University Transportation Research Center - Region 2

Final Report

Urban Travel Time Variability in New York City: A Spatio-Temporal Analysis within Congestion Pricing Context

Performing Organization: State University of New York (SUNY)

August 2017

Sponsor:
University Transportation Research Center - Region 2

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The Region 2 University Transportation Research Center (UTRC) is one of ten original University Transportation Centers established in 1987 by the U.S. Congress. These Centers were established with the recognition that transportation plays a key role in the nation's economy and the quality of life of its citizens. University faculty members provide a critical link in resolving our national and regional transportation problems while training the professionals who address our transportation systems and their customers on a daily basis.

The UTRC was established in order to support research, education and the transfer of technology in the field of transportation. The theme of the Center is "Planning and Managing Regional Transportation Systems in a Changing World." Presently, under the direction of Dr. Camille Kamga, the UTRC represents USDOT Region II, including New York, New Jersey, Puerto Rico and the U.S. Virgin Islands. Functioning as a consortium of twelve major Universities throughout the region, UTRC is located at the CUNY Institute for Transportation Systems at The City College of New York, the lead institution of the consortium. The Center, through its consortium, an Agency-Industry Council and its Director and Staff, supports research, education, and technology transfer under its theme. UTRC's three main goals are:

Research

The research program objectives are (1) to develop a theme based transportation research program that is responsive to the needs of regional transportation organizations and stakeholders, and (2) to conduct that program in cooperation with the partners. The program includes both studies that are identified with research partners of projects targeted to the theme, and targeted, short-term projects. The program develops competitive proposals, which are evaluated to insure the mostresponsive UTRC team conducts the work. The research program is responsive to the UTRC theme: "Planning and Managing Regional Transportation Systems in a Changing World." The complex transportation system of transit and infrastructure, and the rapidly changing environment impacts the nation's largest city and metropolitan area. The New York/New Jersey Metropolitan has over 19 million people, 600,000 businesses and 9 million workers. The Region's intermodal and multimodal systems must serve all customers and stakeholders within the region and globally.Under the current grant, the new research projects and the ongoing research projects concentrate the program efforts on the categories of Transportation Systems Performance and Information Infrastructure to provide needed services to the New Jersey Department of Transportation, New York City Department of Transportation, New York Metropolitan Transportation Council , New York State Department of Transportation, and the New York State Energy and Research Development Authorityand others, all while enhancing the center's theme.

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The modern professional must combine the technical skills of engineering and planning with knowledge of economics, environmental science, management, finance, and law as well as negotiation skills, psychology and sociology. And, she/he must be computer literate, wired to the web, and knowledgeable about advances in information technology. UTRC's education and training efforts provide a multidisciplinary program of course work and experiential learning to train students and provide advanced training or retraining of practitioners to plan and manage regional transportation systems. UTRC must meet the need to educate the undergraduate and graduate student with a foundation of transportation fundamentals that allows for solving complex problems in a world much more dynamic than even a decade ago. Simultaneously, the demand for continuing education is growing – either because of professional license requirements or because the workplace demands it – and provides the opportunity to combine State of Practice education with tailored ways of delivering content.

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16. Abstract

Traffic congestion is an important aspect of quality of life, mobility and accessibility in urban areas. The economic cost of congestion is in the order of billions of dollars especially for dense urban cities. Besides the congestion which relates to the magnitude of travel time, travel time variability is also studied extensively by researchers as an additional measure for transportation network efficiency. In order to enhance the efficiency of urban traffic flow in New York City, numerous policies have been discussed, including different transportation pricing schemes. Pricing schemes – particularly variable pricing – should incorporate the severity of congestion and levels of travel time variability at different times of day and areas throughout the City. However, most of the existing discussions are based on number of trips and bridge/tunnel crossings in the City, mainly because the necessary data to calculate travel time related measures have not been extensively available. This study utilizes taxis as probe vehicles collecting travel time information in the city 24/7 in the New York City urban network. Two separate taxi trip datasets were utilized to calculate the spatio-temporal travel time patterns covering all boroughs of New York City. The street and avenue travel times in Manhattan are also calculated by projecting origin and destinations onto Manhattan's grid network. The identified spatio-temporal congestion and travel time variability patterns are discussed within perspective of congestion pricing policy discussions in New York City

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ABSTRACT

Traffic congestion is an important aspect of quality of life, mobility and accessibility in urban areas. The economic cost of congestion is in the order of billions of dollars especially for dense urban cities. Besides the congestion which relates to the magnitude of travel time, travel time variability is also studied extensively by researchers as an additional measure for transportation network efficiency. In order to enhance the efficiency of urban traffic flow in New York City, numerous policies have been discussed, including different transportation pricing schemes. Pricing schemes – particularly variable pricing – should incorporate the severity of congestion and levels of travel time variability at different times of day and areas throughout the City. However, most of the existing discussions are based on number of trips and bridge/tunnel crossings in the City, mainly because the necessary data to calculate travel time related measures have not been extensively available. This study utilizes taxis as probe vehicles collecting travel time information in the city 24/7 in the New York City urban network. Two separate taxi trip datasets were utilized to calculate the spatio-temporal travel time patterns covering all boroughs of New York City. The street and avenue travel times in Manhattan are also calculated by projecting origin and destinations onto Manhattan's grid network. The identified spatio-temporal congestion and travel time variability patterns are discussed within perspective of congestion pricing policy discussions in New York City.

INTRODUCTION

In New York City (NYC), traffic congestion reduces the quality of life for the residents significantly and costs more than \$5 billion annually in terms of lost time and productivity, \$2 billion in wasted fuel and vehicle operating costs, \$4.6 billion in lost business revenue and increased operating costs [1]. Relieving this high burden (which is among the highest, if not the top, in U.S. metropolitan areas) requires solutions that would work in built-environment, where new road constructions or capacity expansions are not anymore potential solutions [2]. Following the similar cases around the world, toll pricing and congestion charging solutions are proposed, and discussed from multiple perspectives ranging from economic impacts to political and law implications [1,2,4,5]. For instance, Regional Plan Association (RPA) investigates four such potential solutions: 1) Tolling East River bridges with the same toll amount of the parallel MTA tunnels; 2) Variable pricing on East River bridges in sync with the parallel MTA tunnels; 3) Central Business District pricing (similar to London case), which encompasses pricing of entrances to Manhattan below 60th Street; 4) Comprehensive congestion pricing which suggests "variable time-of-day pricing at all entries, including the East River bridges, MTA crossings and at 60th Street" [2]. Move NY plan [3] is similar to RPA's solution #3 and suggests equal tolls for all crossings to Manhattan below 60th street. One the one hand, RPA's study and similar investigations provide very important discussions. However they are mainly based on number of trips and bridge/tunnel crossings. On the other hand, researchers have been studying value of travel time variability similar to value of time as a measure for evaluating transportation planning, policy and investment decisions [6,7,8]. Hence, time and space evolution of travel time variability is also important for pricing policies – particularly variable pricing should incorporate the severity of congestion at different times of day and locations. Such spatio-temporal analysis of congestion and travel time variability requires comprehensive travel time data which were not necessarily available or comprehensive enough for many of the existing studies. Travel time data are becoming more and more available through new intelligent transportation systems (ITS) deployments and with the advent of new technologies such as GPS loggers. This proposed study aims to provide the necessary spatio-temporal congestion and travel time variability patterns to aid the pricing policy discussions in New York City.

In order to come up with effective policies, it is very important to know at what time and where the congestion starts to build up, when it reaches the maximum and starts dissipating, how the travel time variability evolves, and what are the levels of congestion and travel time variability throughout the day. One can easily assume traditional AM-PM peak congestion patterns to be valid for New York City, however similar investigations [10,9,12,14] reveal that the congestion in New York City does not follow the familiar peak/off-peak pattern. Instead, the congestion levels are more or less the same throughout the day, and oddly enough, the highest travel times are experienced on midday. Although there is no hard-data backed answer, this phenomenon is attributed to pedestrian traffic during midday lunch time at business district as well as potential delays due to truck deliveries.

Although the aforementioned studies provide valuable temporal information, they lack spatial details due to data (un)availability. These studies use yellow taxi GPS trip log data to extract travel time patterns. The yellow taxis are practically employed as probe vehicles in city traffic, and the findings are pertinent to the areas where yellow cabs pick up and/or drop off passengers. Since the yellow taxis in NYC mainly travel in Manhattan (and mostly midtown and lower Manhattan), the identified patterns are not necessarily perfect representations of other boroughs, i.e. Brooklyn, Queens, Bronx and Staten Island. Starting summer 2013, New York City Taxi and Limousine commission introduced "boro taxis" (also called green taxi due to their selected standard color). Boro taxis serve exclusively at Brooklyn, Queens (except LGA and JFK airports), Bronx, Staten Island and upper Manhattan (north of north of West 110th street and East 96th street) where the yellow taxi service was poor (Please see Figure 1). This new service, along with the trip GPS logs, enabled the research direction pursued in this study. This recently available dataset make it possible add spatial dimension to the temporal travel time patterns which is missing in the current literature. Besides the descriptive snapshots of the existing patterns, this paper pursues to provide insights on travel time variability and its relationship between space and time. These insights will help facilitate better understanding of congestion and travel time variability patterns in New York City, and lead to a better assessment of proposed congestion pricing schemes.

This paper is heavily based on descriptive data analysis and visualization in order to investigate the urban travel patterns in NYC. Accordingly, the outline of this paper is as follows: First, the dataset used for the analysis is described. Second, the overall approach of the study is briefly summarized. Third the analysis results are presented, and last the conclusions and major findings with respect to congestion pricing are elaborated.

DATA

NYC Taxi and Limousine Commission (TLC) mandates every yellow and green taxi to install a credit card payment system along with a GPS trip logger. This study uses these trip log data for both yellow and green taxis which are obtained from the NYC Taxi and Limousine Commission (TLC). There are more than 13,000 yellow taxis with a GPS device in NYC working 24/7, making more than 400K trips a day. Although there are no publicly available official numbers for boro taxis, the initial plan was to have 18,000 in 3 years after inauguration. Hence it is safe to assume that there are more than 12,000 boro taxis as of 2016. In both yellow and boro taxi GPS logs, each trip record includes the pick-up and drop-off time as well as the metered trip distance. The latitude and longitude for the trip origin and destination coordinates are also recorded, however no GPS "crumb" data are stored regarding the travel route. For the analysis, all the trips in September 2014 for both the yellow and green taxi trip datasets are employed. The total number trips from both dataset sums up to more than 14.4 million.

For data cleaning, erroneous digital records with zero trip distance or zero trip duration are deleted from the dataset. The dataset also includes trips with unreasonable travel time and distance records due to driver human errors while starting and stopping the taximeter. In order to avoid those kind of errors, the records with a travel rate higher than 1 minute per mile (corresponding to an average speed of 60 mph) and lower than 60 minutes per mile (1 mph; one third of the average human walking speed) are excluded from the analysis. The eliminated records constitute a negligible percentage of the overall dataset and elimination is not anticipated introduce bias due to extensive number of existing records.

It should be noted that the travel time values in the dataset are achieved by taxi drivers. Taxi drivers are generally more experienced than ordinary drivers and have more knowledge of the road network to avoid congestion. They are also less likely to waste time while determining the shortest path between two points. Hence the travel times in the dataset may not be a representative of the travel times experienced by ordinary drivers. However the travel time results can be assumed as the best case scenarios with shortest possible travel times obtained by a homogenously experienced driver sample.

Figure 1 Boro Taxi Service Coverage (Figure Source: New York City Taxi & Limousine Commission [13])

ANALYSIS

The travel times are proportional to the traveled distance and taxi trip distance varies for each trip. Hence, the travel times cannot be directly analyzed or compared with choosing particular origin-destination pairs or a representative trip length. In order to overcome this issue "travel rate" (in minutes per mile), which is a length-neutral surrogate measure for trip travel time [11], is used. In order to identify spatio-temporal travel time and congestion patterns, travel times at different times of day are extracted using available the pick-up and drop-off time stamps in the GPS trip dataset. Accordingly the trips are aggregated for each hourly period during the day based on the pick-up time.

In order to identify spatial variations, the trip records are mapped onto each NYC borough's (Manhattan, Brooklyn, Queens, Bronx, and Staten Island) political boundaries. For Manhattan, another virtual boundary is assumed at the southern border of Central park at 59th Street to divide Manhattan into *upper* and *lower* Manhattan. Reader should note that New Yorker residents use Lower Manhattan to describe the area around the south tip of Manhattan, i.e. World Trade Center and Wall Street. In this paper Lower Manhattan refers to the lower half below 59th street. This virtual boundary coincides with the boundary of the proposed central business district pricing plan. The current study aims to identify congestion patterns in each of the designated areas, hence the trips between the boroughs (e.g. a trip passing from Queens to Manhattan) are not used. For each borough (and Manhattan sub-areas), the trips which have the origin and destination in the same borough are extracted for further analysis. Once the trips are mapped onto different boroughs, the travel time patterns are analyzed for varying locations and time intervals. During the illustration of the analysis results, Bronx and Staten Island is omitted as pricing schemes mainly involves Manhattan, Queens and Brooklyn crossings.

Travel Rate Distributions

Travel time distributions are directly related to the travel time variability/reliability. The skewness, uni- or multi-modality of the distribution also provide hints about the travel conditions on the road network. In order to illustrate the travel time distribution, surrogate "travel rates" are shown in Figure 2 and Figure 3 for a weekdays and weekend, respectively. In terms of time-of-day, four 1-hour intervals are selected to represent morning and evening rush hours (8AM-9AM and 5PM-6PM), midday (12PM-1PM) and night (10PM-11PM).

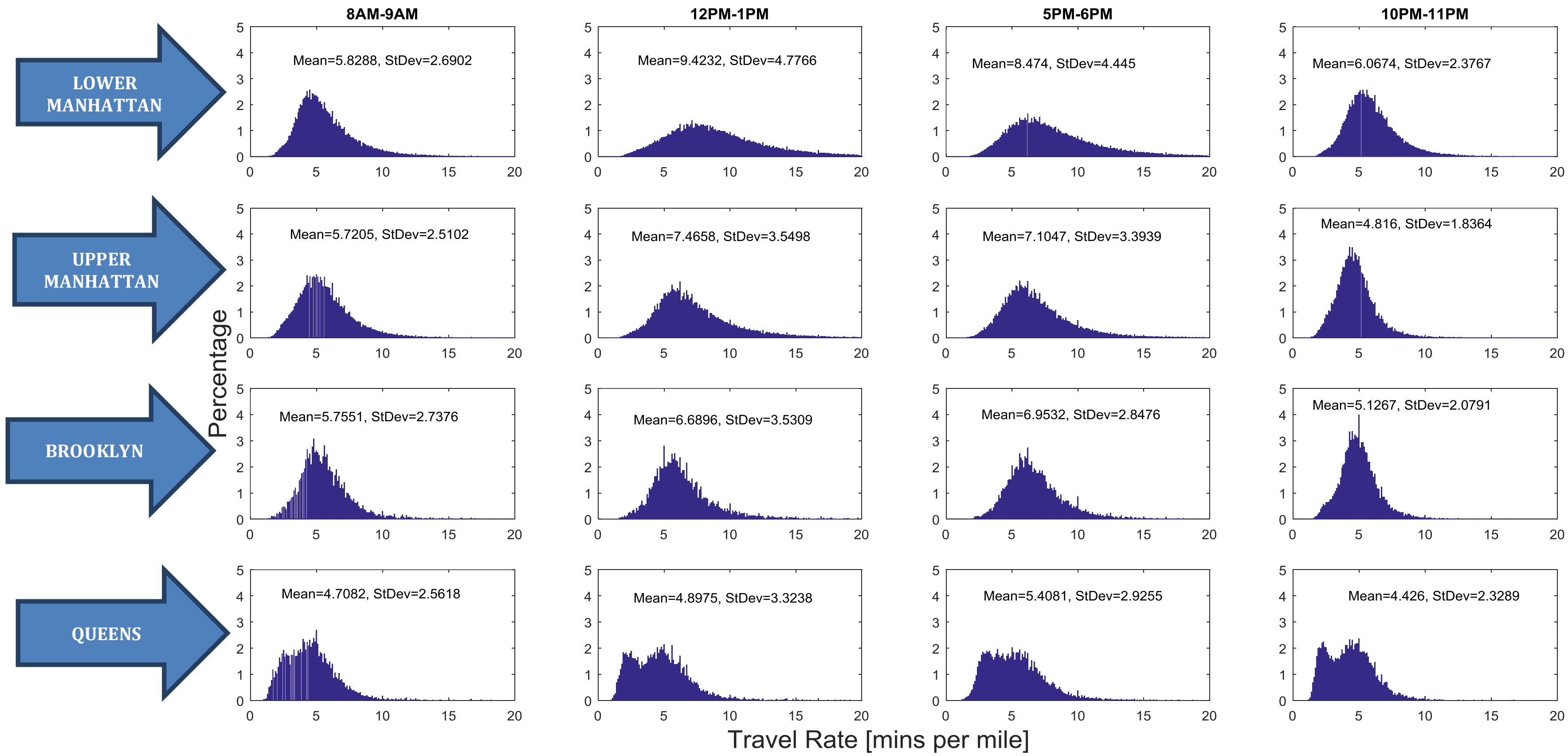

Figure 2 Distribution of Travel Rates for Weekdays

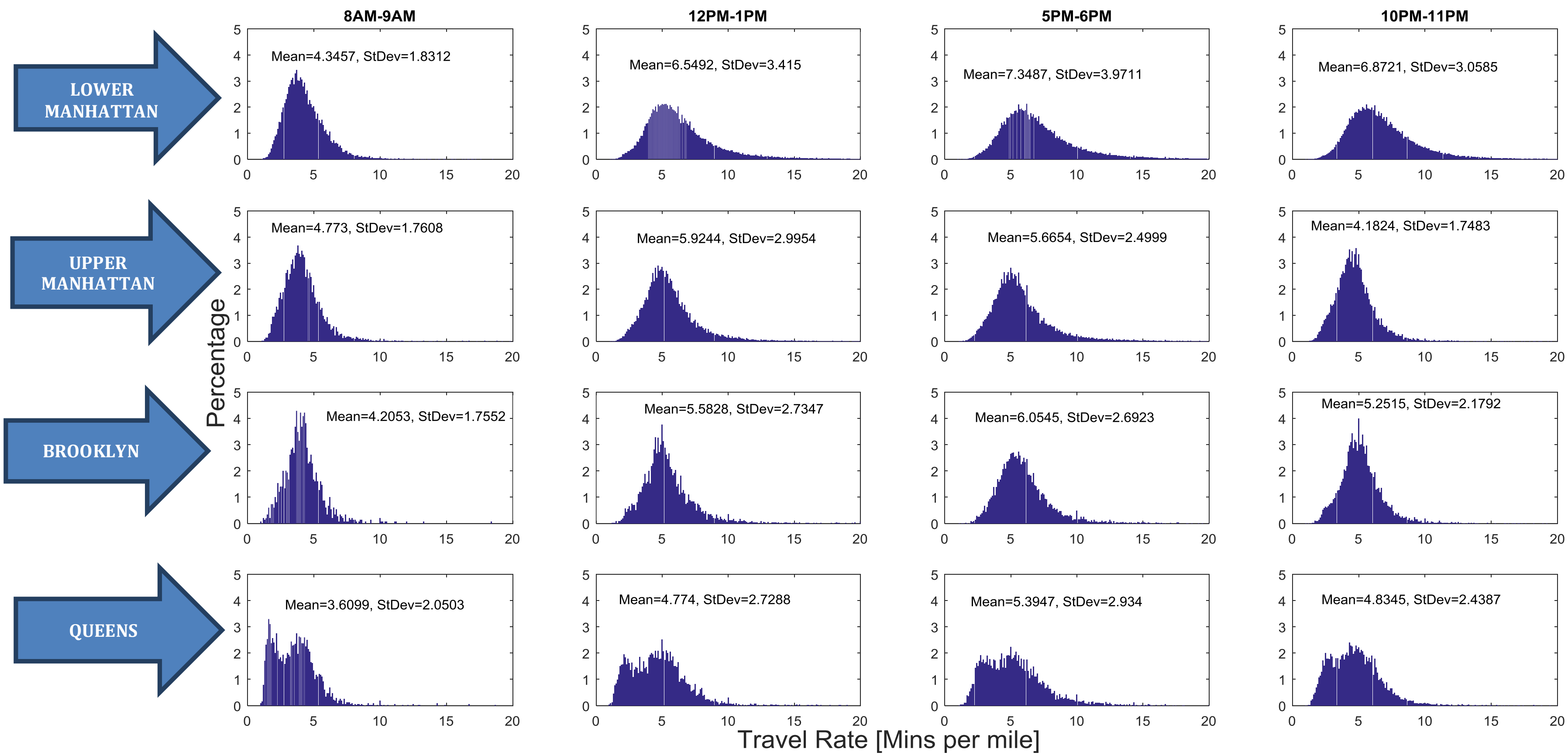

Figure 3 Distribution of Travel Rates for Weekends

Both Figure 2 and Figure 3 show that Queens is substantially different than other boroughs in terms of travel rate distributions. Most striking difference is the existence of clear bi-modal distribution in Queens both on weekdays and weekends. This fact can be attributed to the major highway network in Queens (Figure 4). Manhattan has two major arterials (Henry Hudson Parkway and FDR Drive), but only along the Hudson and Harlem River waterfronts. Similarly I-278 and Belt Parkway serve a relatively limited area at the periphery of Brooklyn. Queens, on the other hand, is crisscrossed by I-278, I-495, I-678 and I-295. As a result, if a certain trip origin and destination are at close proximity to these major highways, the travel may take shorter time with highway travel. If not at close proximity, the travel takes longer through urban streets. Since the taxi trip dataset only includes origin and destination, the travel paths cannot be identified with certainty. Nevertheless, this unique variety in road facility types in Queens is likely the reason for the unique bi-modal travel rate distribution in Queens.

Potential congestion pricing policies may indirectly affect this bi-modal distribution. Manhattan connections to I-495 and I-278 are Queens Midtown Tunnel and Triboro Bridge (both operated by Metropolitan Transportation Authority - MTA), respectively. Both these connections as already tolled. However, the alternate connection of Ed Koch Bridge is not tolled and preferred by drivers who avoid the payment while traveling to Manhattan. Zupan and Perrotta [2] estimate 5% to 17% decrease in peak hour crossings to Manhattan for different pricing scenarios with tolls on East River bridges (including Ed Koch Bridge). Zupan and Perrotta [2] further argue that the drops in traffic would be significantly higher at the East River entry points, leading to a relief on local streets at the crossing approaches. Such an outcome may adjust the bi-modality of travel times. Moreover, Zupan and Perrotta also discuss that the traffic shifting to the MTA tunnels should be studied for a more complete picture. A potential crowding at MTA tunnels and bridges affect the highway travel rates, and in turn may also adjust the bimodality in travel time distribution in Queens.

Figure 2 and Figure 3 also show that Upper Manhattan resembles Brooklyn more than it resembles Lower Manhattan. Travel rate distributions in Lower Manhattan are generally more disperse and heavier on the right tail, which implies more congestion. This finding points out that congestion pricing schemes should particularly target Lower Manhattan, which is actually one common feature of all proposed pricing schemes. Besides decreasing the congestion, the pricing schemes also aim to increase the travel time reliability, which can be achieved by reducing the dispersion (hence variation) of travel times. The dispersion in Lower Manhattan is particularly high during midday thru evening rush hours. This supports the pricing schemes which are proposed for the whole day rather than only during rush hours.

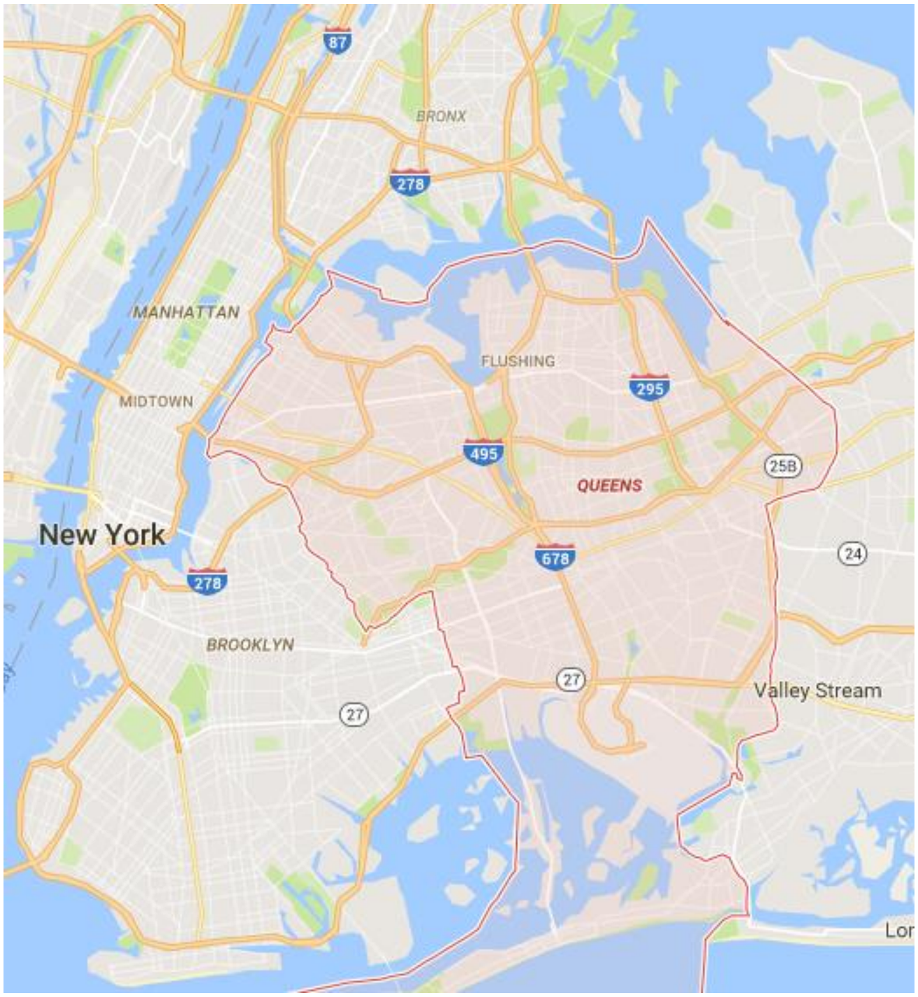

Figure 4 The Highway Network in Queens (Figure Source: Google Maps)

24/7 Average Travel Rates and Variability

In order to discuss the urban travel time variability in New York City, the average, standard deviation and coefficient of variation of travel rates are calculated for 24/7. The results are presented as color maps in Figure 5, Figure 6, and Figure 7 for average, standard deviation and coefficient of variation, respectively. Previous studies [9,10,12] argue that congestion in New York City do not follow the traditional peak/off-peak pattern, but very high throughout the day. These studies also employed only yellow taxi dataset which mainly includes the trips mostly in midtown and south of Manhattan. Hence, the NYC wide validity of the results were not fully confirmed. Figure 5 shows that this untraditional pattern is observed in Manhattan and Brooklyn, though in varying levels. Lower Manhattan exhibits substantially higher congestion levels compared to Upper Manhattan and Brooklyn. Brooklyn has relatively lower congestion levels compared to Upper Manhattan. Meanwhile, that Queens maintains its previously discussed uniqueness compared to Manhattan and Brooklyn and exhibits congestion patterns closer to traditional peak/off-peak fluctuations.

One important consideration for congestion pricing schemes is choosing time of day and day of week to implement the charges. Similar to the argument based on travel rate distributions, Figure 5 confirms the necessity of congestion pricing at least for the work days from early morning till early night. On the other hand, congestion on weekends has a tendency to increase after noon. Particularly Saturday nights in Lower Manhattan exhibit congestion levels almost as high as weekday peak hours. This unusual congestion is arguably due the activities in Lower Manhattan with numerous popular dining and night life spots. In other words, Lower Manhattan's attractiveness during weekends also brings the possibility of extending congestion charging from weekdays to weekends.

Figure 6 and Figure 7 provide additional details regarding travel rate variance and reliability. Figure 6 shows that highest variation in travel times are experienced in Lower Manhattan during weekday working hours. Upper Manhattan and other borough do not exhibit such clear cut patterns. Congestion pricing schemes are supposedly remedies for this high variance in Lower Manhattan by maintaining a smoother flows, hence reducing the variability. Nevertheless, lower variation does not necessarily imply higher travel time reliability. Travel time variation is not considered as a very good indicator of travel time reliability as the variation is more meaningful compared to average travel times. For instance, standard deviation of 10 minutes for a 1 hour long travel results in higher reliability compared to a 20 minutes long trip with 10 minutes of standard deviation. In this respect, coefficient of variation (CoV = standard deviation / mean) is regarded as a better reliability measure (Figure 7). Figure 7 shows that despite high variations, travel time in Lower Manhattan is reliable. That is to say, one knows that a trip under congestion will take twice longer than it should, but the trip end time will not fluctuate much compared to the long trip time. In these respects, lowest travel time reliability values are experienced in Queens despite the relatively lower "average" congestion in this borough. This finding is related to the bi-modal distribution presented in previous section. Although a bimodal distribution's average meet up in the middle, the high variation due to bimodality results in lower reliability.

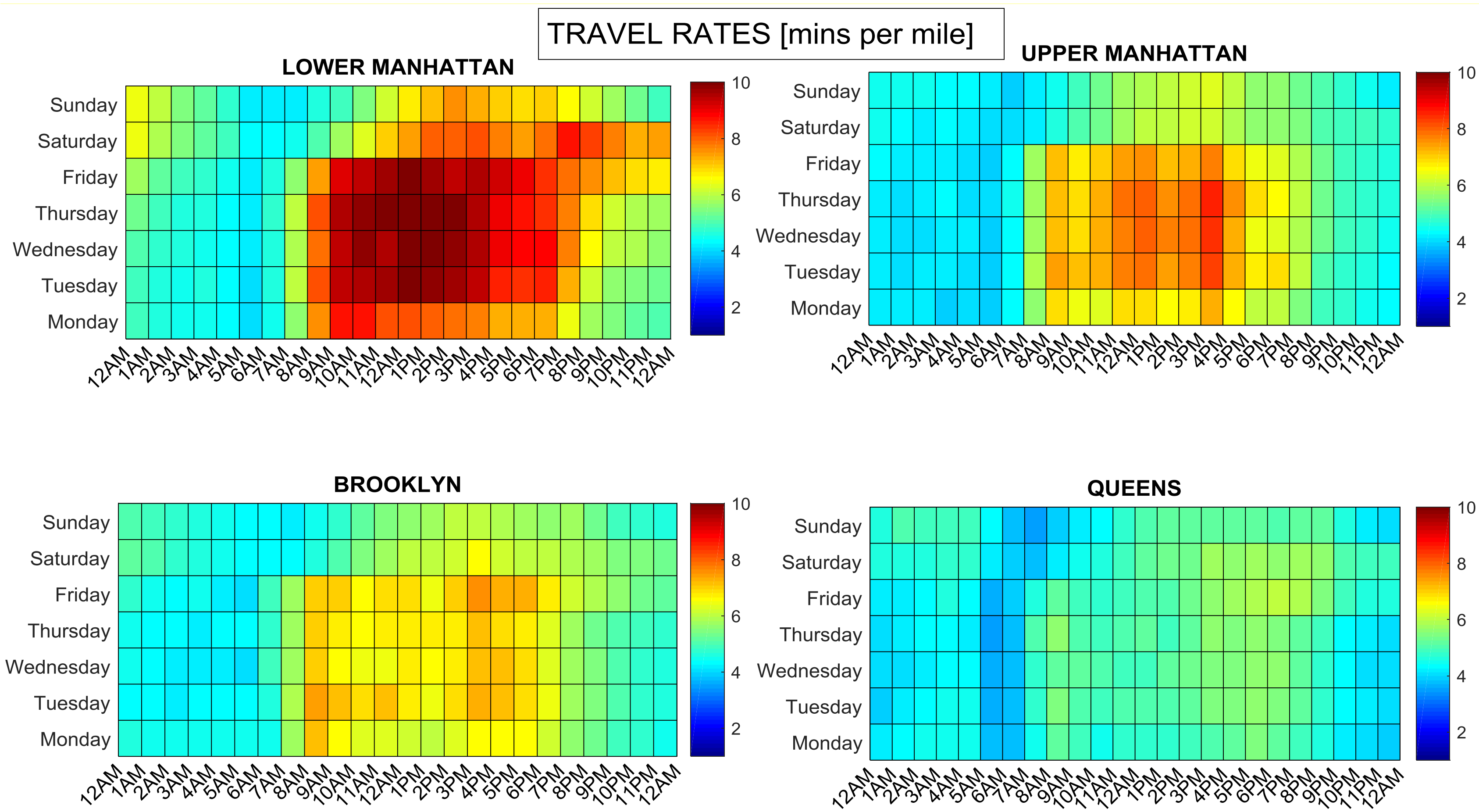

Figure 5 Travel Rates for Different NYC Boroughs

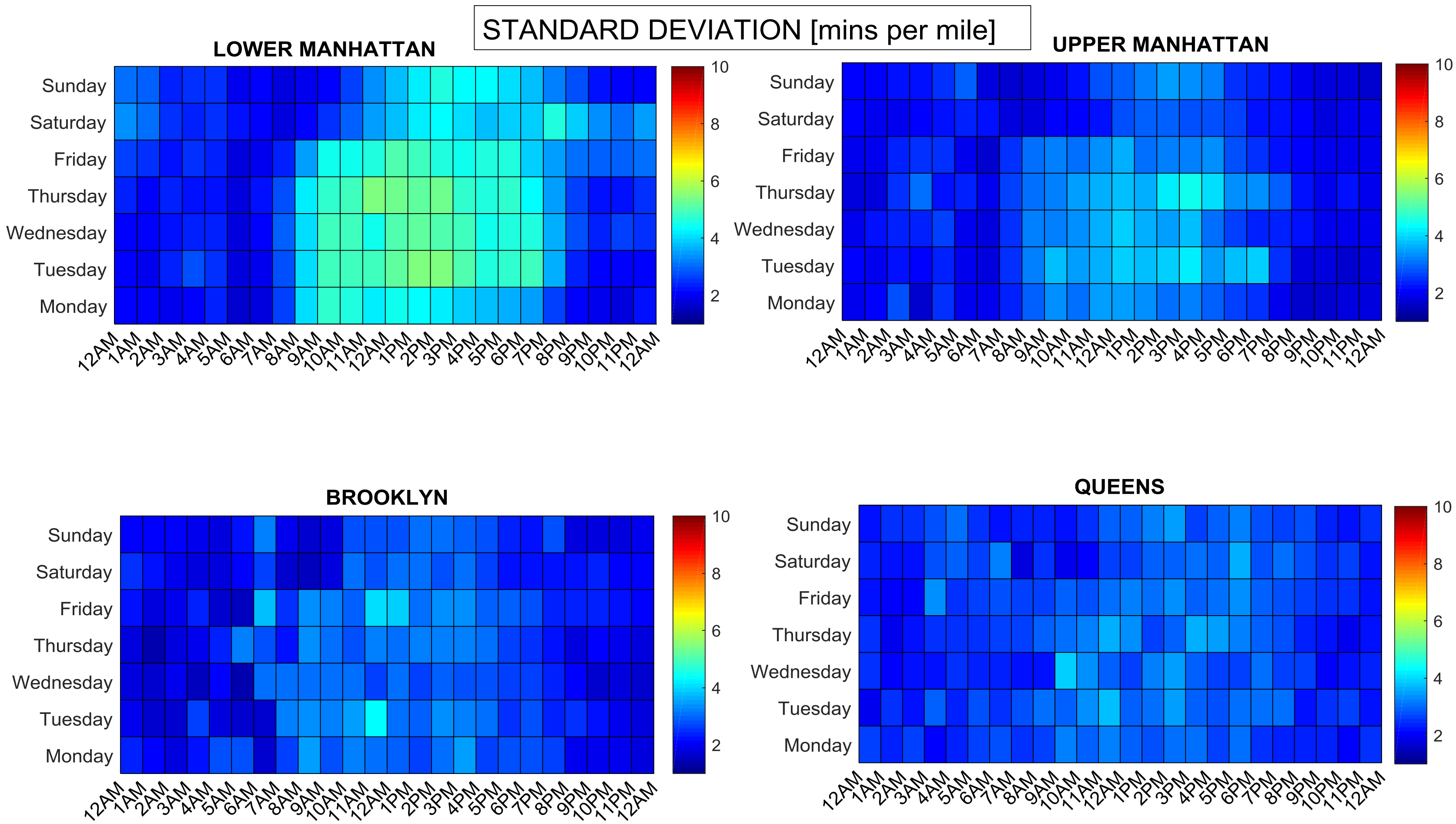

Figure 6 Standard Deviation for Different NYC Boroughs

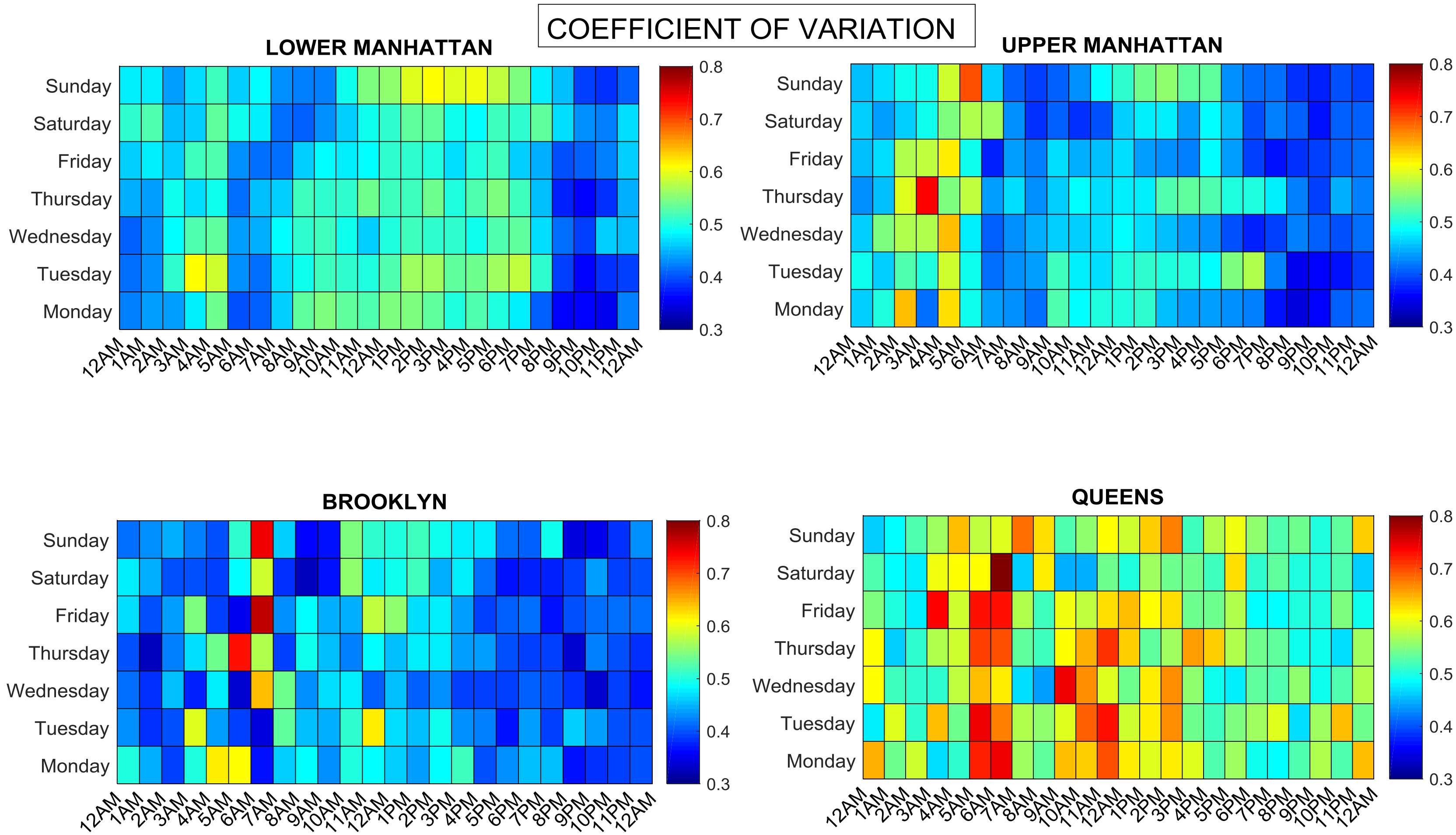

Figure 7 Coefficient of Variation for Different NYC Boroughs

Street and Avenue Travel in Manhattan

The proposed congestion pricing schemes mainly aim to reduce the congestion in Manhattan. In addition to the travel time distribution, averages and variances, travel in Manhattan has one aspect that warrants investigation: direction of travel. The difficulty of cross-town (on East-West alignment) travel is a well-known fact for New Yorkers. This is in large due to lack of subway service in East-West direction, however road travel is also problematic. Move NY plan [3] includes public transportation investment priorities with regards to pricing revenues. Not surprisingly, one of the few suggestions for Manhattan is addition of crosstown buses.

Manhattan's urban road network is an ordered grid which inspired the concept of "Manhattan-mesh". However, not all the links of this mesh are equal. Avenues have higher capacity and traffic flow, with longer green times and faster travel. Thus, the travel in North-South direction is mostly faster. In order to quantify this difference, an additional analysis is performed on the taxi trip GPS dataset and travel distances on avenues and streets are calculated.

For this purpose, first, surface distance is calculated using the origin and destination coordinates in the data according to the below formula:

$$D = \cos^{-1} [\sin \theta_1 \sin \theta_2 + \cos \theta_1 \cos \theta_2 \cos(\varphi_1-\varphi_2)]$$

where θ_1 and θ_2 is the latitude of origin and destination, and φ_1 and φ_2 is longitude, and distance and coordinates are expressed in radians. The calculations assume a perfect sphere and elevation differences are ignored. Then for this set of points, distances in X (east-west) and in Y (north-south) is calculated along the surface of the earth. After that, the coordinates are rotated to a parallel of latitude and a north-south meridian through the origin, and distances came along those lines to the latitude and longitude of the data points. This has provided the true north directional distances. The avenues of Manhattan deviate from true north by 29 degrees, which was recently popularized as Manhattan-edge by Neil deGrasse Tyson. By angular trigonometric calculation, using the relation between True north and New York north, New YorkX (street-distance) and New YorkY (avenue-distance) are projected. Although not perfectly precise (along with precision errors in the origin and destination GPS points), the calculated distances yield a reasonable estimation of traveled distances on streets and avenue.

In order to identify the relationship between the travel times and distance traveled on streets and avenues, linear regressions are performed for Upper and Lower Manhattan for both weekdays and weekends. The results are presented in Table 1.

Table 1 Linear Regression Results (Travel Rate ~ NYX + NYY)

Location and Day of Week	Variable	Coefficient Estimate	SE	tStat	pValue
Lower Manhattan - Weekday	Street-distance	7.91	0.01862	424.76	0
	Avenue-distance	1.99	0.00563	353.33	0
Upper Manhattan - Weekday	Street-distance	4.61	0.01382	333.78	0
	Avenue-distance	2.13	0.00510	417.75	0
Lower Manhattan - Weekend	Street-distance	6.51	0.01719	378.68	0
	Avenue-distance	1.80	0.00533	337.20	0
Upper Manhattan - Weekend	Street-distance	4.62	0.01441	320.84	0
	Avenue-distance	2.07	0.00522	396.24	0

Based on the coefficients of street and avenue travel in Table 1 (1.99 and 7.91 respectively), street travel takes almost 4 times longer than avenue travel for the same distance during weekdays in Lower Manhattan. During weekends, this significant ratio reduces to only to 3.6. Meanwhile, for both weekdays and weekends street travel takes ~2.2 longer than avenue travel in Upper Manhattan. In other words, crosstown travel time do not vary significantly between weekdays and weekend despite the reduced congestion on weekends. As discussed previously, Move NY plan envisions addition of crosstown "select bus services" with the pricing revenues. The Select Bus Service (SBS) is introduced by MTA as a complimentary service to the subway system by connecting neighborhoods to subway stations and major destinations. In order to provide a reliable and faster service, SBS has off-board fare payment, bus lanes, traffic signal priority, and longer spacing between stops [15]. The findings of this study confirm that more SBS investment with traffic signal priority can be a viable option to overcome the crosstown travel issue in NYC. It is a widely accepted fact that the public acceptance and success of congestion pricing projects rely heavily on the transparent use of revenues and investments in alternate public transportation modes. The relatively high crosstown travel times throughout the week provides yet another justification to utilize the revenues to custom tailored public transit services such as SBS.

CONCLUSION

This study utilizes taxis as probe vehicles collecting travel time information in the city 24/7 in the New York City urban network and uses two separate taxi trip datasets to calculate the spatio-temporal travel time patterns covering all boroughs of NYC. The travel time distributions, severity of congestion and levels of travel time variability at different times of day and areas throughout the City are calculated. The analysis results are used to discuss the transportation pricing schemes which are proposed to enhance the efficiency of urban traffic flow in New York City.

Overall, Queens is shown to exhibit distinctive travel time characteristics, possibly due to its mixed facility road network of major highways and urban roads. Travel time patterns in Upper Manhattan (described as north of 60th street) are found to be closer to the patterns in Brooklyn than the trends in Lower Manhattan (below 60th street). It is discussed that congestion pricing for Manhattan should cover the whole day during weekdays as Manhattan exhibits an all-day-long congestion rather than the traditional peak/off-peak congestion. High congestion on weekends in Manhattan is also identified and possible extension of the pricing to weekends is discussed. By projecting origin destination coordinates onto the Manhattan grid network, the street (East-West) and avenue (North-South) travel rates are analyzed using linear regression. It is shown that street travel can be up to 4 times of the avenue travel rate and this significant difference is not particularly affected by the congestion levels. Meanwhile, the crosstown (East-West street) travel are equally slow during congested weekdays and uncongested weekends. In order to address this consistent problem, use of congestion pricing revenues for MTA's crosstown SBS investments (as envisioned in Move NY plan) is a viable option.

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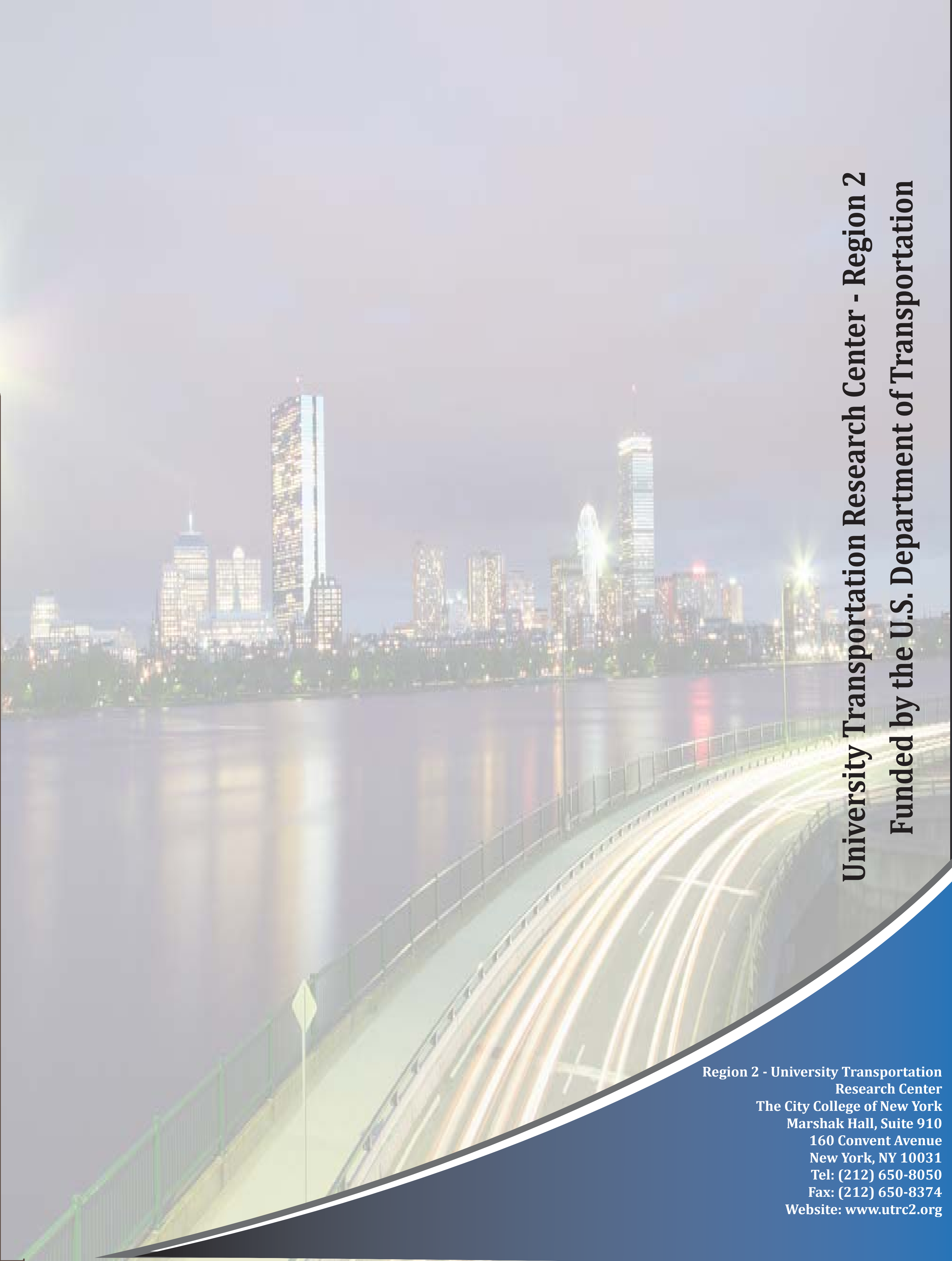

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