the micro-unit buildings themselves are already greener than other development forms. Zeta Communities, the company building the South of Market district micro-units in San Francisco, specializes in pre-fab and green building and is building this project to LEED platinum standards. The often green design and lower car use of micro-units can help as a selling or ameliorating point for micro-units.

## *Multi-Functional Space and Amenities*

Some believe multi-functional amenities, including Murphy beds, hidden or fold down dining tables and euro-baths (without a separated shower) are highly useful (CBC 2011), while others think it is either too expensive or makes it too difficult in which to live (Dirksen 2012). Patrick Kennedy, who had an MIT student try out his prototype unit, said next time around he would install a regular shower and bath instead of the euro-bath and would add more counter and sink space. He would also bring the stove-top to a normal counter-top location, rather than creatively hiding it in a pull out drawer. (Dirksen 2012)

*What we found is that they were willing to give up many of the comforts that housing developers thought were standard.' (Ross 2011)*

*- Kairos Shen chief planner, Boston Redevelopment Authority, on young renters*



## *Management*

Management concerns arise when considering very small apartments in expensive housing markets that are likely to be starter homes or short-term residences for young professionals. This group is likely to be transitory. How will subleases be prevented, or will they be allowed? (adAPT 2012, 11) How will common spaces be maintained and used: will it be possible to reserve certain spaces, will it be for a fee, will they be professionally cleaned, how will utilization of the space and social interaction be encouraged? Will there be an increased need for security? It is important to note that the management duties are likely to be greater than with a comparatively sized building. Just based on residents per square feet, there will be more managerial responsibilities, such as managing leases and collecting rents. Younger residents who stay for shorter terms may have higher wear and tear on the units. Last, additional safety concerns come into play with the increased population density. Examples include evacuation procedures, fire spreading, bed bugs, additional health concerns, etc.

## 8.1 Amenity Preferences

When the units are divided up by their size (micro= less than 400 SF; small= 400-600; medium= 600-1,000; large=1,000-2,000; and extra large=2,000+ SF), a hedonic regression analysis on the condo sales transaction data highlights some of the differences among residents of small versus large units in terms of unit and location preferences.

This analysis used condo sales transactions from 2003-2012, since this was a more robust dataset.<sup>28</sup> It includes several measures of quality and preference: unit floor number, number of bedrooms and bathrooms, the year the unit was built, and the number of subway stations within a 10 minute walk. Ideally, this analysis would be done with an even more robust, amenity-filled dataset,<sup>29</sup> however the two I worked with provided considerable insight. I did not have the resources or access to utilize a truly robust dataset, however the two I worked with did provide considerable insight.

The results of a hedonic regression analysis run of the condo sales data set, with sales transactions grouped by unit size, are given here. The basic price / square foot equation estimated for multi-family residential units can be expressed as:

$$P = \beta_0 + \beta_1 S + \beta_2 S^2 + \beta_3 N + \beta_4 Y_3 + \beta_5 F + \beta_6 R + \beta_7 B + \beta_8 T$$

where:

$P$  = price per square foot,

$S$  = unit size,<sup>30</sup>

$N$  = number of units in the building,

$Y$  = sale year dummy variable ( $Y_3$  = Year 2003,  $Y_4$  = Year 2004, etc.; reference year is 2011)

$F$  = floor number that the apartment is on,

$R$  = number of bedrooms,

$B$  = number of bathrooms,

$T$  = number of public transit stations within a ½ mile

---

<sup>28</sup> This dataset was generously provided by Sofia Song of Streeteasy

<sup>29</sup> A robust dataset for a more accurate hedonic regression model could include: more nuanced measures of proximity to transit; building amenities such as a roof deck or fitness room, unit measures such as kitchen finishes and private laundry facilities; the allowance of pets; the inclusion of utilities in the rental rate; proximity to parks; a measure of the liveliness of the neighborhood, perhaps as a Walkscore; and a measure for school quality.

<sup>30</sup> Unit size here is average unit size for the building, as all sales records are at the building level.

The models applied an ordinary least squares regression analysis to the data. The dependent variable was price per square foot (*P*), and the independent variables are listed above.

Table 6, below, shows a sample regression analysis for the Washington Heights – East Harlem neighborhoods in Northern Manhattan. The results indicate floor number, added bedrooms, and added bathrooms increase the value of condos in this neighborhood. Interestingly, the presence of public transit nearby had a disutility. This trend was true for roughly half of the Manhattan neighborhoods, but becomes more clear when units are broken down by their size.

Table 6.  
Regression Analysis for Washington Heights-East Harlem

	Estimate	Std Error	t Ratio
Intercept	-1522.164	248.6993	-6.12**
Sq feet	-0.364453	0.084398	-4.32**
SqFt^2	0.0001006	0.000039	2.58**
Floor Number	6.7140737	1.808802	3.71**
Beds	18.130193	10.45392	1.73
Baths	67.467895	13.90228	4.85**
Year Built	1.1491198	0.120621	9.53**
# of subway stations w/in 0.5 miles	-35.1238	5.103127	-6.88**

*N* = 476

\* Significance:  $p < .05$

\*\*Significance:  $p < .10$

Of note, these models had relatively high R Squares, given the small number of variables that affect price which we are accounting for:

*R*-Squared = .828

Adjusted *R*-Squared = .5147

*F*- Statistic = 30.6342

Even with a comparatively low adjusted R-Squared, given the F-Statistic, this regression equation can be accepted at better than a 99.99% confidence level as generating significant explanatory power. The F-Statistics are highly significant on the models for all neighborhoods.

Table 7, below, shows how different sized units valued traits differently. The willingness to pay for a high floor number increased as unit size increases, possibly because residents of larger units have more buying power for luxury items such as a view. The relationship of number of subways to apartment size appears to be clearer when the data is sliced this way rather than by apartment. The micro sized units (0-400 SF) and medium sized units (600-1,000 SF) had the most utility realized by additional public transit service. The relationship between these items appears to be an inverse one, with larger apartments achieving a lesser utility.

The utility added by additional bedrooms is huge for micro and small sized units. This probably represents the difference between a studio and a 1 bedroom apartment, and this utility function is reflected in the very common real world trend of erecting walls to turn studios into very small 1 bedroom units. Creating a junior one-bedroom out of studio apartment will pay off. The privacy of a bedroom is of high value to even those in the smallest of units.

Table 7  
Coefficients on Variable Grouped by Unit Size

	MICRO	SMALL	MEDIUM	LARGE	XLARGE
Intercept	1096.72	963.84	-827.01	-2213.97	-7530.80
Sq feet	-17.376	-3.472	1.543	0.785	0.346
SqFt^2	0.023	0.003	-0.001	0.000	0.000
Floor Number	4.665	4.122	5.611	7.166	7.075
Beds	165.39	80.30	2.81	-62.21	14.65
Baths	-99.40	221.83	140.51	123.92	80.87
Year Built	1.583	0.363	0.469	1.153	4.221
# of subway stations w/in 0.5 miles	14.206	8.354	14.431	11.292	-0.606

Additionally, number of subway stations within close proximity to the unit was most important for micro and medium sized apartments; extra-large apartments actually saw a slight disutility from added subway stations within a ½ mile radius. Additional baths were most important for the 400-600 square foot apartment size, decreasing as apartment size increases from there. The year the building was built was not significant, likely because of the historic value of some old buildings.

## Hedonic Regression Results, Looking at Preferences by Neighborhood

	HARLEM			LOWER EAST			LOWER MANHATTAN			MIDTOWN		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Intercept	546.08	234.04	0.0198*	763.32	522.40	0.14	1101.83	383.34	0.0041*	-487.99	211.59	0.0211*
Sq feet	-0.334	0.042	<.0001*	0.090	0.095	0.344	-0.071	0.049	0.146	0.111	0.021	<.0001*
SqFt^2	0.000	0.000	<.0001*	0.000	0.000	0.493	0.000	0.000	0.309	0.000	0.000	0.0120*
Floor Number	12.982	0.891	<.0001*	7.607	1.925	<.0001*	8.848	0.414	<.0001*	6.340	0.229	<.0001*
Beds	21.993	6.793	0.0012*	-35.716	18.362	0.053	25.686	9.242	0.0055*	-7.416	6.891	0.282
Baths	45.831	10.394	<.0001*	51.988	30.593	0.090	48.092	16.623	0.0039*	105.482	8.703	<.0001*
Year Built	0.043	0.098	0.662	0.000	0.269	1.000	-0.226	0.187	0.229	0.497	0.104	<.0001*
# of subway stations w/in 0.5 miles	8.341	3.909	0.0331*	27.212	4.493	<.0001*	-7.819	1.425	<.0001*	25.838	0.911	<.0001*
y2003	0.000	0.000	.	0.000	0.000	.	-68.756	140.634	0.625	-331.858	60.460	<.0001*
y2004	-285.534	114.706	0.0130*	-404.667	91.382	<.0001*	-54.210	87.356	0.535	-157.924	47.383	0.0009*
y2005	-55.908	114.482	0.625	-289.503	41.527	<.0001*	106.016	86.661	0.221	5.258	47.106	0.911
y2006	-50.423	114.961	0.661	-164.924	36.388	<.0001*	234.015	85.645	0.0063*	25.617	46.583	0.582
y2007	74.308	114.070	0.515	-36.947	41.289	0.372	201.304	85.764	0.0190*	133.663	46.777	0.0043*
y2008	102.217	114.254	0.371	58.524	41.700	0.161	254.165	85.658	0.0030*	215.529	46.630	<.0001*
y2009	16.665	114.749	0.885	-101.693	63.150	0.108	344.084	86.023	<.0001*	80.513	47.129	0.088
y2010	-31.961	114.098	0.779	-90.520	39.994	0.0243*	91.330	86.104	0.289	124.920	46.762	0.0076*
y2011	-31.889	114.027	0.780	-80.804	43.253	0.063	141.668	85.880	0.099	144.217	46.754	0.0020*
y2012	-29.339	114.069	0.797	0.000	0.000	.	224.023	85.664	0.0090*	188.920	46.641	<.0001*
	n = 965			n = 341			n=2149			n=8694		

	UPPER MANHATTAN			UPPER MANHATTAN - B			VILLAGE			WASH HEIGHTS		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Intercept	-2699.27	292.51	<.0001*	4322.36	385.67	<.0001*	-2296.65	285.06	<.0001*	-1522.16	248.70	<.0001*
Sq feet	0.376	0.023	<.0001*	-0.207	0.036	<.0001*	-0.045	0.022	0.0369*	-0.364	0.084	<.0001*
SqFt^2	0.000	0.000	<.0001*	0.000	0.000	<.0001*	0.000	0.000	0.881	0.000	0.000	0.0101*
Floor Number	9.719	0.518	<.0001*	3.835	0.598	<.0001*	11.425	1.161	<.0001*	6.714	1.809	0.0002*
Beds	-72.505	8.945	<.0001*	-2.707	10.012	0.787	80.737	9.736	<.0001*	18.130	10.454	0.084
Baths	144.215	11.413	<.0001*	208.305	15.296	<.0001*	67.991	8.559	<.0001*	67.468	13.902	<.0001*
Year Built	1.559	0.144	<.0001*	-1.775	0.190	<.0001*	1.715	0.138	<.0001*	1.149	0.121	<.0001*
# of subway stations w/in 0.5 miles	88.853	3.108	<.0001*	-39.442	4.366	<.0001*	-10.830	1.562	<.0001*	-35.124	5.103	<.0001*
y2003	-539.493	88.550	<.0001*	-513.478	103.851	<.0001*	-445.834	126.656	0.0004*	-295.692	94.201	0.0018*
y2004	-279.403	64.656	<.0001*	-178.822	83.350	0.0321*	-330.785	84.384	<.0001*	-115.255	70.539	0.103
y2005	-143.700	63.849	0.0244*	-73.041	82.485	0.376	-145.100	83.736	0.083	-96.168	69.307	0.166
y2006	-72.001	63.772	0.259	-24.523	81.998	0.765	-24.107	83.861	0.774	9.459	70.728	0.894
y2007	35.613	63.334	0.574	59.798	81.978	0.466	123.362	83.272	0.139	56.140	68.796	0.415
y2008	126.393	63.380	0.0462*	144.820	82.098	0.078	153.233	83.425	0.066	79.874	67.895	0.240
y2009	-79.337	63.554	0.212	72.687	81.818	0.374	135.803	83.651	0.105	-22.001	69.113	0.750
y2010	-59.947	63.274	0.344	-14.557	81.573	0.858	105.830	83.275	0.204	-19.861	68.393	0.772
y2011	-21.147	63.480	0.739	-52.022	82.339	0.528	112.256	83.690	0.180	-26.853	68.660	0.696
y2012	0.677	63.349	0.992	25.274	82.390	0.759	230.797	83.355	0.0056*	-8.330	68.263	0.903
	n=7339			n=1783			n=4414			n=476		

## 9. Prototypes and AdApt Competition

### *New York City Housing Market Overview*

The rental market in New York has rebounded strongly since the recession, particularly in the high end market, with 2012 seeing great rental increases. As of mid-2012, the average rental rate in Manhattan was \$3,778 – up 9% from the year before. In March of 2012, the average rent in Manhattan (then at \$3,418) surpassed the all-time high set at the height of the real estate bubble in 2007. The rents on small units are actually responsible for pulling these numbers up: the average studio rent rose 18.8% to \$2,569, a report from Prudential Douglas Elliman found.

The rise in rents is due to several factors. The city has rebounded economically overall, creating more movement and household formations. In January of 2012, the city added 31,200 new jobs, the largest increase in 23 years. Additionally, the tightness of credit has left many would-be-owners still renting.

Rent increases are negatively correlated with apartment size this year. Studios rose 18.8%, 1 bedrooms 11.5%, 2 bedrooms 5.2%, 3 bedrooms 3.8% and last, four or more bedrooms fell by 0.1%. This supports the shortage of studio and 1-bedroom units that Mayor Bloomberg believes creates a need for micro units. The inflation in rents of the smaller, lower-cost units in the city also supports this.

*“I believe there’s a market for this... But at what rent? What will it cost to build and to carry the units, and will the market rent that can attract people cover the costs? That’s the real question.”*

*- Steven Spinola, president of the Real Estate Board of New York*

## 9.1 AdAPT NYC Competition Winner: My Micro New York

Earlier in July of this year, New York Mayor Bloomberg issued an RFP for a building of micro-units to be built on city-owned land. The prototypical development will test the idea of reducing the minimum apartment size from 400 to 275 square feet and comes following a conference in November of 2011 called “Making Room”. The conference challenged architects to design what they would like to build if there were no regulatory barriers, provided their designs would be safe, practical, and in-demand. The current and real project will provide waivers on the two main regulatory obstacles, the above size restriction as well as the lot density regulation. The Mayor hopes for ground breaking on the project by the end of next year. (adAPT 2012)

*Currently, zoning forbids units smaller than 400 square feet. Also, the new building will exceed the number of units allowed by zoning—55 planned versus 38 currently allowed—because they are so small. Also the configuration of the building on the site, including the location of the street wall, planters, setbacks, and overall lot coverage are not typical. The building's footprint is 3,864 square feet, rather than the prescribed 3,600 square feet.*

The lot offered by the City is located on block 933 and is lot 10, in the neighborhood of Kips Bay, Manhattan. See Appendix B for a zoning map inclusive of this site. It is 4,725 square feet, with an FAR of 6.02 and a maximum lot coverage allowance of 80%. Aaron Koffman, Director of Affordable Housing at the Hudson Companies, estimated the land at the AdAPT site is relatively low cost for Manhattan, perhaps about \$150 per square foot, or approximately \$725,000. The city gave this land away at a slight discount to the winning team, for \$500,000.



The winners of the adApt competition, the micro unit design competition referenced throughout this paper are a team composed of Monadnock Development, nARCHITECTS, and the Actors Fund Housing Development Corporation. The building will be 10 stories and also Manhattan's first modular construction apartment building. Twenty percent of the units will be affordable, restricted to those earning less than \$77,190, or 80% of the Area Median Income (AMI). An additional 9% will be restricted to people earning up to 145% of AMI and 11% will be reserved for those making less than 155% of AMI. The cheapest apartment will begin at \$914 a month, with \$1,873 still considered subsidized, and all the way up to market rate.

The building has a wealth of shared spaces; 18% of the gross square footage is programmable shared interior space.

*“Though each unit is extremely small, the structure overall is designed with open space in mind, offering amenities such as nearly 10-foot ceilings, a gym, bike storage, a large common room on the ground floor and a “salon” with a roof terrace, plus a sitting room on each floor for community interaction.”*

### *Adapt Competition Submissions*

The competition solicited over 6,000 RFP downloads from around the world. A sample of the proposals that made it to the final round are used here to examine market assumptions.

The proposals had considerable freedom. The RFP for the competition did not specify a land price (the competitiveness of the land offer was a small percentage of the judging criteria); they did not necessitate how many affordable units were required, beyond the 20% of units set aside for the 421a tax credit that most rental buildings have to utilize to make ends meet; they left regulation modifications up to the developers (See Appendix C for the proposed zoning amendments for this site); it did not specify a market rate rent, nor did it set a maximum or minimum number of units. Given the openness of this competition, it is interesting to look at some of the ranges and differences on key elements of the financial documents among entrants.

Of the 11 proposals I looked at, the average number of units in one of these buildings was 66, the median was 62. The average unit size was 278, the median 266. The smallest unit was 236 ft, the largest was 341. The total gross square footage ranged from 22,410 to 39,087 – with the mean and median sitting around 32 to 33,000. The buildings provided a wide spread of



affordable units, some as low as 30% of AMI, others with the lowest at 80% of AMI<sup>31</sup>. All proposals were at least 50% market rate, many with additional units over 100% of AMI. The mean percent of market rate units was 58.9%. The mean market rate rent was just under \$2,000, as was the median. The market rate assumed rent ranged from \$1,800-\$2,200.

Most proposals included commercial and community space. Commercial space was estimated to be worth around \$45/SF. The range on estimates for this was from \$20-\$75/SF. Commercial and ancillary income made up about 15-17% of the total project annual income, on average. Maintenance and operating expenses were around \$400,000 on average, annually, for the projects. On a per unit basis that comes out to just over \$6,000. The year 1 NOIs ranged considerably, from 527,299 to 1,173,783. The net cash flows after 12 years were between \$2,725,853 and \$7,319,620.

The per unit cost of residential construction for these micro unit buildings was around \$150,000, ranging from \$100,920 to \$168,243 per unit. On a per square foot basis, cost of total construction was around \$265/SF. Architects/engineers fees varied considerably, between \$373,755 and \$975,000. The total cost of development for the project was right around \$14 to \$15.5 million, on average. On a per square foot basis that came out to a mean of 455 and median of 439 – or \$230,398 on average per unit. All but one submission took out a mortgage and the average developer contributed equity was between 3 and \$5 million. Two projects received tax credit equity, three used HDC financing, and three received NYSERA grants (for environmental design - ranging from 30,000 to \$1,500,000). Only one project estimated an IRR, and it was 7% total project yield. That project was about middle of the road on most measures.

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<sup>31</sup> The lowest AMI percentage was in the selected proposal.

## 9.2 Micro and Small Unit Prototypes

Tumbleweed Tiny House Company

“Loring”

[www.tumbleweedhouses.com](http://www.tumbleweedhouses.com)



Front View

Rear View



Left Side View



Right Side View



Bedrooms: 0 + Loft

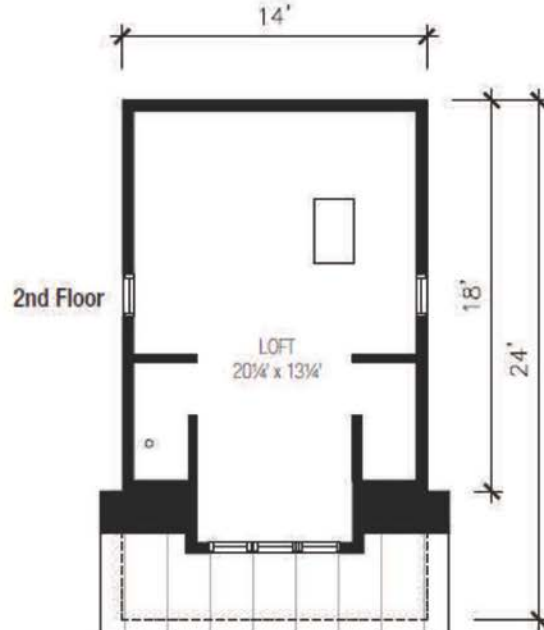
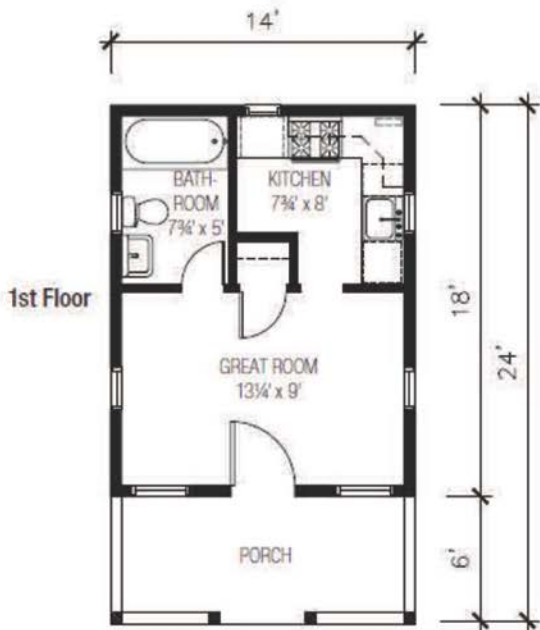
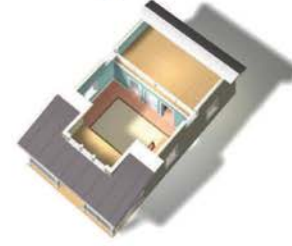
Square Feet: 261

Stories: 1.5

Building Height: 16'10" Tall

Footprint: 14' x 24' ( 336 SF)

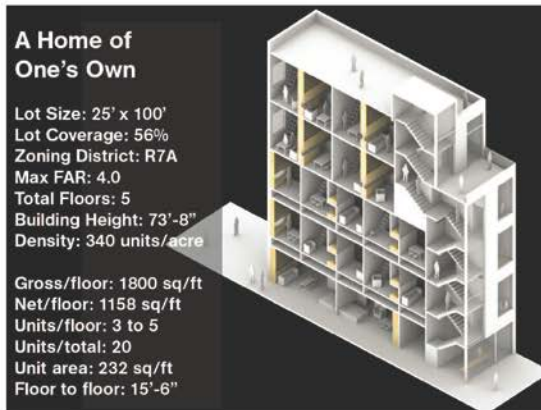
Cost of Materials: \$22,500



## CHPC Making Room Conference

## Micro-Loft "A Room of Ones Own"

Gluck Team



Unit Size: 232 SF

Unit Dimensions: 14'6" x 10'6"

Ceiling Height: 14'10"

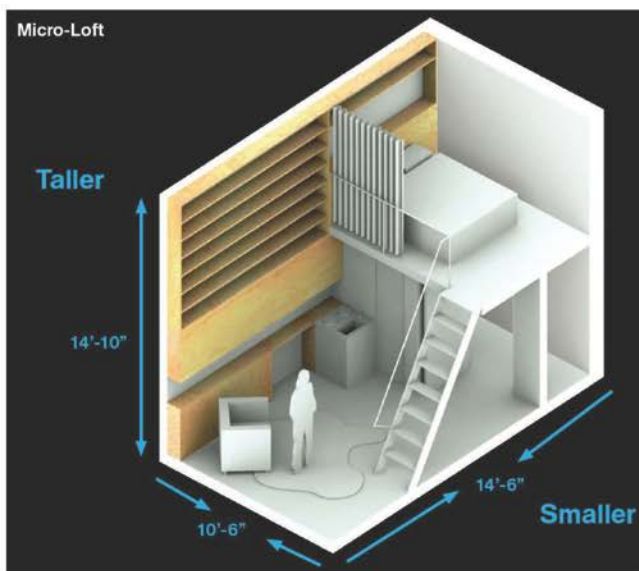
Status: Designed as prototype for CHPC Conference

Notes: 20 micro-lofts (5 per floor) in a low rise building by adding five-foot side lot for light and air to typical 25'x100' NYC lot. Density of 340 units/acre.

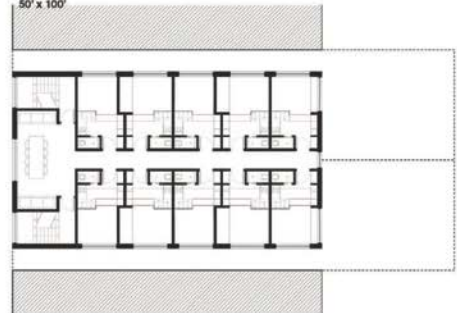
\*Specifically designed for NYC lots, may not be as applicable to other cities. Also only has a raised sleeping area, no first-floor bedroom.



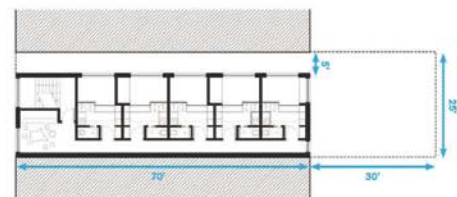
Built-In Unit  
232 sf

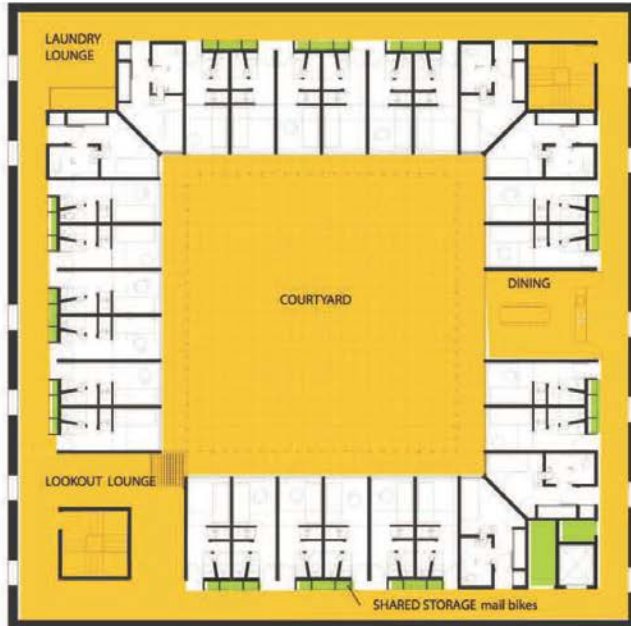


Double Lot  
50' x 100'



Single Lot  
25' x 100'





TYPICAL FLOOR

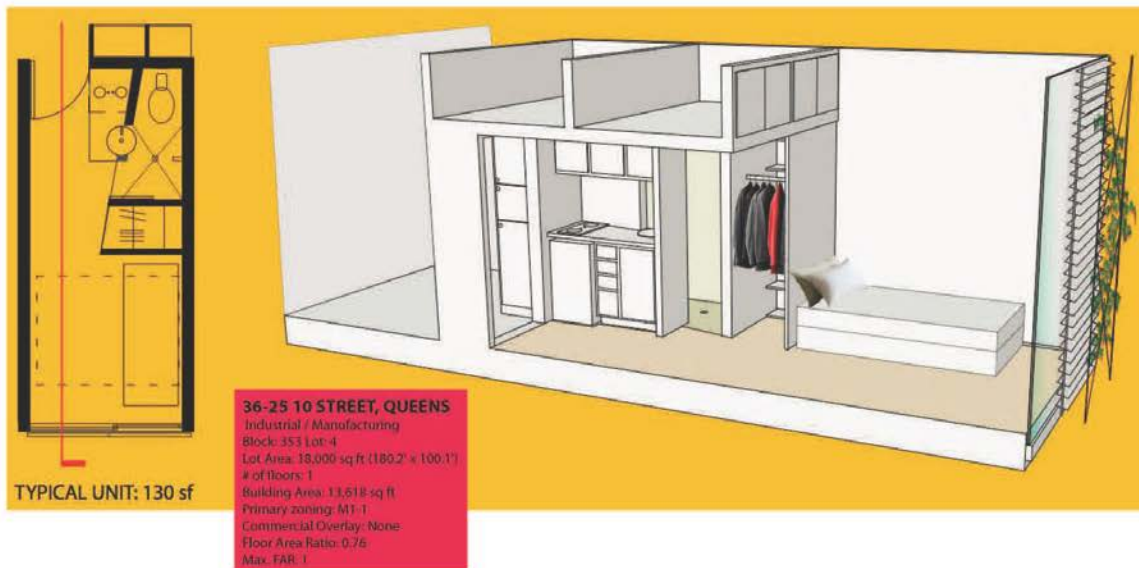
Location: Design for New York City

Unit Size: 130 SF

Units: 62 on 2 Floors

Status: Designed as prototype for CHPC Conference

Notes: 10,000 SF ground floor flex space; common areas on each floor. A typical unit has an “emergency” kitchen and small bathroom with a single sink in between, the idea being that they are fragments of a larger dwelling completed by the public spaces, namely the various lounges and a larger shared dining room. The units are packed in a layer of storage inside and out. The proposition is that the mini units might act as timeshares and that the departing tenant would shift his or her belongings to the loft and corridor when they are on the road.



TYPICAL UNIT: 130 sf

## Smart Space

Patrick Kennedy of Panoramic Interests and Zeta Communities, Builder



Location: San Francisco South of Market district

Unit Size: 300 SF

Number of Units: 23

Status: Under Construction

Notes: Patrick Kennedy might be willing to re-release floor plans. His work is the most comprehensive and well-researched of any that I've seen on how to actually design and sell micro-units. Additionally this building is being built off-site pre-fab, extremely quickly, and to LEED Platinum standards.



## New rooming house

Vidère, with 46 small rooms for rent, plans to open next month



Source: ZSR, Telesatlas

### THE COMPLEX

- Two buildings
- Each building has single bedroom/bathrooms for 23 people
- Rooms range from 90 to 168 square feet including bathroom
- Monthly rent of about \$500-600 includes utilities and Internet
- Parking: 6 spaces, each an additional \$80 a month

### COMPARING SIZES

How size of rooms compares to Seattle parking lot spaces:

THIRD FLOOR SAMPLE LAYOUT



PARKING-LOT SPACES:

Small: 25 feet X 7.5 feet

Medium: 26 ft. X 8 ft.

Large: 19 ft. X 8.5 ft.

112.5 square feet

128 square feet

161.5 square feet

Volkswagen Beetle  
13.4 feet X 5.7 feet

76.38 square feet

SMALLEST ROOM

90 square feet

Sources: Vidère, Seattle Department of Planning and Development, Seattle city code

THE SEATTLE TIMES

Location: Seattle, WA

Unit Size: Average 130 SF

Number of Units: 46

Rentals or Sales: Sales

Status: Built

Notes: Developers got around SRO laws by calling each eight bedroom section one "unit" sharing a kitchen, and we able to call them townhouses. The owners say they rent exceptionally low and at very low prices in desirable neighborhoods.



## Cubix Yerba Buena

Originally developed and owned by HausBau/Hauser Architects



Paul Christ - The Chronicle

Location: San Francisco

Unit Size: 250-350 Square feet

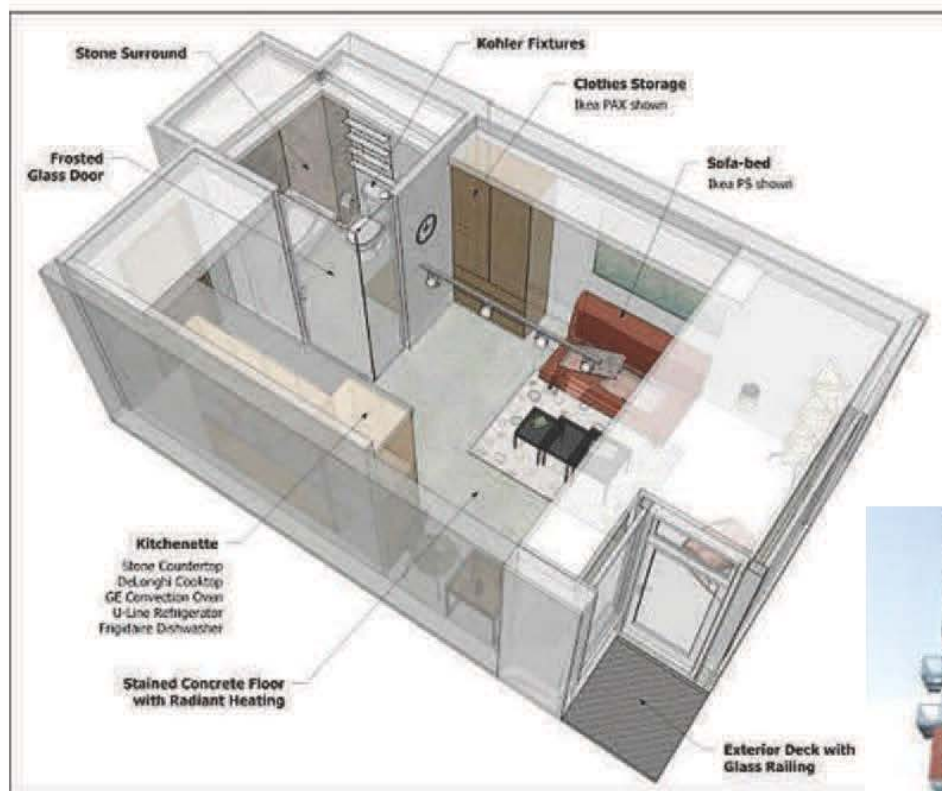
Number of Units: 98

Rentals or Sales: Sales

Status: Built

Notes: Car share and rentable storage units in the basement

Cubix was originally developed by HausBau/Hauser Architects but went bankrupt in 2009. Bank-owned, it went back on the market in 2010 and is currently fully occupied.



## **Part III. Are Micro Units Good for NYC?**

So, all in all, is reducing the minimum apartment size a good idea? Do micro units have the capability to achieve what they are supposed to? Is it a scalable solution that can succeed in the open market?

From the findings of this thesis, the answer is a hesitant “yes”. There will be demand for these units, likely in many neighborhoods across the city. New York is in a housing affordability crisis and all strategies to provide reasonably priced housing to young people will be met with demand.

However, micro units are unlikely to be produced en masse in the open market in Manhattan. That is not to say, however, that the government could not incentivize their development through tax credit or zoning bonuses, or that they could not be a viable and useful housing product in the other boroughs. Some neighborhoods such as Prospect Heights could be a good as-of-right site for the units and others, including Williamsburg, could be a great location for them if up-zoned to allow a more reasonable residential density.

If the intention is to bring down housing costs to young people – this goal will only be met if the tenants of micro units would otherwise be in larger units by themselves (studio and one bedroom) rather than in roommate share situations. While a micro unit might provide a better quality of life relative to living with roommates, they would be less dense and more expensive.

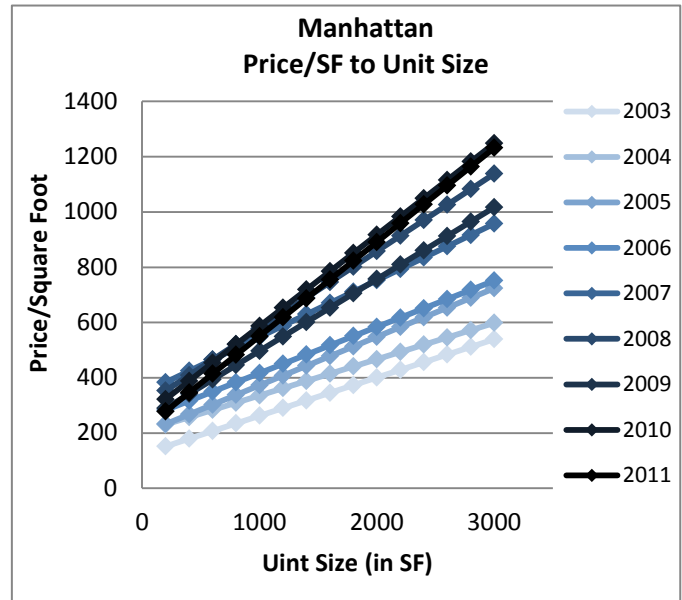
A summary of the findings from this thesis follows.



## 10. Summary of Major Findings:

This thesis highlights important considerations concerning micro unit development in New York City. At the top of that list is the issue of price per square foot premiums. In Manhattan, the trend right now is building big and expensive and it does not look to be changing – more likely, it is becoming more pronounced and the trend is spreading outward. This indicates both that there is an even bigger need for innovative and affordable housings, and that getting these units built in prime locations will be more difficult than might be currently expected. In other cities this does not appear to be the case, in San Francisco and Boston small units (and the ability to pack more of them into the same envelope) can command a per square foot premium that is competitive with the larger units.

A key finding to take from this study is the shape and progression of this price premium curve for Manhattan. The graph on the right shows how this has changed based on the year the building was sold, over the past ten years. In Manhattan this trend is strong, it is statistically significant (0.01 level), and the curves are getting steeper every year. Manhattan (and New York City generally, eventually) is becoming an enclave of the super-wealthy. This is a side-finding to this study, but is really crucial to understand in planning for housing and the future of New



York City. If luxury buyers are driving prices of large units up so high that even a building crammed full of well designed, 250 square foot units are not competitive when renting for \$2,100 to young single people – the city has a housing crisis.

As far as the most efficient and viable place to locate these units right now within New York City, it would be in a neighborhood which still places a premium on small units (from the neighborhoods examined here, that is most of Brooklyn, Washington Heights, and Harlem). Other neighborhood characteristics must also be considered, however, including zoning regulations, socioeconomic characteristics, and parking requirements. Neighborhoods that might be a good location from a broad perspective include: Williamsburg, Washington Heights/Inwood, Gowanus, Prospect Heights, Cobble Hill West, and Park Slope South.

## **11. Summary of Motivations / Drivers of Micro Units**

The housing market conditions of New York City definitely point towards a need for this type of housing (among other types). The theory that developers will build them and residents will rent them at a higher price/square foot than bigger units is solid, if the economics of the market are obliging. The forces pushing for this housing type in the city right now are: a continuing growth of single person households, an affordability crisis resulting from a resurgence of popularity in central cities and a large influx of foreign and second-home buying into New York specifically, a lack of new units coming online that are studio or 1 bedrooms, and illegal/unsafe living conditions resulting from residents trying to work with the housing stock that exists. City officials are clear about wanting this typology to provide safe, affordable, simple housing to young people who might otherwise choose to move to a less expensive city.

## **12. Effectiveness at Meeting above Needs:**

Micro units have a lot of potential. In some markets, that potential can be maximized simply by reducing the minimum apartment size regulation and allowing developers to do the rest. In these cases, if the developer is making a much higher price/square foot on the small units, cities may even require them to contribute a percentage of these units as affordable.

In New York, however, the situation is not so simple. In most of Manhattan, developers will not have an incentive to build tiny units – on the island the exorbitant cost of and competition over developable land requires them to maximize the price / square foot, which currently means building large and luxurious units, usually condos.

There is definitely a need for more and different housing types in the city and young people will definitely rent these units if they are at a reasonable price point. I tend to think many other demographics would do so as well. The problem is the price point and getting these units into a neighborhood in which the price can come down on them. The other issue is scalability if they are not competitive on an open market.

## 13. Policy Implications, Potential Solutions

This research revealed many possible ideas about how to handle micro unit development from a policy standpoint.

One developer suggested the city offer a square footage bonus to developers who include a certain number of small units in their building. This, he argued, would help overcome one of the development obstacles which is that building efficiency goes down as more units are crammed in. The percentage of buildable square footage that is devoted to hallways, elevators, HVAC and plumbing, etc. increases as the number of units in a building increases.<sup>32</sup> The NYC Zoning Office provides FAR bonuses in Inclusionary Housing (IH) designated areas. Such a program could reward the development of small units with similar bonuses.

Allowing some of the 20% in 80/20 buildings to be made up of micro units, or creating a similar program that encourages small units as a percentage of total units, might also be a unique solution that diversifies housing stock and brings overall costs down. The 80/20 program has been successful with the development community. (Smith 2013)

Another possibility is to waive parking requirements for these units if developed within a certain distance of public transit, since residents of smaller units, and younger residents in general, have been shown to have a far smaller likelihood of owning a vehicle.

Changing affordability standards for small units could also be effective – perhaps putting a maximum rent cap or AMI percentage on the whole building (in the 125-175% of AMI range, from looking through the numbers) and then getting rid of the requirement that 20% of the units are affordable to moderate income. This could bring the highest rents down and make them a little more feasible.

Going back to the second home buying and super wealthy trend, several cities have used different tax systems to discourage this sort of buying. While record home prices contribute to the city's tax base and may not want to be discouraged, a version of one of these policies or a tax

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<sup>32</sup> From email conversation with Timothy Dumbleton on April 23, 2013.

“Since geometry / Zoning do not favor small units if we want more of them to be created we should give bonuses for that purpose. What if you gave a 10-15% SF bonus for micro units to make up for the problems that are inherent to the type. I expect people would make a lot more of them.”

on second home purchases / residential purchases over a certain amount could go directly into an affordable housing or 'micro-unit' fund.

Increasing density, as in the Midtown East rezoning, the Williamsburg rezoning, and the proposed Crown Heights rezoning could also ease the housing crisis and accommodate growth in high demand areas while minimizing displacement.<sup>33</sup> Manhattan is seeing shocking levels of demand, at numbers few would have dared to guess during the darkest days of 2009. But Manhattan is an island with finite room to grow. As DiPasquale and Wheaton (1996) assert

*"An area may experience strong demand-induced economic growth pressures, but unless it can easily produce housing, such growth will drive up real estate rents and reduce effective wages, perhaps to the point of curtailing growth. In the longer run, the ability of an area to produce a reasonably priced and plentiful supply of housing and industrial structures may be one of its strongest assets."*

Increasing density allowances in carefully chosen areas is the right development pattern for New York and a good step towards increasing both the number and the variety of housing options for residents. The Bloomberg Administration has actively rezoned much of the city, in fact 40% of it has been rezoned since 2002. (Nettler 2013)

This thesis recommends a reconsideration of micro unit policy, and possibly New York City's affordable housing policies overall, in light of some of these findings. The ubiquitous and growing tendency towards large and luxurious units is not just a threat to the development of micro units or housing for young people, it is an under-estimated threat to everyone not in the top 1% who wish simply to call New York City home.

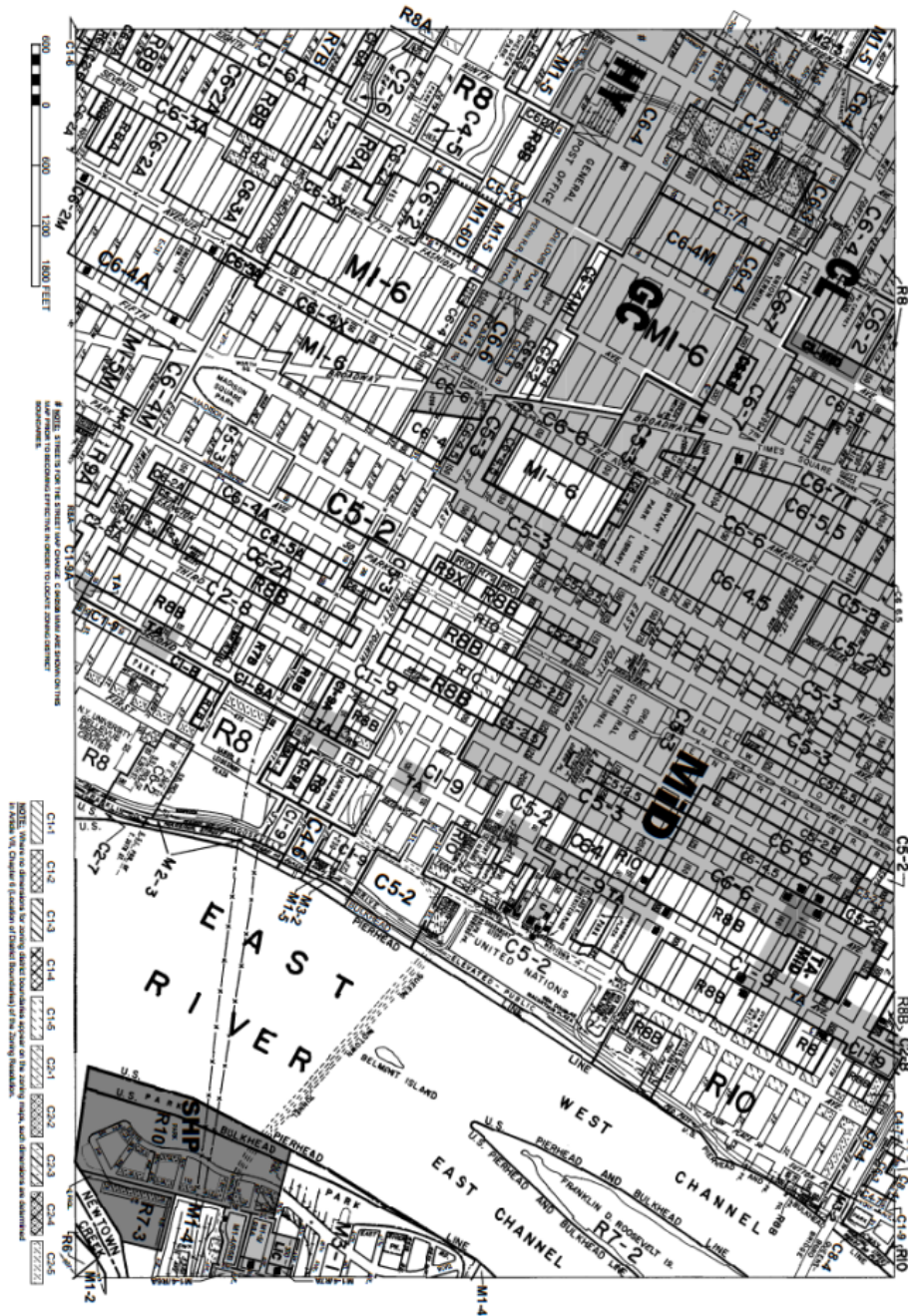
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33 (Smith 2013) Stephen Smith argues that conservative, and outdated, zoning codes are to blame for the unequal balance between supply and demand. According to Smith, the result of such controls is that as gentrification makes "significant inroads" in Brooklyn and Queens, "the housing that the poor are losing to the rich is not being replaced." And while such "conservative zoning" may be appropriate for "tree-lined blocks of Brooklyn Heights and Park Slope," for functional (misguided attempts to preserve manufacturing) and aesthetic (the houses are "some of the ugliest in the city") reasons northern Brooklyn should allow for more density. "If desirable neighborhoods don't start shouldering more of the burden of increased urban demand," concludes Smith, "American cities will soon end up like their counterparts in Europe, where everyone except the rich and the tourists are shunted off to the suburbs."

## Appendix A. Data Set Comparisons

<b>Data Set Comparisons: Coefficient on Unit Size (Square Feet)</b>		
	<b>Condo Data</b>	<b>Rental Bldg Sales Data</b>
MN01: Financial District	0.088	0.098
MN02: Greenwich Village/Soho	0.066	0.168
MN03: Lower East Side/Chinatown	0.125	0.111
MN04: Clinton/Chelsea	0.064	0.069
MN05: Midtown	0.218	0.161
MN06: Stuyvesant Town/Turtle Bay	0.174	0.119
MN07: Upper West Side	0.191	0.071
MN08: Upper East Side	0.301	0.098
MN09: Morningside Heights/Hamilton	0.189	-0.021
MN10: Central Harlem	-0.020	-0.011
MN11: East Harlem	-0.114	-0.039
MN12: Washington Heights/Inwood	-0.014	-0.046

# Appendix B. Zoning Map Inclusive of AdApt Site



# NOTE: STREET NAMES AND DISTRICTS ARE SUBJECT TO CHANGE WITHOUT NOTICE. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. FOR THE LATEST INFORMATION, VISIT THE CITY PLANNING COMMISSION'S WEBSITE AT [www.cityplanning.com](http://www.cityplanning.com).

# NOTE: THE CITY PLANNING COMMISSION HAS CONDUCTED A VISUAL ANALYSIS OF THE PROPOSED DEVELOPMENT AND HAS DETERMINED THAT THE PROPOSED DEVELOPMENT IS COMPATIBLE WITH THE SURROUNDING ZONING DISTRICTS AND CHARACTERISTICS.

# NOTE: THE CITY PLANNING COMMISSION HAS CONDUCTED A VISUAL ANALYSIS OF THE PROPOSED DEVELOPMENT AND HAS DETERMINED THAT THE PROPOSED DEVELOPMENT IS COMPATIBLE WITH THE SURROUNDING ZONING DISTRICTS AND CHARACTERISTICS.

## ZONING MAP

THE NEW YORK CITY PLANNING COMMISSION

**Major Zoning Classifications:**  
 The number(s) and/or letter(s) that follows on the map indicates the zoning district and other controls as specified in the text of the Zoning Resolution.

- R - RESIDENTIAL DISTRICT
- C - COMMERCIAL DISTRICT
- M - MANUFACTURING DISTRICT

**SPECIAL PURPOSE DISTRICT**  
 SPECIAL PURPOSE DISTRICTS are shown on the map with a shaded background. For a list of the special purpose districts and their respective controls, see the text of the Zoning Resolution.

**AREAS(S) REZONED**

**Effective Date(s) of Rezoning:**  
 09-21-2011 C 100063 ZAM

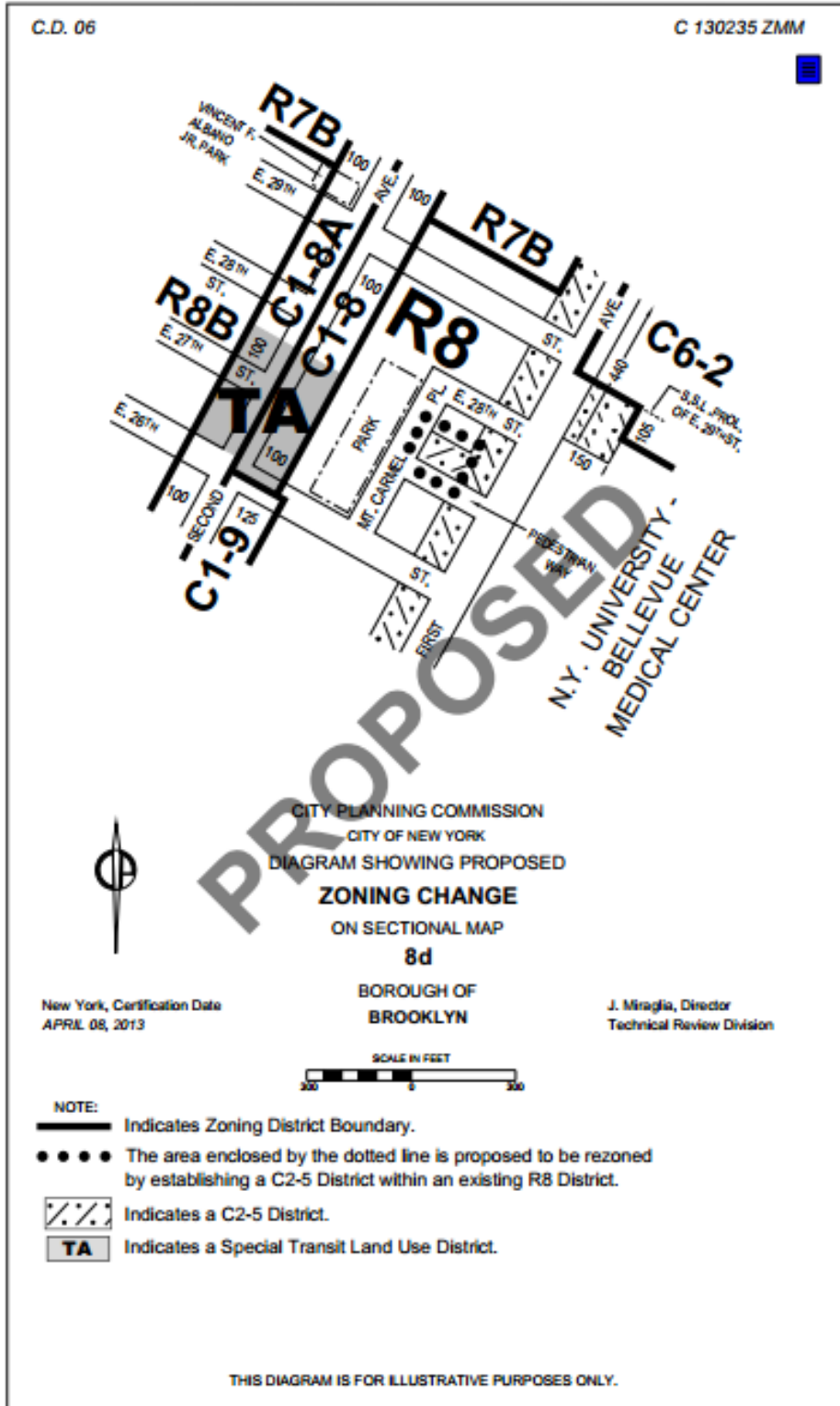
**Special Requirements:**  
 For a list of lots subject to CEQR requirements, see APPENDIX C.  
 For a list of lots subject to "D" restrictive declarations, see APPENDIX D.  
 For a list of lots subject to "F" (provisional) hearing requirements, see APPENDIX F.

**MAP KEY**

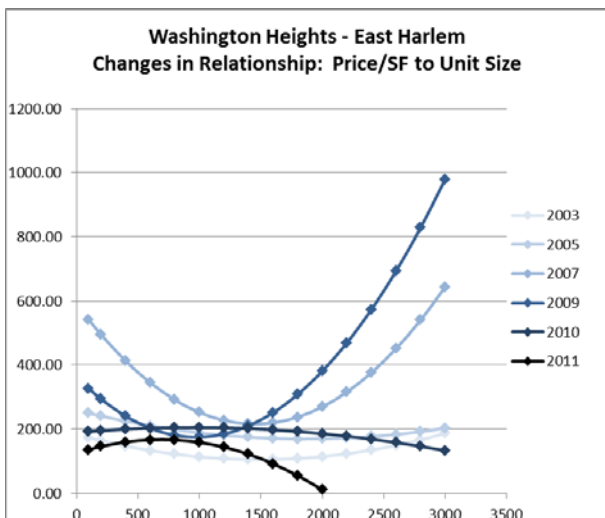
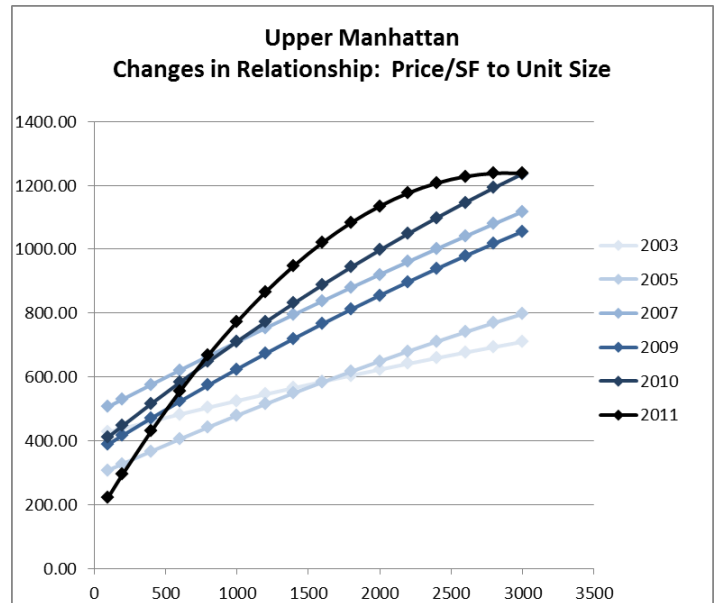
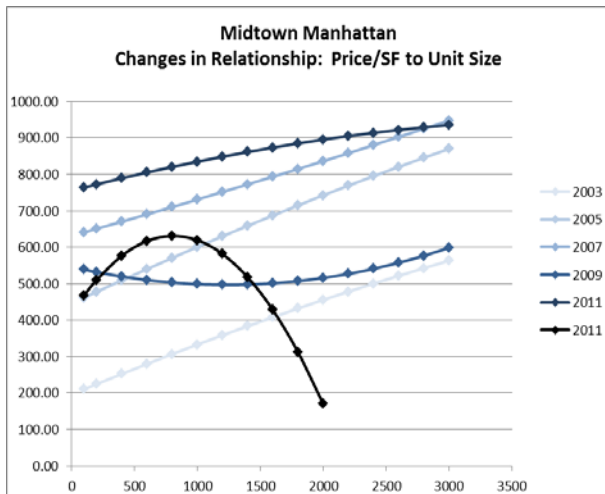
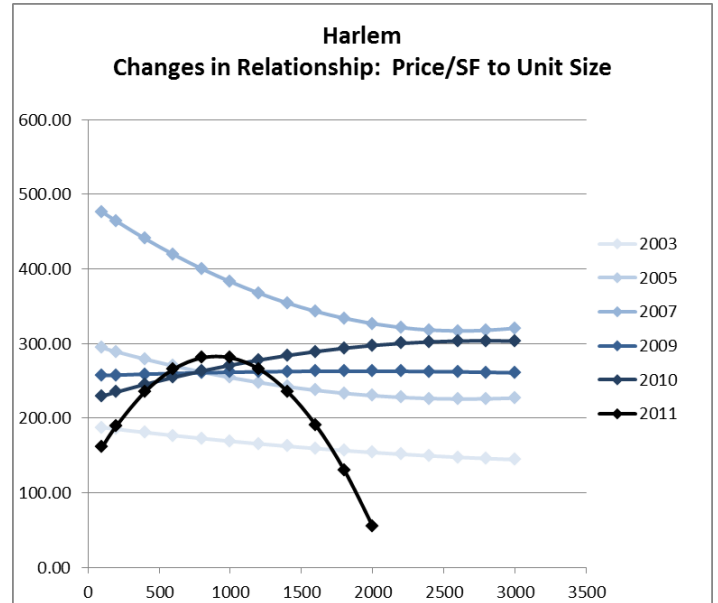
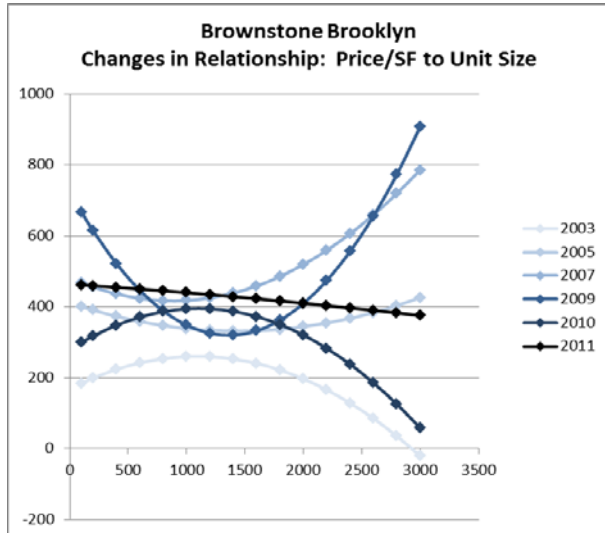
8a	8c	9a
8b	8d	9b
12a	12c	13a

88 ZONING MAP

**Appendix C. AdApt Site Proposed Zoning Changes**

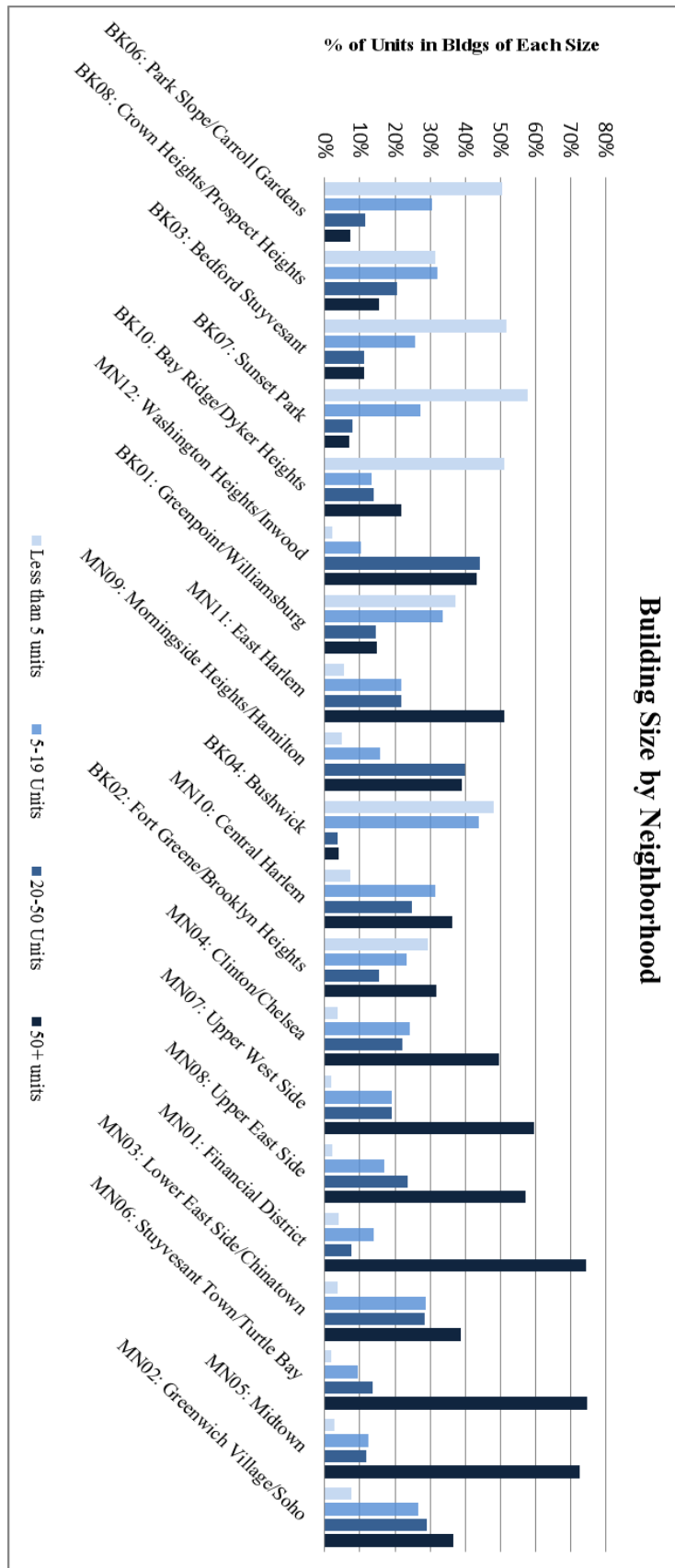


## Appendix D – Historic trends in Price/SF to Unit Size Relationships

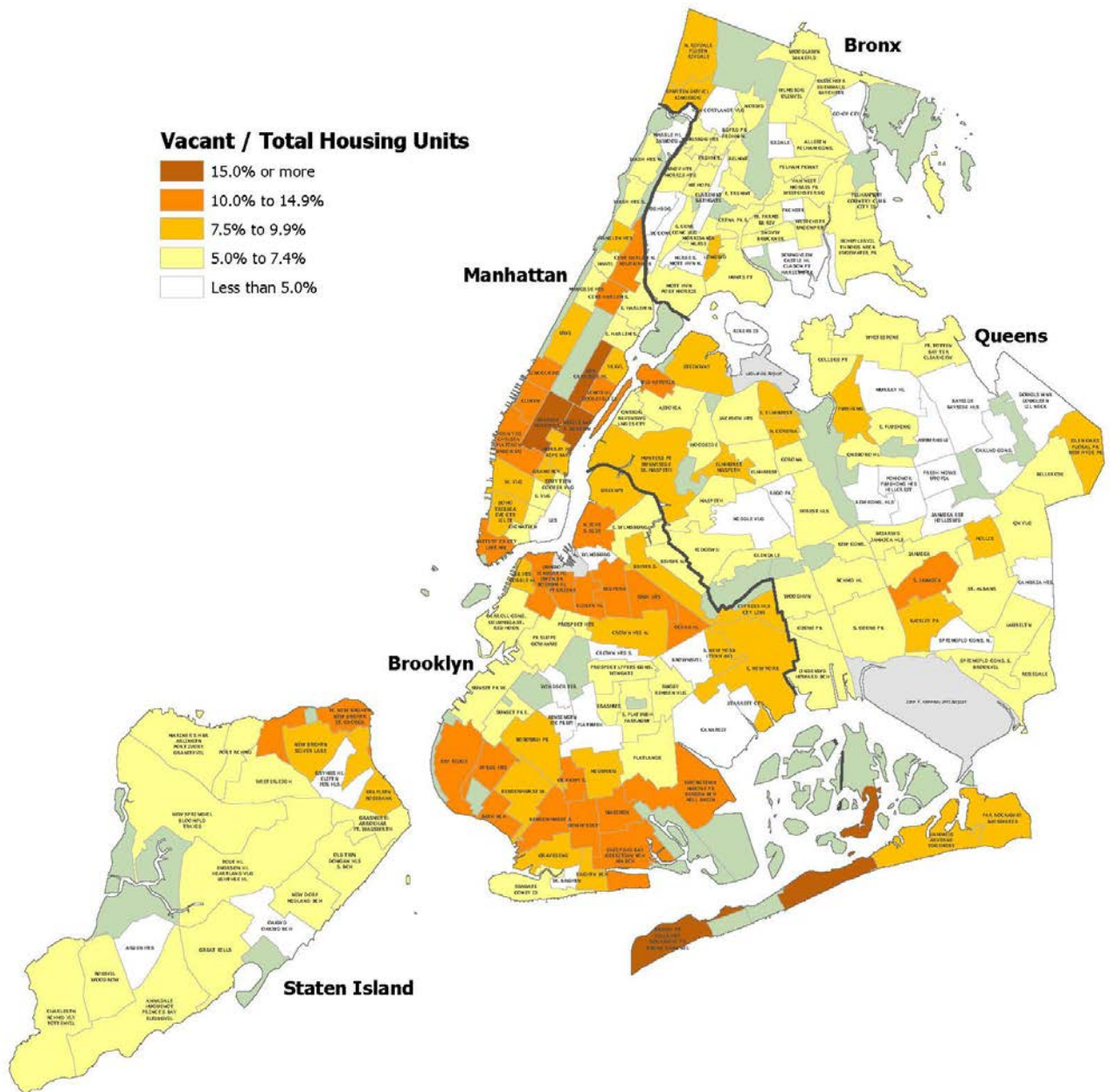




## Appendix E: Number of Units per Building by Neighborhood (Community district)



# Appendix F. Vacant Units in New York City as Percent of Total Housing Units, 2010

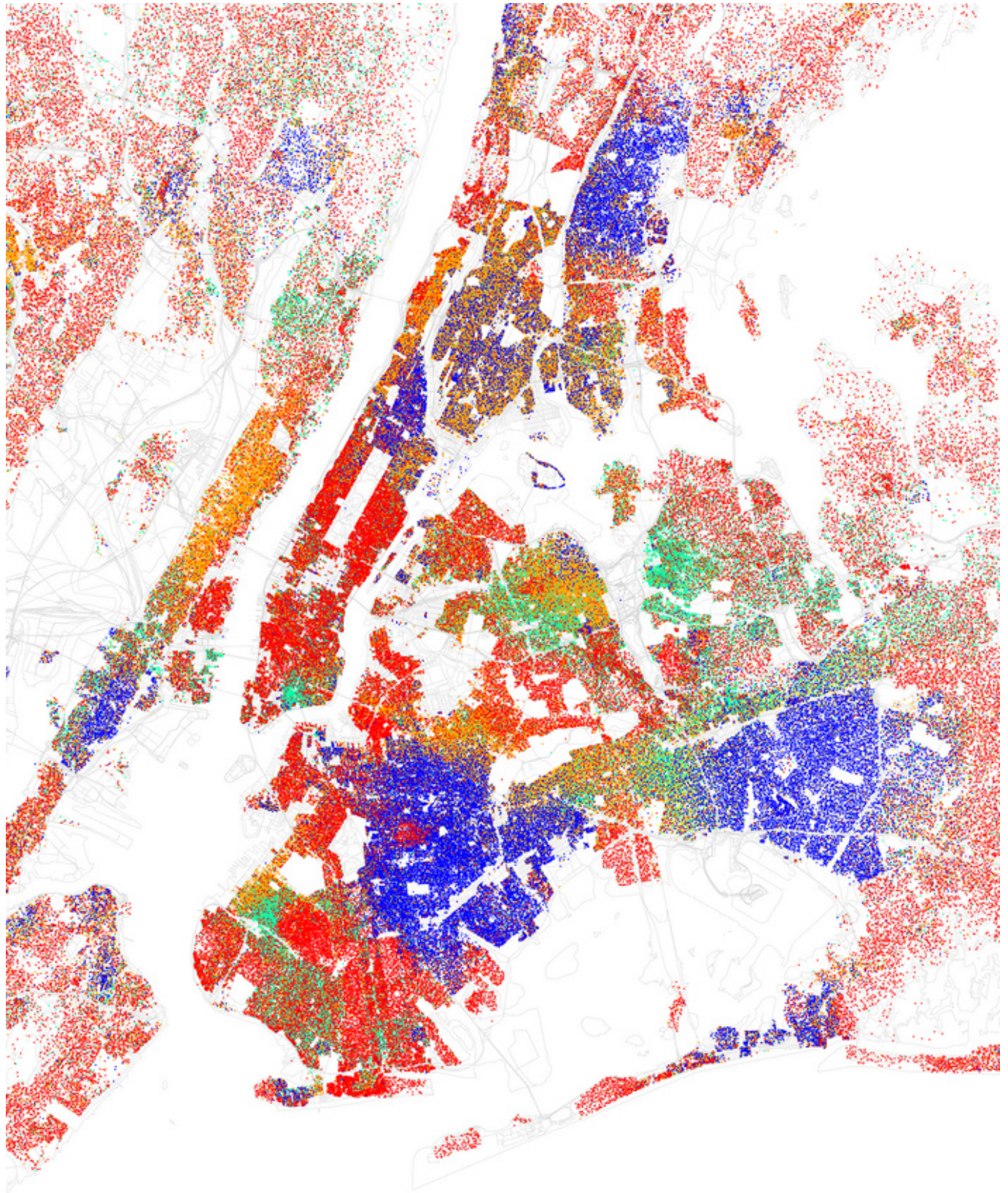


\*Neighborhood Tabulation Areas or NTAs, are aggregations of census tracts that are subsets of New York City's 55 Public Use Microdata Areas (PUMAs). Primarily due to these constraints, NTA boundaries and their associated names may not definitively represent neighborhoods.

Source: U.S. Census Bureau, 2000 and 2010 Census Public Law 94-171 Files Population Division - New York City Department of City Planning



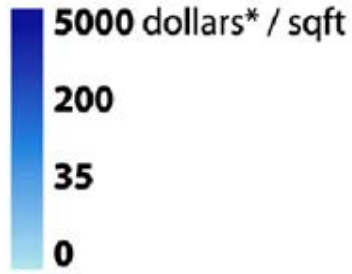
**Appendix G - New York City Race Map, 2010 Census**



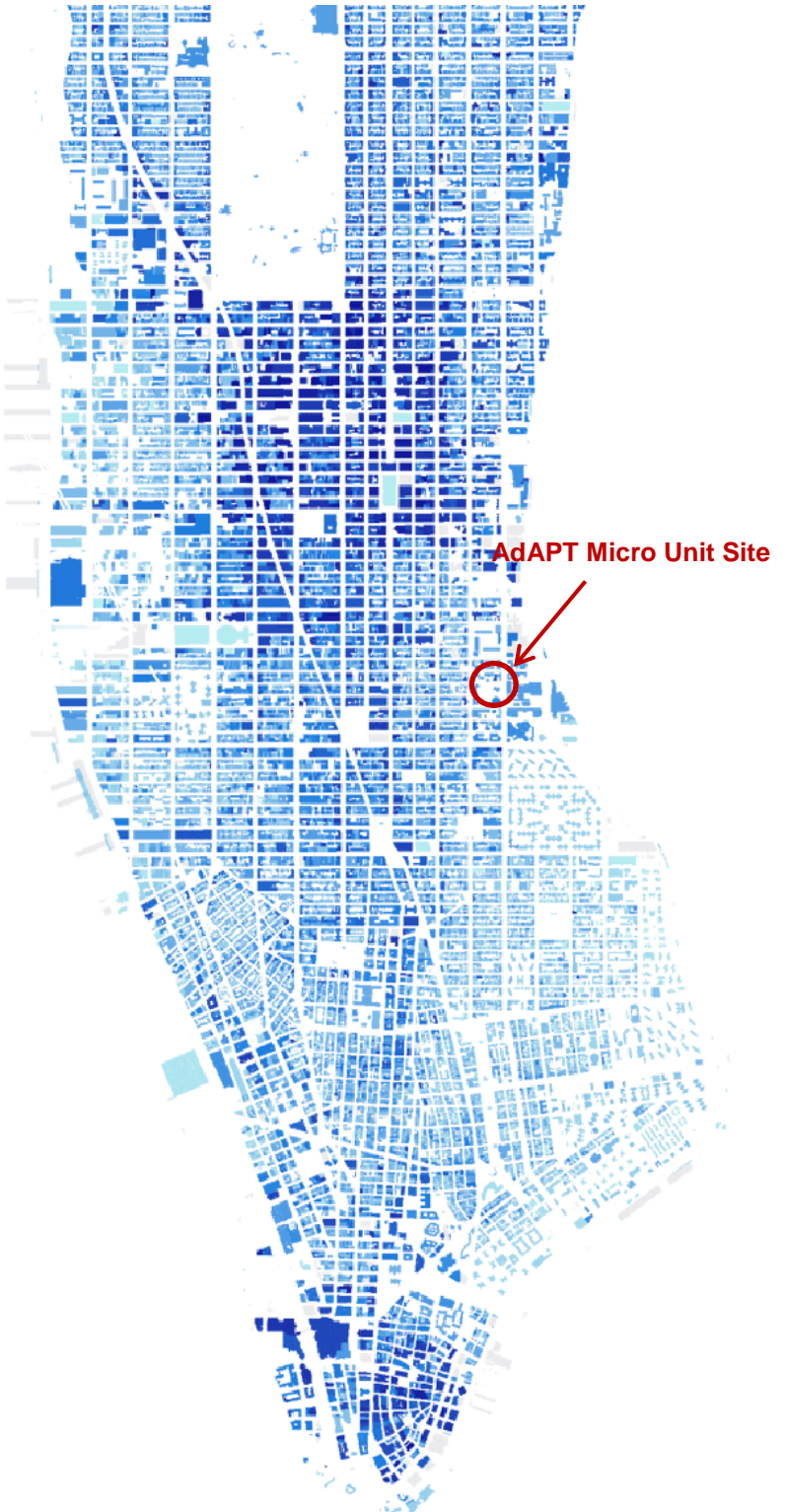
## Appendix H. NYC Land Value

### Value of Land:

tax assessment of land, per sqft of dirt



\* note: Assessed value is not market value.  
Also, assessed values for this data set seem low: here the total value of Manhattan is \$88b, whereas published total tax assessment for FY 2004 is actually \$169b. Grey buildings: no data.



## Appendix I: Neighborhood Groupings for Data Analysis

	Avg PriceSF	Avg Sale Price / Unit	Count of Sales
<b>Manhattan</b>	<b>525</b>	<b>614,042</b>	<b>5,078</b>
<b>Harlem</b>	<b>262</b>	<b>321,519</b>	<b>1,609</b>
Harlem-Central	271	321,879	1,253
Harlem-Upper	233	320,253	356
<b>LowerEastManhattan</b>	<b>535</b>	<b>644,141</b>	<b>204</b>
AlphabetCity	376	400,728	50
<b>LowerEast-Flatiron-LittleItaly-SOHO</b>	<b>687</b>	<b>649,727</b>	<b>73</b>
FLATIRON	377	282,292	5
LITTLEITALY	702	2,304,651	16
LOWEREASTSIDE	299	214,161	23
SOHO	1,041	145,465	29
EastVillage	495	789,362	81
<b>LowerManhattan</b>	<b>1,187</b>	<b>3,072,624</b>	<b>395</b>
<b>GreenwichVillage</b>	<b>1,212</b>	<b>3,209,038</b>	<b>377</b>
GREENWICHVILLAGE-CENTRAL	1,126	4,535,352	84
GREENWICHVILLAGE-WEST	1,236	2,828,798	293
Tribeca	679	215,506	18
<b>Midtown</b>	<b>675</b>	<b>1,495,504</b>	<b>495</b>
Chelsea	689	1,212,790	148
<b>Gramercy-Kips-Murray</b>	<b>637</b>	<b>1,366,691</b>	<b>173</b>
GRAMERCY	608	1,393,386	54
KIPSBAY	676	1,428,418	31
MURRAYHILL	642	1,328,565	88
MidtownEast	902	3,557,996	77
<b>MidtownWest-Clinton</b>	<b>541</b>	<b>519,366</b>	<b>97</b>
CLINTON	446	559,069	62
MIDTOWNWEST	709	449,034	35
<b>UpperManhattan</b>	<b>823</b>	<b>208,192</b>	<b>1,376</b>
<b>Morningside-ManhattanValley</b>	<b>292</b>	<b>316,675</b>	<b>87</b>
MANHATTANVALLEY	312	347,262	68

MORNINGSIDEHEIGHTS	221	207,204	19
<b>UpperEast59-79</b>	<b>1,225</b>	<b>212,234</b>	<b>361</b>
<b>UpperEast79-96</b>	<b>848</b>	<b>187,601</b>	<b>329</b>
<b>UpperWest59-79</b>	<b>711</b>	<b>226,256</b>	<b>181</b>
<b>UpperWest79-96</b>	<b>701</b>	<b>194,237</b>	<b>290</b>
<b>UpperWest96-116</b>	<b>425</b>	<b>179,994</b>	<b>123</b>
<b>WashHeights-EastHarlem<sup>34</sup></b>	<b>199</b>	<b>229,191</b>	<b>1,004</b>
<b>EastHarlem-UpperEast</b>	<b>273</b>	<b>256,511</b>	<b>225</b>
UPPEREASTSIDE(96-110)	352	232,583	5
HARLEM-EAST	271	257,054	220
<b>HarlemWest-WashHeightsLower</b>	<b>196</b>	<b>218,441</b>	<b>408</b>
HARLEM-WEST	193	127,896	70
WASHINGTONHEIGHTSLOWER	197	237,193	338
<b>WashHeightsUpper-Inwood</b>	<b>158</b>	<b>224,445</b>	<b>371</b>
INWOOD	175	199,185	154
WASHINGTONHEIGHTSUPPER	145	242,371	217
<b>Brooklyn</b>	<b>181</b>	<b>159,253</b>	<b>22,142</b>
<b>BrownstoneBkln</b>	<b>358</b>	<b>251,395</b>	<b>1,255</b>
<b>Boerum-Carroll</b>	<b>362</b>	<b>323,092</b>	<b>372</b>
BOERUMHILL	348	319,506	108
CARROLLGARDENS	368	324,559	264
<b>BrooklynHeights</b>	<b>401</b>	<b>361,259</b>	<b>101</b>
<b>CobbleHill</b>	<b>414</b>	<b>398,719</b>	<b>112</b>
<b>FortGreene</b>	<b>302</b>	<b>279,530</b>	<b>241</b>
<b>ParkSlope</b>	<b>361</b>	<b>109,090</b>	<b>429</b>
<b>EasternBkln</b>	<b>149</b>	<b>139,648</b>	<b>14,050</b>
<b>Bed-Stuy</b>	<b>145</b>	<b>137,977</b>	<b>5,768</b>
BEDFORDSTUYVESANT	164	155,767	3,060
BUSHWICK	124	122,009	2,371
WYCKOFFHEIGHTS	115	88,784	337
<b>Canarsie-Brownsville</b>	<b>151</b>	<b>142,546</b>	<b>3,941</b>
BROWNSVILLE	156	149,676	374

<sup>34</sup> In some instances, non-adjacent neighborhoods were grouped together when they were geographically close and more demographically, economically, and physically similar than the neighborhoods adjacent to them.

CANARSIE	176	174,575	458
EASTNEWYORK	149	135,323	1,741
OCEANHILL	144	139,065	1,368
<b>ClintonHill</b>	<b>244</b>	<b>219,524</b>	<b>262</b>
<b>CrownHeights</b>	<b>138</b>	<b>128,555</b>	<b>2,027</b>
CROWNHEIGHTS	139	128,781	1,315
FLATBUSH-NORTH	138	128,138	712
<b>CypressHills</b>	<b>152</b>	<b>144,130</b>	<b>491</b>
CYPRESSHILLS	152	144,059	473
SPRINGCREEK	155	145,999	18
<b>Flatbush</b>	<b>139</b>	<b>135,798</b>	<b>1,279</b>
FLATBUSH-CENTRAL	127	128,203	618
FLATBUSH-EAST	155	146,489	512
FLATBUSH-LEFFERTSGARDEN	134	130,562	149
<b>Flatlands</b>	<b>189</b>	<b>200,366</b>	<b>113</b>
FLATLANDS	177	193,249	50
OLDMILLBASIN	198	206,014	63
<b>ProspectHeights</b>	<b>292</b>	<b>113,865</b>	<b>169</b>
<b>NorthernBkln</b>	<b>200</b>	<b>129,092</b>	<b>1,105</b>
<b>Greenpoint</b>	<b>200</b>	<b>177,116</b>	<b>463</b>
<b>Williamsburg-East</b>	<b>184</b>	<b>108,346</b>	<b>310</b>
<b>Williamsburg-North</b>	<b>285</b>	<b>53,992</b>	<b>112</b>
<b>Williamsburg-South-Central</b>	<b>179</b>	<b>95,491</b>	<b>220</b>
WILLIAMSBURG-CENTRAL	160	122,277	114
WILLIAMSBURG-SOUTH	200	66,684	106
<b>SouthernBkln</b>	<b>218</b>	<b>195,389</b>	<b>4,547</b>
<b>BayRidge-Dyker</b>	<b>213</b>	<b>200,494</b>	<b>501</b>
BAYRIDGE	197	177,660	289
DYKERHEIGHTS	235	231,622	212
<b>BoroughPark</b>	<b>209</b>	<b>212,276</b>	<b>960</b>
<b>ConeyIsland</b>	<b>185</b>	<b>138,970</b>	<b>198</b>
BRIGHTONBEACH	200	149,731	148
CONEYISLAND	142	107,117	50
<b>Kensington</b>	<b>206</b>	<b>180,798</b>	<b>84</b>
<b>ParkSlopeSouth</b>	<b>357</b>	<b>94,816</b>	<b>126</b>

<b>South-Central</b>	<b>202</b>	<b>186,032</b>	<b>589</b>
MIDWOOD	173	172,982	152
OCEANPARKWAY-NORTH	196	190,066	249
OCEANPARKWAY-SOUTH	232	191,242	188
<b>SouthEast-Medium</b>	<b>205</b>	<b>209,816</b>	<b>269</b>
BERGENBEACH	199	216,281	157
MADISON	209	197,555	84
MANHATTANBEACH	249	186,111	3
MARINEPARK	219	214,155	23
MILLBASIN	184	202,964	2
<b>Southwest</b>	<b>222</b>	<b>205,870</b>	<b>1,739</b>
BATHBEACH	218	223,695	259
BENSONHURST	228	219,317	668
GRAVESEND	224	214,308	548
SEAGATE	199	135,778	58
SHEEPSHEADBAY	208	137,144	206
<b>WindsorTerrace</b>	<b>295</b>	<b>68,275</b>	<b>81</b>
<b>WesternBkln</b>	<b>212</b>	<b>183,575</b>	<b>1,185</b>
<b>Gowanus-Redhook-Navy-CobbleWest</b>	<b>249</b>	<b>181,075</b>	<b>273</b>
COBBLEHILL-WEST	264	205,696	48
GOWANUS	263	203,934	125
NAVYYARD	231	171,544	37
REDHOOK	219	122,558	63
<b>Sunset-Bush-Downtown</b>	<b>201</b>	<b>184,324</b>	<b>912</b>
BUSHTERMINAL	198	156,921	40
DOWNTOWN-FULTONFERRY	204	181,903	5
DOWNTOWN-FULTONMALL	191	105,866	5
DOWNTOWN-METROTECH	187	162,184	7
SUNSETPARK	201	186,260	855
<b>Grand Total</b>	<b>245</b>	<b>244,096</b>	<b>27,220</b>



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