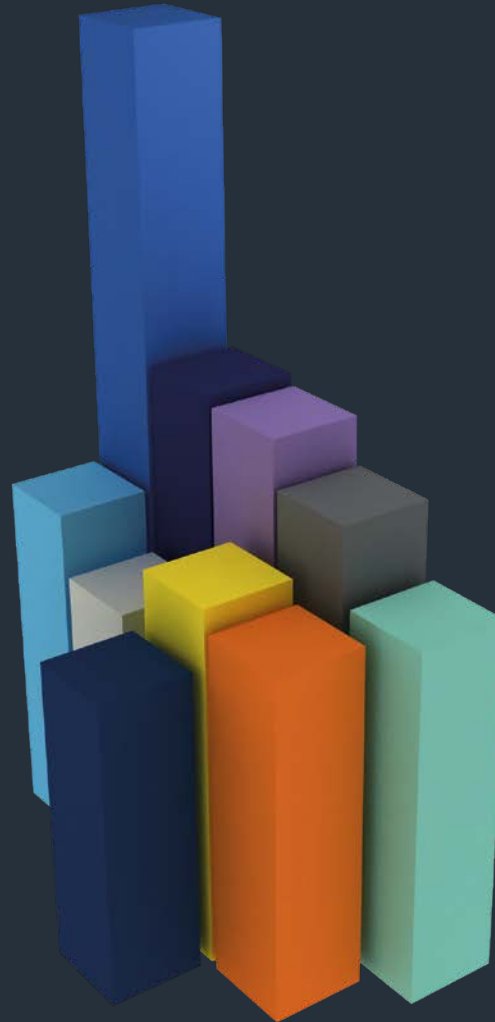


THINK US: New York

Big shifts in the Big Apple

TH Real Estate

a **nuveen** company



Data generating art

This image is an abstract representation of Fig.10, illustrating the top taxi drop-off locations from trips originating in Manhattan.

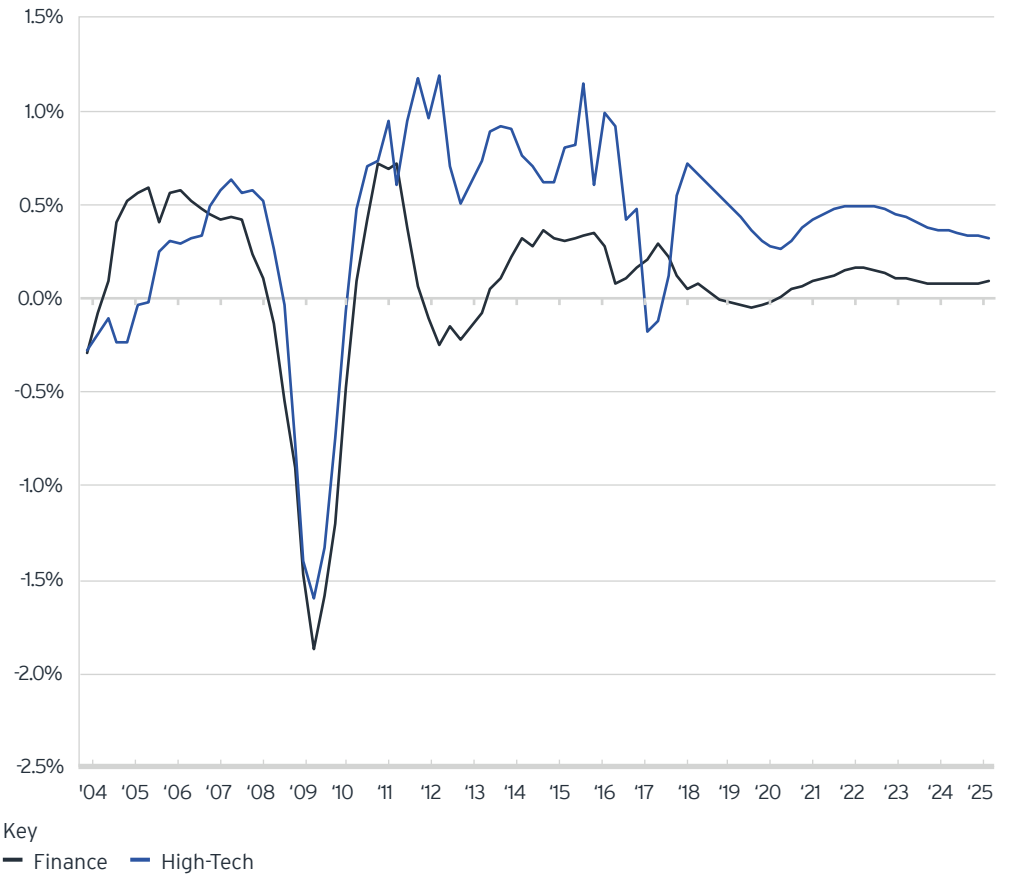
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Introduction

TH Real Estate’s proprietary city “DNA” analysis suggests New York City is a technology trailblazer, millennial magnet, cultural capital and coastal champion. Each of these DNA strands benefits the city’s commercial property market. As a technology trailblazer, New York City’s high-tech employment has consistently outpaced finance employment (Figure 1). Currently, high-tech employment exceeds 335,000 employees while financial employment exceeds 590,000. As a cultural champion, this city generates and fosters artistic experiences through its city-owned cultural institutions and unique entertainment attractions. An increasing number of technology opportunities, distinguished cultural experiences, and its connectivity have positioned New York City to be a millennial magnet.

It is imperative to understand the implications of New York City as a technology trailblazer and millennial magnet from a commercial property perspective. Identifying and tracking the subtle trends that lead to gentrification is integral in uncovering how real estate dynamics in a (sub) market will change. After employing real-time New York City Open Source Data to complement traditional real estate data sources, we believe neighborhoods such as Midtown East, Astoria, and Jersey City will be millennial magnets and top performers in Tomorrow’s World.

Fig.1: Change to New York City employment (% change)



Source: TH Real Estate Research; Moody’s Analytics, January 2018

Lessons Learned: Meatpacking Mania

The Meatpacking District in Manhattan has undergone significant revitalization in recent years. This once dangerous neighborhood full of slaughterhouses, packing plants, homelessness and delinquency has seen an influx of rooftop bars/nightclubs, trendy hotels, fashion houses, museums/galleries, and world-renowned restaurants within the last decade. In recent years, the city transformed a once old rail system into The High Line, which is referred to as a “park in the sky”. There has been an increased desire for firms to secure a spot in this petite trendy market due to the District’s

recent invasion of creatives & innovators, proximity to transit, and abundance of old and empty warehouses that could be redeveloped into creative, office, retail, and living spaces. As such, office rents in this submarket surpassed the New York City market average in 2012 (Figure 5). Tech companies like Google and Samsung have secured space in to this neighborhood and have led innovation in the area ever since. Samsung’s New York Flagship store, “Samsung 837”, offers 4-D Virtual Reality, interactive art installments, exclusive screenings, and live music performances.

Such a space exemplifies how the combination of art, fashion, and technology can create a community for locals and a destination for visitors. In early 2017, LiveNation, a dominant ticket seller and concert promoter, moved from Times Square to 100,000 sq ft of office space in Meatpacking District. Later in 2017, Tesla opened a showroom across from the buzzing Standard Hotel. Here, Tesla showcases its high-end vehicles as well as its energy products which include home solar panels. These moves suggest that large firms will follow where the fresh, young talent clusters.

Fig.2: Then: Gansevoort Pumphouse



Source: 6sqft, Digital Trends

Fig.3: Now: The High Line, trendy hotel and bars



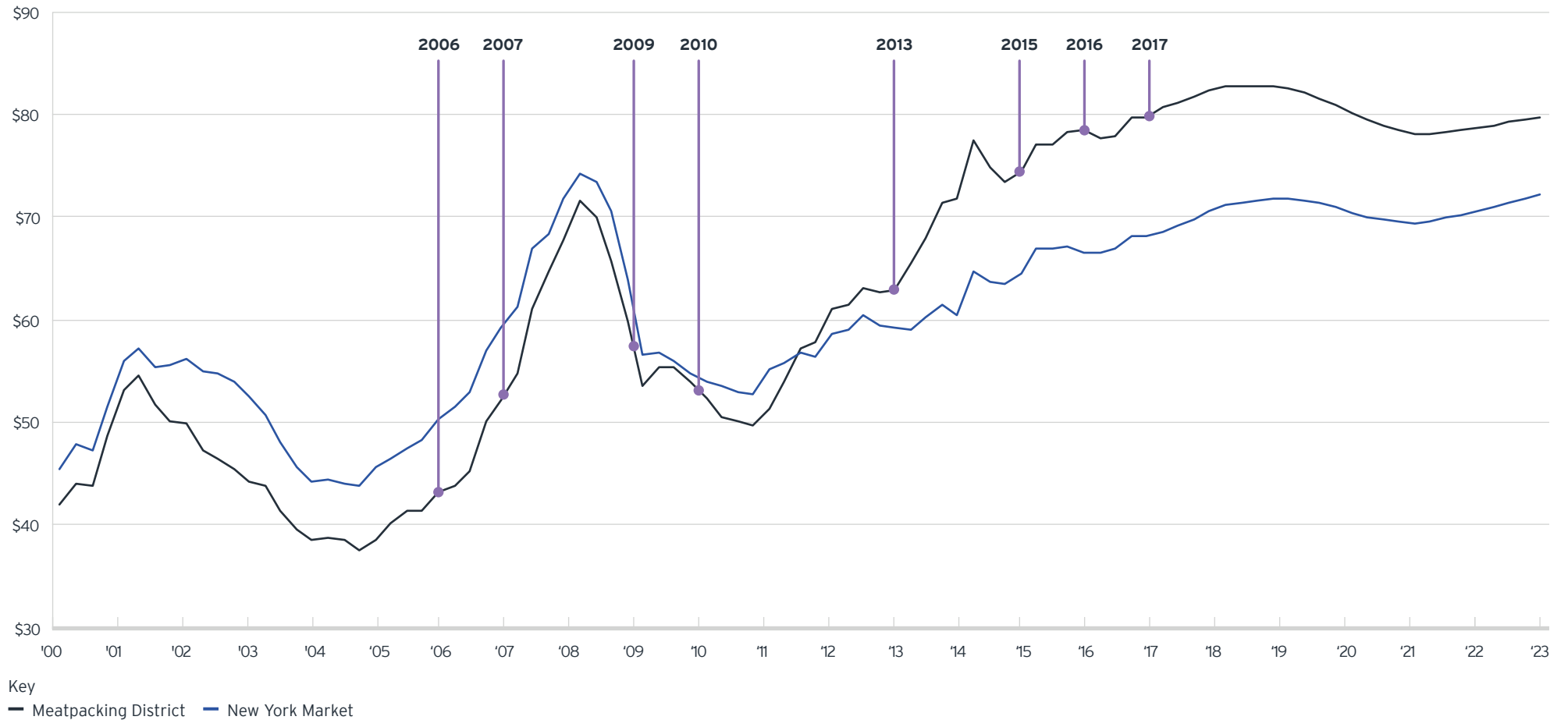
Fig 4: 837 Washington Street, home of “Samsung 837”



Lessons Learned: Meatpacking Mania (continued)

Fig.5: Office rent index (\$/sq ft)

2006: Google moves into 111 Eighth Ave **2007:** World-renowned 10AK NYC nightclub opens; Apple opens 3-story store **2009:** The Standard Hotel Opens; The Highline opens **2010:** Google buys 111 Eighth Ave for 1.9bn (largest U.S. Real Estate transaction of the year) **2013:** Giorgio Armani moves HQ from Park Avenue South **2015:** Whitney Museum of American Art opens; TH Real Estate acquires 837 Washington Street **2016:** Samsung 837 opens **2017:** LiveNation moves HQ from Times Square; Tesla opens showroom



Source: TH Real Estate Research; CBRE-EA, December 2017
 Note: Utilized "Chelsea" market to represent "Meatpacking District"

Lessons Learned: Bustling Brooklyn

Fig.6: Aerial view of Brooklyn Tech Triangle (facing downtown Manhattan)



Source: brooklyntechtriangle.com

Lessons Learned: Bustling Brooklyn (continued)

Across the East River from Manhattan, a major transformation occurred in a once crime-infested borough. Brooklyn has experienced a significant demographic shift in recent years—specifically in Williamsburg. Millennials were originally drawn to this residential neighborhood because it was a cheaper alternative to Manhattan and offered accessible transportation options.

As evidenced by its numerous art galleries, vegan restaurants, yoga studios, and organized tech-events, this neighborhood has been a safe haven for millennials. The energy found in Williamsburg has spilled over into other areas of the borough. The collaboration of techies, creatives, and entrepreneurs has produced numerous start-up companies across Brooklyn.

With support from local government, a strategic plan for a “Brooklyn Tech Triangle” was formed in Spring 2013 in order to nurture the economic growth of the area. The trio comprised of DUMBO (which stands for “Down Under the Manhattan Bridge Overpass”), Downtown Brooklyn, and Navy Yards, has become home to over 1,350 innovative companies. According to Bureau

of Labor Statistics, cumulative job growth in Brooklyn has consistently outpaced Manhattan since 2001 (Figure 7). Brooklyn office rents remain 32% below New York City market rents, but cumulative office rent growth in Brooklyn has outpaced that of the New York City market since 2000 (Figure 8).

New York University plans to invest \$500m during the next decade in their Downtown Brooklyn Campus in an effort to create an ‘innovation hub for engineering, applied science, urban science, digital technology, and digital media arts’. Collaboration of tech professionals and motivated students will remain robust in years to come as a result of these efforts from New York University. The combination of millennial techies, artists, creatives, and strongminded students in this particular area creates a large network for individuals to join forces and alter the way we live in Tomorrow’s World.

Fig.7: Cumulative job growth (since 2001)

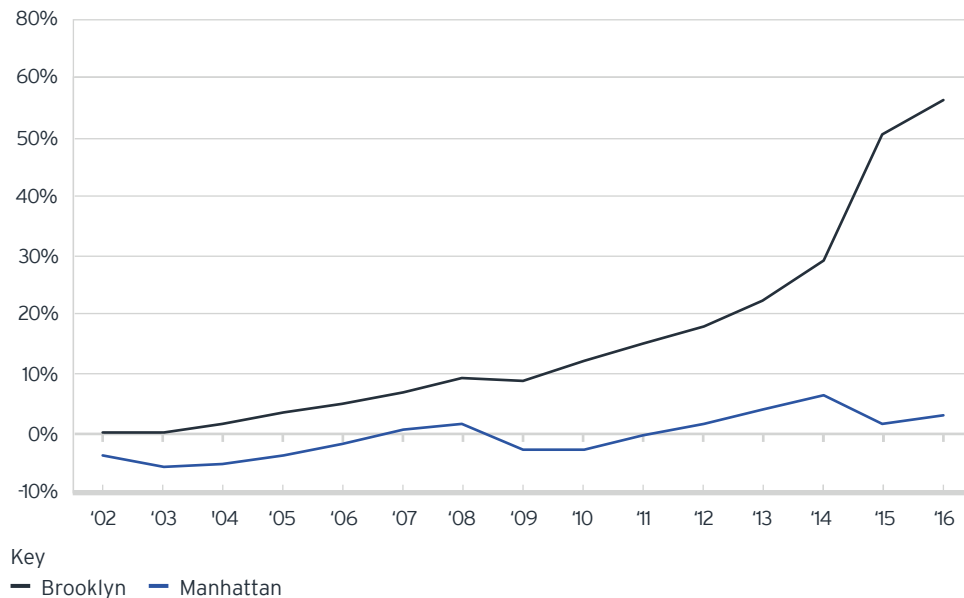
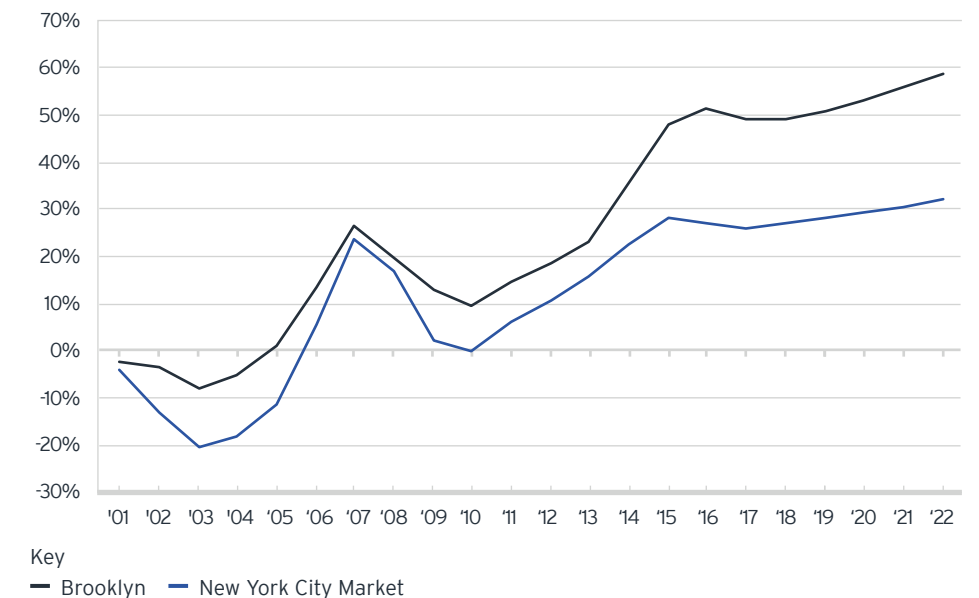


Fig.8: Cumulative office rent growth (since 2000)



Source: TH Real Estate Research; Bureau of Labor Statistics, January 2018

Source: TH Real Estate Research; CoStar Group, December 2017

Looking Forward in Midtown East

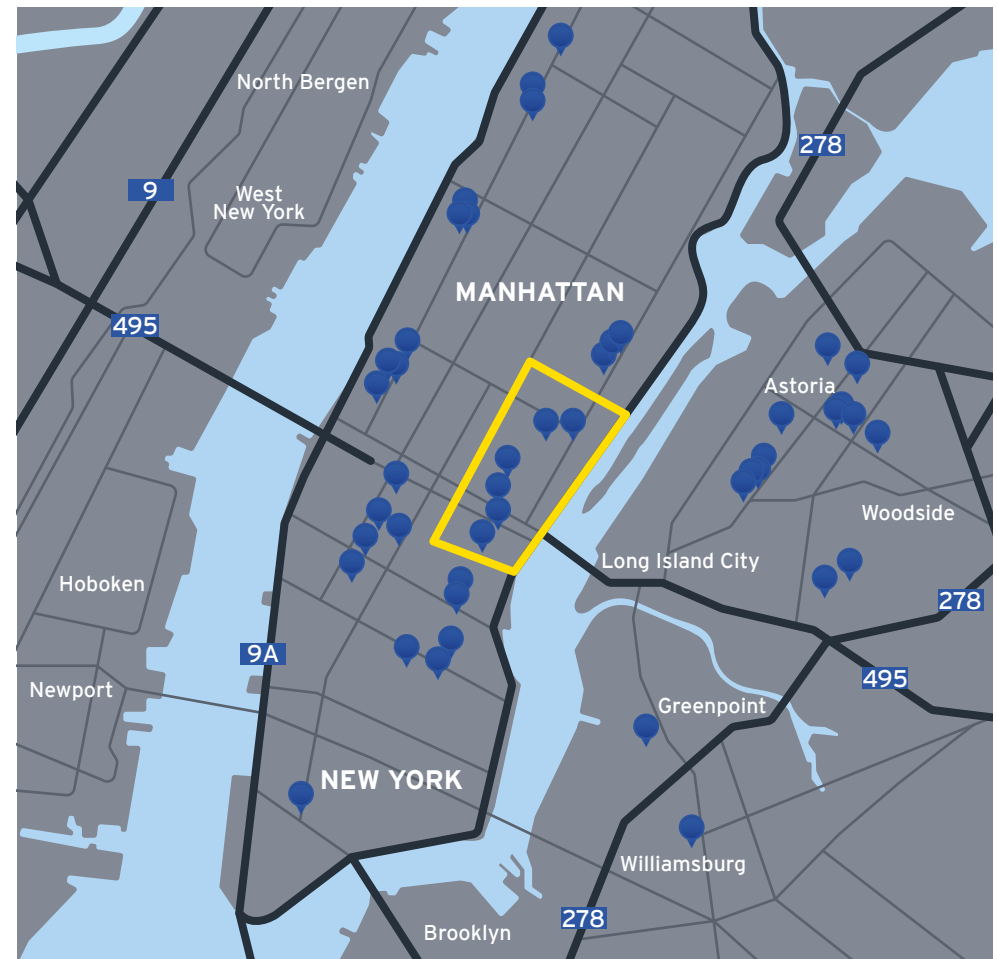
Midtown East is set to be a top performer in the coming decade as the area is rezoned, has proximity to the Cornell Tech campus, and captures millions of Long Island Rail Road riders via Grand Central Terminal.

In order to compete with other world-class markets across the globe, the New York City Council voted in Summer 2017 to rezone 78 blocks of east Midtown East. This vote permits the current aging building stock to be replaced with newer and larger Class-A sustainable buildings. Midtown East is near the largest transportation hub in New York City, Grand Central Terminal. This hub is home to Metro North and numerous subway lines. The East Side Access project currently underway by the Metropolitan Transportation Authority (MTA) will bring the Long Island Rail Road (LIRR), one of the largest commuter railways by ridership, into Grand Central Terminal.

Another boon to Midtown East will be the Cornell Tech campus, which is projected to attract thousands of tech-focused and entrepreneurial-minded students into this area of the city. This state-of-the-art campus is located across the East River from Midtown East, on Roosevelt Island. The city estimates Cornell Tech will create hundreds of spin-off companies and more than \$23bn in economic activity during the next 35 years.

Midtown East currently has one of the largest amount of pending Link NYC locations in Manhattan (Figure 9). Link NYC is an innovative communications network that provides fast and free public Wi-Fi and device charging stations across New York City. By having one of the largest clusters of Link NYC locations pending activation across all boroughs, this area is sure to have continued professional, resident and tourist activity in the near future. The enhancements to this area's infrastructure will present several opportunities for investors, specifically in the office and apartment sectors. The zoning changes will give investors the opportunity to develop new Class-A office product. The restoration of office stock and proximity to Cornell Tech will give this area the ability to attract the projected spin-off companies from the university that will desire open-floor plans and various amenities. On a multifamily front, there will be opportunities to invest in apartment complexes that attract and retain Cornell Tech students that desire to live in Manhattan and commute to Roosevelt Island.

Fig.9: LinkNYC locations pending activation



Source: TH Real Estate Research; New York City Open Data

Looking Forward in Aspirant Astoria

TH Real Estate expects Astoria, Queens to have continued millennial attraction in the years to come. Using a combination of both real-time open source data and traditional real estate data, one can determine that this particular area is an attractive neighborhood for the youthful population. In order to identify where millennials are going after their nights out in Manhattan, we examined New York City Taxi Data.

Specifically, we granulated our analysis to filter on:

1. What: Taxi drop-off locations from trips originating in Manhattan
2. Where: Outside Manhattan
3. When: Weekends, between 10pm-4am, sampled from June 1, 2016 to July 1, 2017
4. Why: This is the most likely time millennials will be traveling home after their nights out in Manhattan

Our analysis indicates that Astoria, Queens has the highest number of taxi drop offs from Manhattan in this time period (Figure 10). From these results, we can infer this particular

Fig.10: Top 5 taxi drop-offs from Manhattan

Submarket	Borough	Average Daily Trips	Average Trip Fare (\$)
Astoria	Queens	2553.404	20.64165
Williamsburg (South Side)	Brooklyn	1556.307	15.90755
Williamsburg (North Side)	Brooklyn	1523.675	18.08244
Park Slope	Brooklyn	1376.711	23.5577
Greenpoint	Brooklyn	1175.132	18.80938

Source: TH Real Estate Research; New York City Taxi & Limousine Commission; CoStar Group, January 2018

neighborhood is a residential magnet for New York City citizens that enjoy the Manhattan night life. Williamsburg, previously mentioned as a residential hub for millennials, had the second highest number of taxi drop-offs in this same time period. Greenpoint, situated between Astoria and Williamsburg, also had a significant number of taxi drop-offs. Given its close proximity, this particular area has opportunity to capture millennial residential spillover from Williamsburg.

To strengthen this study of taxi drop-offs, we also investigated multifamily construction data across New York City. We recognized several overlapping locations between the two data sets. In fact, each area identified as a top taxi drop-off location in 2016 and 2017 was identified as a top construction area for 2018 (Figure 11). Long Island City (which includes Astoria in the source's boundary definitions), is forecasted to have the most net completions in 2018. Furthermore, Astoria is located across the East River from Cornell Tech and also has significant amount of Link NYC locations pending activation.

Given Astoria's close proximity and ease of travel to Midtown Manhattan, this neighborhood is an attractive alternative for those that commute into Manhattan. As such, we believe that there will be investment opportunities for apartment and retail in this particular neighborhood.

Fig.11: Top 5 multifamily completions expected in New York City during 2018

Submarket	Borough	Net Completions (in units)
Long Island City (includes Astoria)	Queens	3,446
Williamsburg/Greenpoint/Navy Yard	Brooklyn	3,200
DUMBO/Downtown Brooklyn	Brooklyn	1,938
Midtown West	Manhattan	1,053
Park Slope/Prospect Heights	Brooklyn	978

Almost There: Jubilance in Jersey

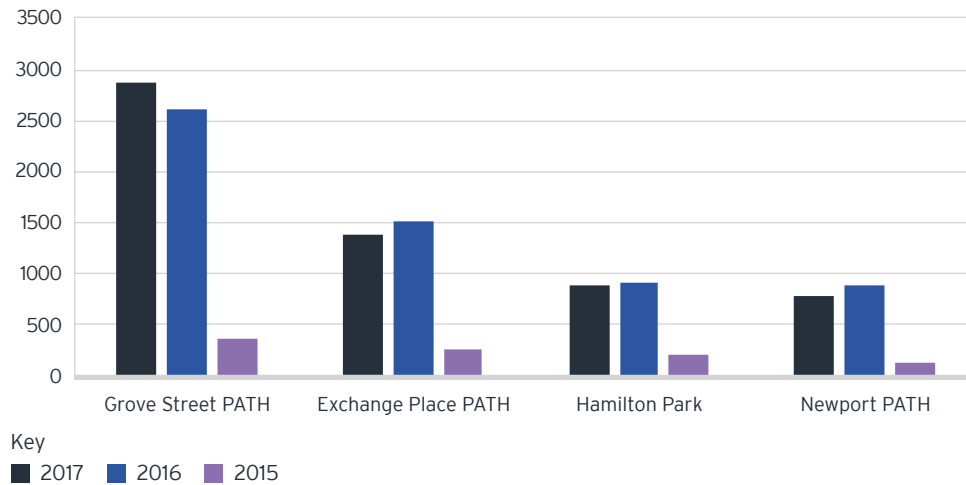
Currently, there is a clustering of an active, youthful population occurring within Jersey City. Specifically, our analysis indicates a cluster of millennials and Generation Z living and working near the Grove Street PATH.

The ease of travel to and from Jersey City, via PATH (Port Authority Trans-Hudson), ferry, and bus services has created an incredible amount of synergy, specifically with nearby Lower Manhattan. To identify where millennial and Generation Z cohorts are congregating within Jersey City, we examined CitiBike Data. Our analysis indicates that in Jersey City, millennial and Generation Z bike ridership to and from the Grove Street PATH station is exponentially higher than any other station (Figure 12).

These results offer various implications:

- 1) Active, younger generations are living in Manhattan and commuting to an office in Jersey City near Grove Street PATH

Fig.12: Millennial and Gen Z Citi Bike ridership in Jersey City



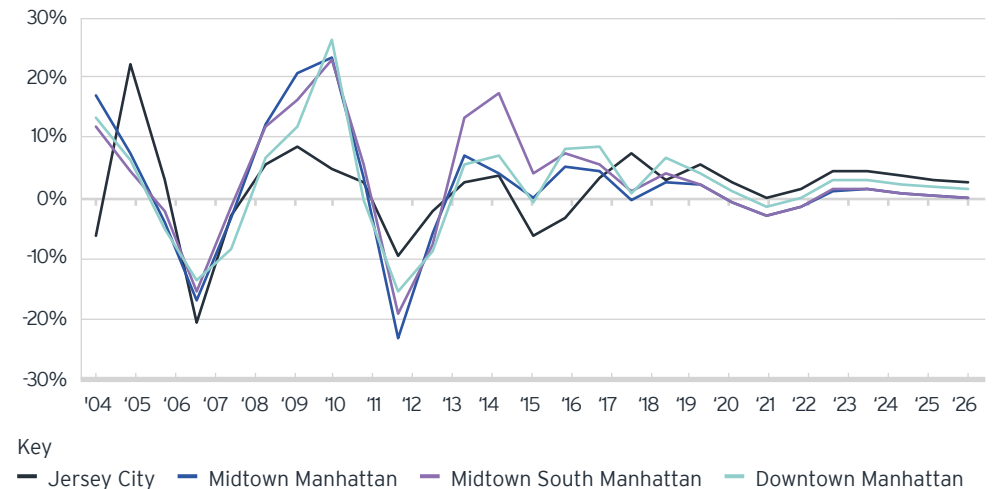
Source: TH Real Estate; CitiBike, November 2017

Note: We utilized September as the sample month for our analysis. We applied the following generation definitions: Millennials (born 1981-1998) and Generation Z (born after 1998) when filtering CitiBike data on “year born”.

- 2) Active, younger generations are living in Jersey City, near Grove Street PATH, and are commuting into Manhattan

From Grove Street PATH station, riders can be at the World Trade Center Hub in 10 minutes or 14th street in Manhattan in 14 minutes (which is walking distance to Meatpacking District). Jersey City has one of the largest concentrations of tech professionals in the New York City area. As such, there has been an influx of large tenants including UBS, Bank of America, JP Morgan, and New York Life that have expanded outside Manhattan and into space along the Hudson River Waterfront for their tech-related teams to station. CBRE-EA projects that office rent growth in Jersey City will be stronger than other major office markets in New York City through 2026 (Figure 13).

Fig.13: Office rent growth



Source: TH Real Estate; CBRE-EA, December 2017

Almost There: Jubilance in Jersey (continued)

Jersey City has adapted the arts in recent years. There has been a noticeable restoration from graffiti to street art across the area, which has been led by the Jersey City Mural Arts Program. Established in 2013, this program seeks to engage local artists to create an “outdoor art gallery” through street art, as opposed to vandalism and graffiti. Interestingly, the largest cluster of murals and street art in Jersey City overlaps with the largest cluster of millennial and Generation Z CitiBike ridership previously mentioned (Figure 14). On the new luxury Cast Iron Lofts Apartments, a massive mural of David Bowie greets visitors and draws attention to the amenity-filled residential development occurring in the newly dubbed “SoHo West” (South of Hoboken, West of New York) (Figure 15).

Axiometrics projects effective rental rates for apartments in Jersey City to exceed those in traditional NYC neighborhoods like Upper East Side, Upper West Side, and Downtown Manhattan by 2022. Stevens Institute of Technology, just one town north in Hoboken, is home to over 6,500 students eagerly seeking full-time positions in technology-related fields. Identified by College Board as a “very selective” school with a 39% acceptance rate, it is clear that fresh tech talent is rampant in this particular area. Similar to Brooklyn, tech-related networking events are starting to become a norm in Jersey City, allowing for collaboration amongst professionals.

These trends present several investment opportunities within apartment, office, retail, and industrial sectors. As the Hudson Waterfront in New Jersey (Weehawken, Hoboken, and Jersey City) continues to densify with youthful families, there will be significant residential and retail opportunities. If clustering of talented millennials continues in the area, there will be opportunities in the office sector to capture from continued tenant movements. From an industrial perspective, we believe that between the growing population, sizeable industrial stock and land available in New Jersey, this will be a last-mile distribution market.

Fig.14: Jersey City mural locations vs top millennial and Gen Z Citi Bike locations



Key

■ Mural location ● Top Citi Bike location

Source: TH Real Estate Research; Jersey City Mural Arts Program, Citi Bike

Almost There: Jubilance in Jersey (continued)

Fig.15: Cast Iron Lofts apartment building in Jersey City



Source: Jersey Digs

Conclusion

Undoubtedly, New York City is experiencing an influx of technology-focused talent. While New York City will remain the financial capital of the world in the near future, it is imperative for investors to recognize and adapt to the changes that are occurring in this market as it shifts away from being predominantly finance-driven. By utilizing real-time New York City Open Source Data to complement traditional real estate data sources, investors can create holistic viewpoints and educated predictions of where millennials and young talent is clustering in New York City.

Our “DNA” analysis concludes that New York City will be a technology trailblazer and magnet for millennials to congregate in the years to come. TH Real Estate believes that the movement and clustering of talented millennials into new and upcoming areas of this strong and resilient market will provide significant opportunities for investors in Tomorrow’s World.



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