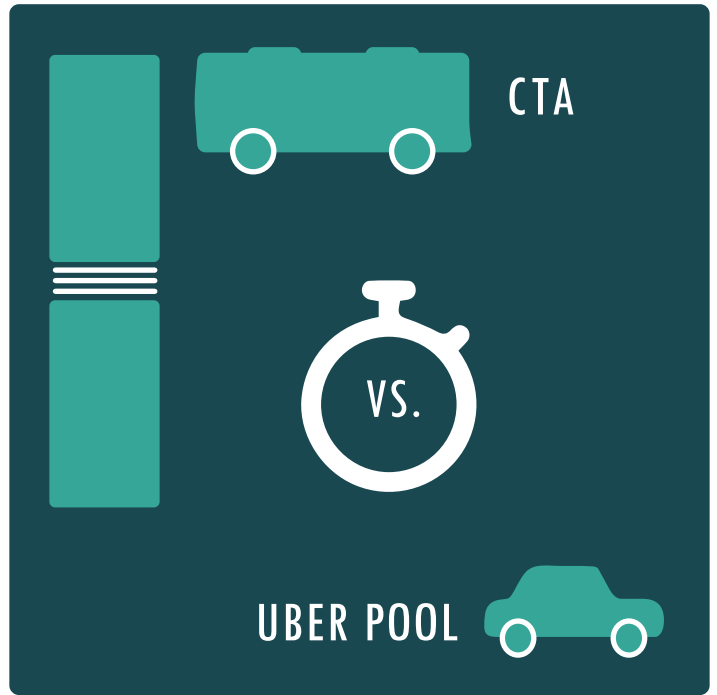# HAVE APP WILL TRAVEL

Comparing the Price & Speed of
Fifty CTA & UberPool Trips in Chicago

BY JOSEPH P. SCHWIETERMAN, PH.D. & MATTHEW MICHEL • JUNE 27, 2016

CTA

VS.

UBER POOL

2016

THE STUDY TEAM

AUTHORS JOSEPH P. SCHWIETERMAN, PH.D. & MATTHEW MICHEL

DATA TEAM DANIELLE DAVIS, MICHAEL FODOR, GRAY TUREK, KATE BAKER, ANTIONETTE THOMAS, RACHAEL SMITH, JAZMINE ROMERO REJAS

TEAM LEADERS HALEY CANNON, HEATHER SPRAY

GRAPHICS RACHAEL SMITH & HALEY CANNON

INTRODUCTION

Dramatic growth in the "sharing economy" is having profound implications on mobility in urban areas. Whereas travelers in densely populated areas once had only a limited set of options to reach their destination—e.g., drive their private vehicle, take public transit or a taxi, or walk/bike—they now have an expanding array of options. In many cities, travelers can use their smartphones to:

- Summon a *ridersourcing service*, such as a Lyft or Uber, which provide the benefit of curbside pickup and drop-off with a simple click. Unlike taxis, payment and gratuity are settled electronically at the end of the trip.

- Use a *carsharing service*, such as Car2Go or Zipcar, which provide access to a car via a mobile app or website.

- Rely on *specialized minibus* or *shared-ride services*, such as Via, which operate much like the jitneys of yesteryear. These affordable services are now prolific in many corridors (some offer one-way trips for $5 or less in roomy SUVs).

- Access a *bikesharing program*, which are on the rise and now boast hundreds of "pods" in some cities, providing new competition on short-hop trips.

Among the most notable recent innovations affecting mobility, however, are emerging "carpooling" services, such as LyftLine and UberPool. These shared-ride services offer lower costs than conventional ridesourcing options by allowing drivers to pick up and drop off multiple passengers when traveling to their destinations.

This study explores the different performance characteristics of UberPool and public transit services between downtown Chicago and the city's north- and northwest-side neighborhoods. The study involves a controlled experiment in which trained data collectors made 50 one-way trips between various urban locations to measure the differing costs, time, and conveniences associated with UberPool and Chicago Transit Authority (CTA) public transit services. During each trip, one member of the data team uses transit while the other uses UberPool, each to and from the same location. This allows for a "real world" comparison while controlling for a wide variety of others factors, such as time of day, weather, and origin and destination.

BACKGROUND ON UBER & LYFT CARPOOLING

Uber and Lyft's car-pooling services, UberPool and LyftLine, were both unveiled in the summer of 2014—despite attempts from Lyft to covertly move its product to market ahead of its competitor. These new services were rolled out in gradual fashion, with UberPool launching in Chicago in the midst of considerably publicity in November 2015.

Informal versions of this type of carpooling have nonetheless been common across the world

for a longer period. In fact, Lyft CEO, Logan Green, was inspired by a similar service in Zimbabwe. Both his company and Uber started their services with the same mission—to keep costs low for the consumer by building efficiencies into the system and matching riders headed in the same direction. Initially, Uber and Lyft deeply subsidized these services, offering discounts to encourage riders to try them out.

These new "sharing" services work similarly to the more traditional exclusive-ride offerings. A rider opens the app on their smartphone and inputs his or her location and destination. The app then displays two prices—a traditional rate and a discounted rate if you choose to pool, which is often more than 25% less costly than the former. (The pool option is the default choice for Uber, which has resulted in some riders choosing to share their ride without realizing it.) The pooling option is least expensive if a user is riding solo, as the rate is a slightly higher for two or more people in a party. Once the user chooses the pool option, a driver is assigned to them. The user may be the second or third pick-up on a trip, or they could be the only rider.

The profitability of Uberpool hinges on the "match rate"—how often riders get paired—due to the fact that the user pays the same price regardless of whether another rider is found. When the service started, the publicized match rate was 20-30%. However, Uber has recently hinted that its match rates now can reach 90% in certain high-traffic areas during peak periods.

Once a ride has started, the driver may get notification that there is another passenger nearby to be picked up. Although drivers can decline this pickup, doing so can lower their ratings, and so such requests are generally accepted. The algorithms that Uber and Lyft use to determine efficiencies aren't known, but drivers and users sometimes complain that what is purported to be an efficiency enhancement to the company often doesn't feel like one to them. With passenger waiting times and unknown additional stops, carpooling can add time to a trip[i]

Past research suggests that shared-mobility services, including ridesourcing, are generally complimentary to public transit service by solving the "first mile" and "last mile" problems (i.e., the problems posed by the difficulty of getting from the traveler's origin to the nearest transit stop as well as from the last transit stop to the ultimate destination). This finding is a centerpiece of an American Public Transportation Association study released in early 2016. In fact, it's considered a general rule that as many people use transit *more* frequently rather than less after integrating ridesourcing into their lifestyles. One reason is that some opt not to own a private vehicle and thus find themselves taking buses and trains more often as well.

Nevertheless, as services such as LyftLine and UberPool become more prevalent, it is important to explore in more detail the circumstances in which carpooling services and public transit compete. The following analysis offers perspective on this.

METHODOLOGY

To identify routes in a systematic way, the study team used a Geographic Information System (GIS) to identify the geometric center of Community Areas, as defined by the U.S. Census Bureau, on the north and northwest sides of Chicago. The nearest residential address to the geometric center of the area was then selected.

For locations in the downtown and "outer downtown" areas, zip code maps were used to identify the nodes. Each zip code was divided in half, with the center of each half used as a starting/stopping point. These nodes fall into three categories:

Downtown Zone: East of Canal Street and South of Kinzie (one of the first streets north of the Chicago River). Almost all points in this zone are within close proximity to CTA rapid transit service.

Outer Downtown Zone: Outside downtown but east of the Dan Ryan/Kennedy Expressway and south of North Avenue. Public transit service, particularly rail rapid-transit, is less pervasive in this zone. (See Appendix map showing Downtown and Outer Downtown Zones)

Neighborhood Zones: Locations north and west of downtown, as depicted in Figure 1. This includes both residential, industrial, and commercial oriented areas.

Observations were limited to routes involving the north and northwest sides due to the study's goal of "holding constant" as many factors as possible when comparing travel times and costs. Spreading 50 observations over a large area would have resulted in many areas of the city having only a few observations, making statistical analysis more tenuous. Moreover, the data team sought to focus on areas in which both transit and ridesharing have relatively high market shares. The market for UberPool service on the south and southwest sides appears less well-developed, as population densities and average incomes tend to be lower and transit service more sporadic in some neighborhoods. Nevertheless, by focusing on the heavily served north and northwest sides, the study might present a more sanguine assessment of UberPool than would be the case if the observations included other neighborhoods as well.

FIGURE 1: The Neighborhood Locations on North and Northwest Sides Serving as Origination and Destinations for Paired Observations

CTA Blue Line ——— CTA Brown Line ——— CTA Red Line ———
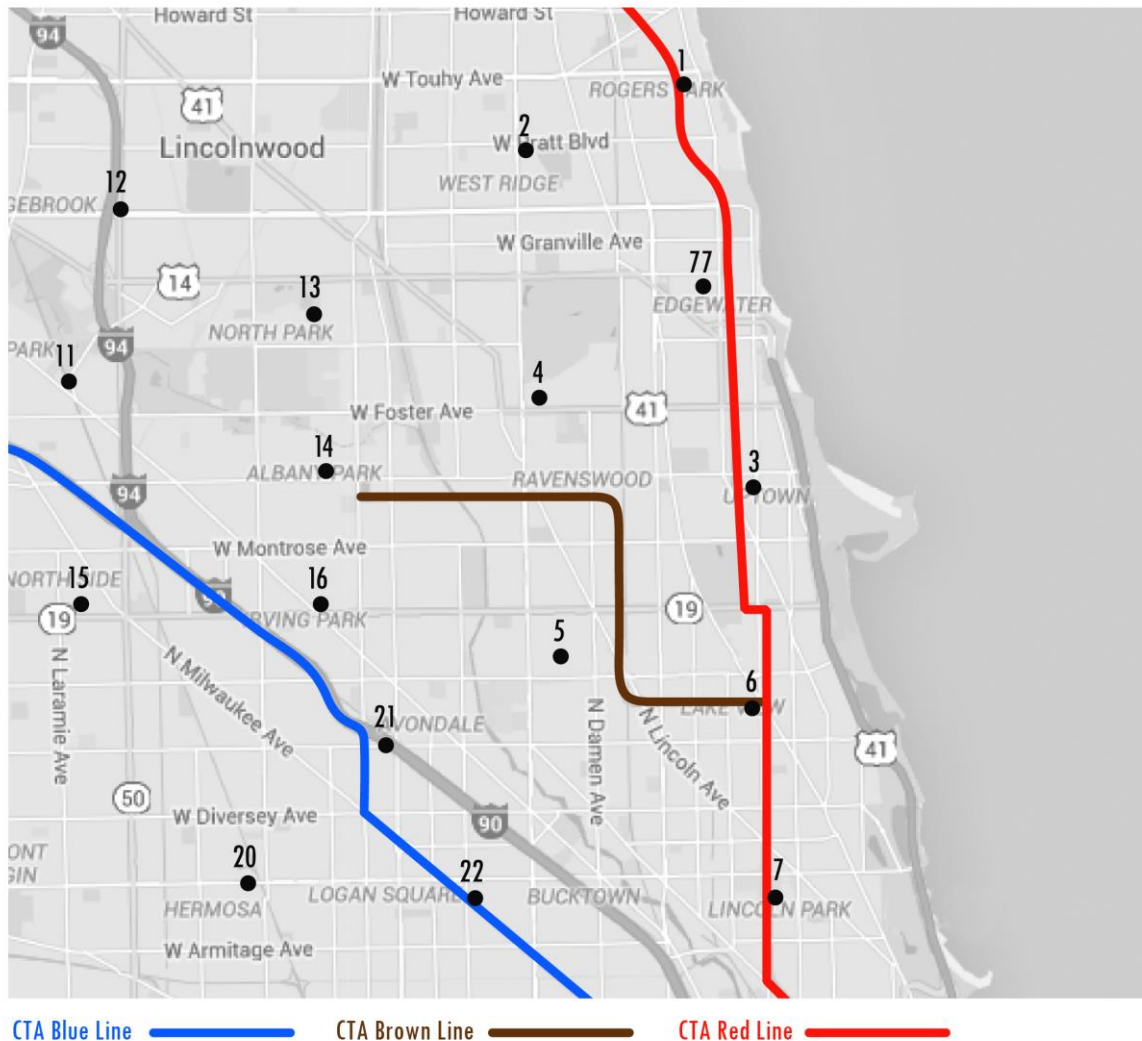
The study team collected data during weekdays—between the hours of 9 a.m. and 6 p.m.—on 50 routes. These routes were selected through a stratified sample to assure that no route was sampled more than once. As shown in Table 1, slightly more than half the trips (54%) were either downtown – neighborhood travel or outer downtown – neighborhood runs and the remaining 46% were neighborhood – neighborhood trips.

Data collectors used Google Transit to select the best transit option to avoid subjective judgments and had a loaded Ventra card to avoid the time required to pay the CTA fare. Each trip generated data on numerous variables, including walking distances, wait times, availability of seating on the CTA, number of stops on UberPool, and other factors.

RESULTS

The performance of the two modes varied widely on the basis of the properties of the trip, with CTA performing best for downtown trips and UberPool generally considerably faster on other trips.

Overall Speed, All Trips: The average elapsed time for all UberPool trips was 35:52 (35 minutes and 52 seconds) and 48:29 on the CTA. Of the 50 trips, UberPool was faster on 39 (78%) while the CTA was faster on 11 (22%). The average cost of UberPool was $9.66, while that for the CTA was $2.29 (the odd number owing to the fact that some trips required transfers, which cost an additional $.25). The base CTA fare is $2.25 on trains and $2 on buses.

UberPool trips involved an average of .85 stops, suggesting that users can generally expect this service to be considerably slower than conventional UberX service. Ten trips (20%) involved more than one stop, while a pair of trips involved three. At the same time, CTA riders made transfers on 24 trips, resulting in a certain degree of added inconvenience.
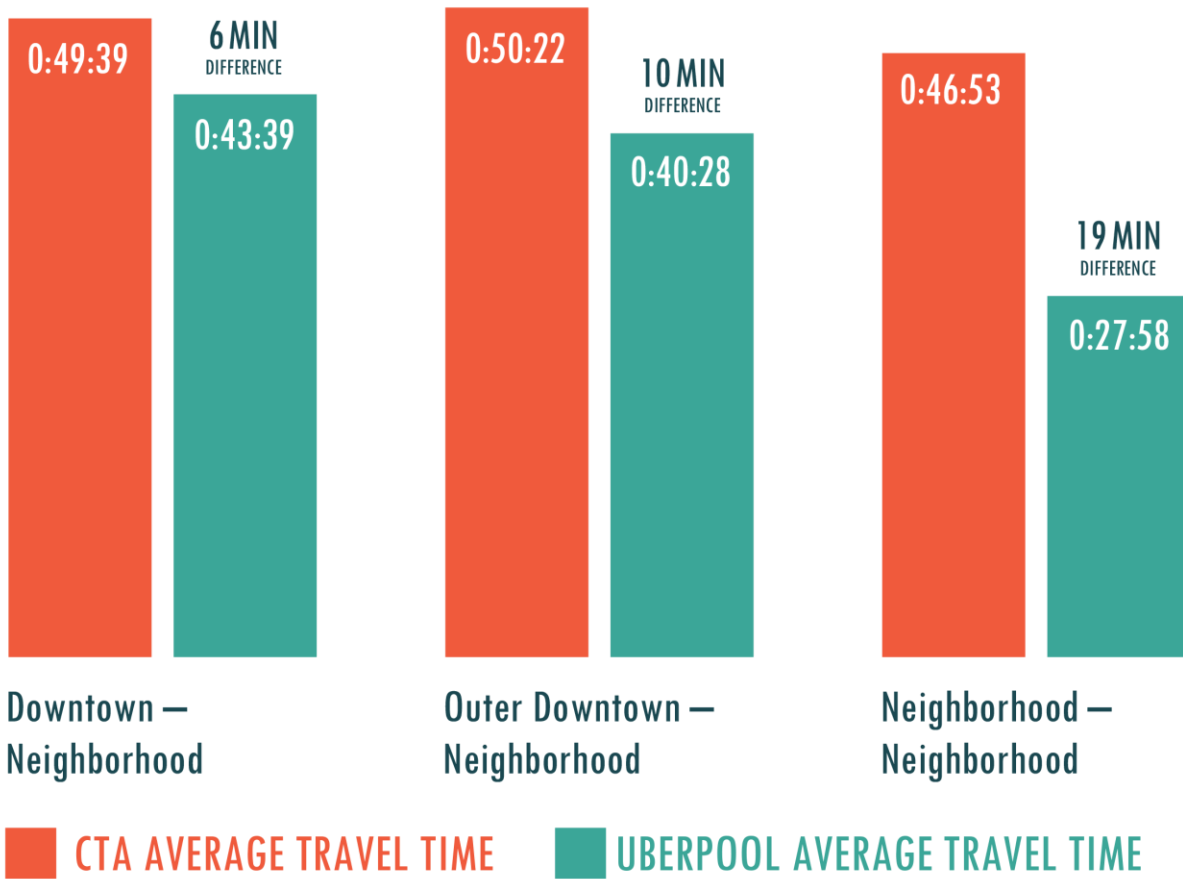
The CTA outperformed UberPool to the greatest degree on a trip from 55 W. Monroe to 5388 N. Milwaukee Avenue, delivering its rider 32 minutes earlier than UberPool, a result that is partially attributable to the fact that this particular Uber trip involved two intermediate stops. The largest margin for UberPool was 1 hour and 8 minutes between 235 S. Columbus Drive and 5406 W. Devon Avenue, which involved an unusually time-consuming train-to-bus transfer.

Looking only at *significantly different* travel times, which is defined as being more than 10 minutes, presents a somewhat more favorable picture for the CTA. Only slightly more than half—29 trips—were significantly faster on Uber, compared to 4 on the CTA. The other 17, however, had no significant difference (i.e., 10 minutes or less).

Downtown – Neighborhood Travel: CTA performed the best, by far, on downtown-oriented trips, posting an average time of 49:39—just 6 minutes more than the 43:39 on UberPool. The average UberPool price was $10.11, compared to the CTA's $2.35. On these routes, passengers who do not place a high value on their trip may find the $6-$10 premium generally paid for an UberPool ride an unattractive option. Travelers who opt to carpool could expect to make about 1.15 stops per trip to serve other passengers.

Of the 18 trips in this category, UberPool was faster in 11 and the CTA on 7. However, only 6 of the UberPool trips were significantly (more than 10 minutes) faster. No doubt, many commuters would not consider the added cost a justifiable expense on these routes. Nonetheless, it is also noteworthy that even with the extra stops, UberPool is often still faster than the CTA, especially during off-peak periods. The CTA generally performs best on Red Line trips involving the North Lakefront, due to the high train frequency and difficult traffic congestion. Trips involving the Blue Line tended to perform relatively worse.

**FIGURE 2:** Average Travel Time During Paired Observation - CTA vs. UberPool

	Downtown — Neighborhood	Outer Downtown — Neighborhood	Neighborhood — Neighborhood
CTA	0:49:39	0:50:22	0:46:53
UberPool	0:43:39	0:40:28	0:27:58
Difference	6 MIN	10 MIN	19 MIN

CTA AVERAGE TRAVEL TIME   UBERPOOL AVERAGE TRAVEL TIME

TABLE 1: Results of 50 One-Way Trips in Chicago: CTA & UberPool

| TRIP TYPE | SAMPLE | | AVG TRAVEL TIME | | # TRIPS EACH MODE IS FASTEST | | | | COST | | WALK DISTANCE |
	PAIRED TRIPS	AVG UBER DISTANCE	UBER	CTA	UBER FASTER	CTA FASTER	UBER > 10 MIN. FASTER	CTA > 10 MIN. FASTER	UBER	CTA	AVG CTA DISTANCE
DOWNTOWN — NEIGHBORHOOD	18	6.16 MILES	43:39	49:39	11	7	6	4	$10.11	$2.35	.49 MILES
OUTER DOWNTOWN — NEIGHBORHOOD	9	5.99 MILES	40:28	50:22	7	2	4	0	$9.51	$2.24	.41 MILES
NEIGHBORHOOD — NEIGHBORHOOD	23	4.31 MILES	27:58	46:53	21	2	19	0	$9.47	$2.22	.45 MILES
ALL TRIPS	50	5.23 MILES	35:52	48:29	39	11	29	4	$9.66	$2.29	.46 MILES

Average of all Trips

FIGURE 3: Comparing Trip Differences
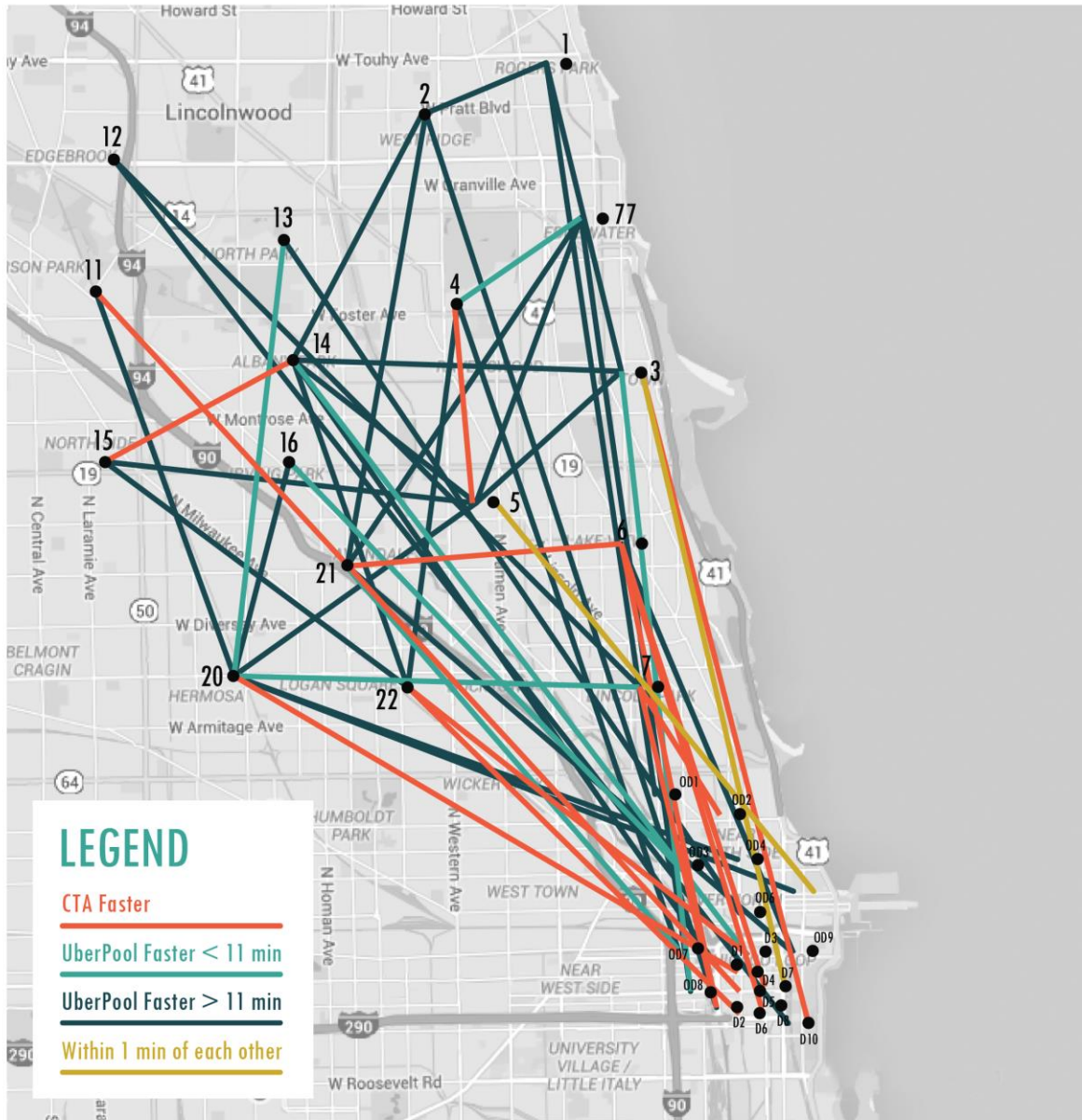
Neighborhood locations labeled with area number • Outer downtown locations labeled with OD • Downtown locations labeled with D

Outer Downtown – Neighborhood Travel: These trips often involve lengthy walks or bus rides to CTA rapid transit lines, giving UberPool an added edge. Nevertheless, the time differences were usually less than 10 minutes, making UberPool a tenuous option for many budget-constrained travelers. The average time was 40:28 for UberPool rides and 50:22 on the CTA. The carpooling costs averaged $9.51 versus $2.24 on the CTA.

Of the 9 trips in this category, UberPool was faster on 7 trips and the CTA on 2. However, UberPool was significantly faster (10 minutes or more) on 4 trips, while none were on the CTA.

Neighborhood – Neighborhood Travel: UberPool dominated in this category with an average time of 27:58, compared to 46:53 for trips on the CTA. Carpooling was faster on 21 of the 23 trips—and significantly faster on 19. The advantage for UberPool is enhanced by the relative paucity of intermediate stops on this type of trip, with only slightly more than half of trips involving such stops.

Even so, it was rare for the UberPool fare on the neighborhood-oriented trips sampled to be less than $6 (it was such in only two cases). This suggests that many commuters, despite the time-savings, may have trouble justifying using this option. However, for travelers in a rush or those who value time over cost, UberPool is no doubt an attractive choice.

FACTORS OTHER THAN TIME & COST

Comfort and predictability are no doubt factors that affect the choice of modes. Note the following:

1. CTA riders on downtown trips had seating 71% of the time, whereas about 90% of those on outer downtown and neighborhood-neighborhood trips had seats. Overall, about four of five transit riders had seats.

2. A passenger's comfort with walking affects the relative level of convenience. Three CTA trips involved walking one mile or more, and 11 involved walking at least two-thirds of a mile. In comparison, UberPool generally involves minimal walking.

3. The average wait time for UberPool was 5.2 minutes. On neighborhood - neighborhood trips, however, the average is higher, at 5.6 minutes. Passengers traveling to or from the downtown core waited 4.9 minutes.

4. A significant negative aspect of using UberPool appears to be the variability in pricing. Six of the 50 trips involved surge pricing, resulting in prices as much as 60% above the normal fare. Users may find the lack of certainty over pricing to be a consideration when making travel plans.

5. The study did not consider the price and speed of UberPool during the evening and late-night hours, when demand is reportedly heaviest. During these times, surge pricing appears to be more prevalent. As such, the results may understate the cost of carpooling for the typical consumer.

CONCLUSIONS

The growing prevalence of carpooling services, such as LyftLine and UberPool, constitutes an important new alternative that transportation researchers are only beginning to understand. Results from the Chicago study suggest that UberPool is an option attractive to far more than extremely time-conscious travelers, albeit not an option that many commuters would use every

day.

As a general rule, UberPool tends to perform worst between precisely when CTA service is at its best, i.e., on trips to and from the central business district, especially during rush hour. During peak hours, CTA service is more frequent while street traffic is more congested. As a result, UberPool passengers are burdened with slower service due to the prevalence of stops to pick up other passengers. Moreover, "surge pricing" is more common during this period. This supports the idea emphasized in the previously mentioned APTA report that UberPool appears to generally be complementary to public transit by helping fill the gaps that exist in urban bus and rail operations.

The implications of these findings can be appreciated by considering that USDOT recommends that policy analysts assume that the average urban traveler places a value of about $24.00/hour on their time (USDOT, 2012). This suggests that the "average" travelers on an UberPool trip, by arriving about 10 minutes (about one-sixth of an hour) faster, may derive an approximate average benefit of around $4/trip. Of course, the amount of savings will differ widely by the characteristics of the trip and the passenger. For example, on neighborhood – neighborhood runs, the value of average time saving appears closer to $8, suggesting that UberPool, which often changes a $6-$8 premium over transit, is an attractive proposition for many. More research on the value of these time savings, however, is clearly needed.

Interpreted broadly, these results suggest that heightened competition in urban transit markets is a reality that will bring dramatic changes to the way people live, work, and play in urbanized areas across the United States.
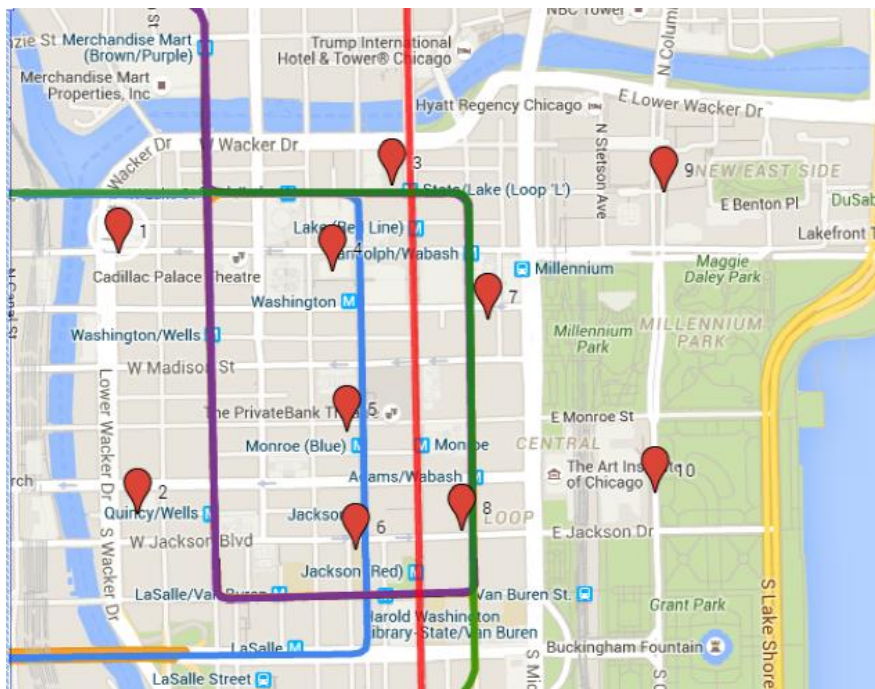
APPENDIX

Figure A1: Outer Downtown Zone
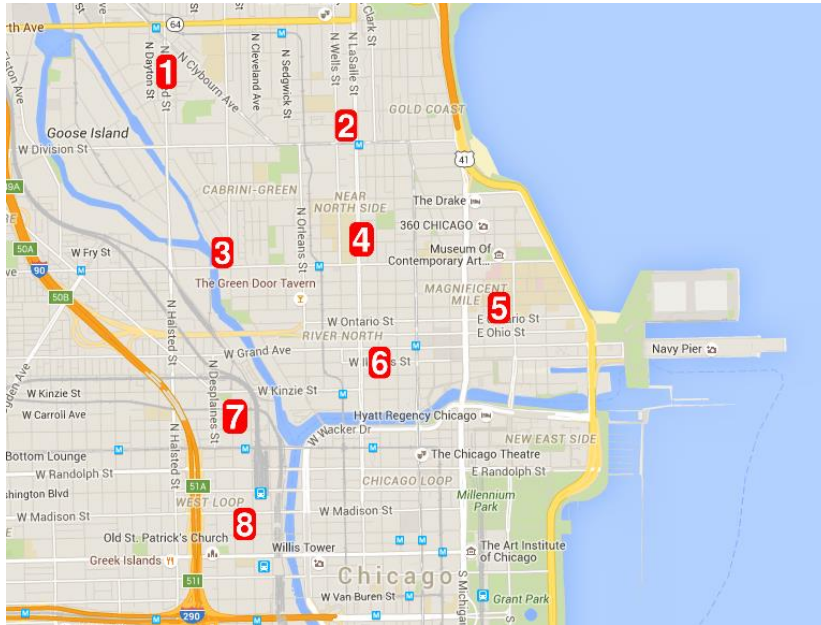
Note: Zones 1 – 5 and 7 comprise the Outer Downtown. Zone 6 is part of the core Downtown Zone.

Figure A2: Downtown Zone

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Rogoff, Peter. 2014, Revised Departmental Guidance on Valuation of Travel Time in Economy Analysis, Memorandum, U.S. Department of Transportation, July 9, 2014. Available at <u>https://cms.dot.gov/sites/dot.gov/files/docs/USDOT%20VOT%20Guidance%202014.pdf</u>

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[i] Both companies tout the environmental benefits of their services, despite the fact that they differ from a traditional carpooling service, in which the driver of the vehicle is making the trip whether they have passengers or not. Uber and Lyft see this difference and have since introduced UberCommute and LyftCarpool, which allow the average driver to input their daily commute and matches them with riders going the same way. The services are set up to help drivers to cover some of the costs of driving, not as a way to profit from it. Uber reimburses its commuting drivers at a rate of $0.54 per mile driven with a fellow commuter in his or her vehicle.