Bike Share and User Motivation: Exploring Trip Substitution Choices Among Divvy Users

Hugh Bartling, DePaul University

INTRODUCTION

- Bike sharing schemes can help to achieve multiple objectives for urban policymakers. Getting more people on bikes can reduce congestion, improve air quality, and enhance public health. Municipal bike sharing systems require significant public investment and potentially will have an impact on other mode choices in urban environments. Thanks to open data reporting, researchers can understand ***how*** people are using bike share to travel around their service areas. What is less understood are the motivations about ***why*** users are drawn to bike share and how bike share use figures into ***user decisions*** about urban mobility. Using an intercept survey of users of Chicago's bike share system, Divvy, this research addresses the question of what motivates users to use Divvy instead of other transport modalities.

METHODS

1. An intercept survey was conducted in Chicago's Lincoln Park neighborhood in April and May 2016 which resulted in 297 valid observations.
2. The survey contained questions on demographic characteristics, trip purpose, travel mode substitution, and motivations for using Divvy.
3. Binary logistic regression models were used with response variables measuring whether the trip substituted for transit (composite measure of bus & train substitutions), bus, train, automobile (including taxi, TNC, private car), and walking.
4. Motivational variables were scored on a Likert scale and collapsed into dichotomous variables. Respondents were asked if they prefer using Divvy for convenience, exercise, safety, low cost, or for environmental reasons.

RESULTS

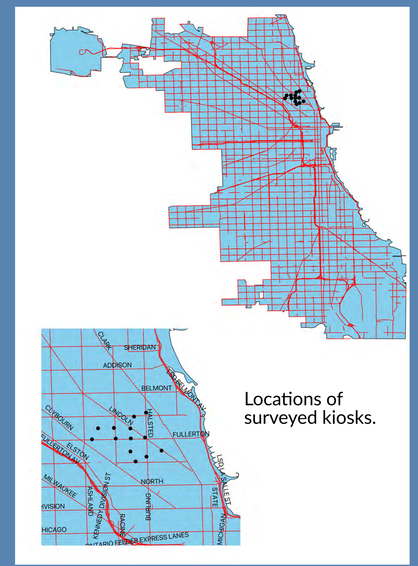
The study finds that most people taking Divvy trips are substituting Divvy for another mode. Modal substitution is complex with our survey showing that walking (n=90), train (n=76), bus (n=37), and automobile (n=50) travel are all being substituted by Divvy trips. The logit models reiterate this complexity with no variables sharing significance across all models. In terms of motivational factors, when controlling for the variables in the model, a respondent who uses Divvy for its convenience has 2.75 times the odds of reporting a trip substitutive for walking. Users who reported that they use Divvy because it is a less expensive form of mobility have 1.8 times the odds of their trips substituting for trains and 1.8 times the odds of their trips substituting for automobile. For the transit substitution model the only significant factor is if the Divvy user was wearing a helmet. Helmet use indicates that the odds of reporting a transit substitution are 2.2 times the odds than for a non-helmet user.

DISCUSSION

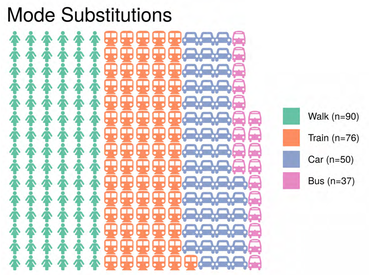
- For policy makers seeking to improve bike share service and attract more users, keeping costs low could be appealing to users seeking to switch from other modes.
- Bike share's promise as a flexible, 'last mile' mode of transport appears to be validated. The shift from walking to cycling suggests that the ability to travel quickly and conveniently for relatively small distances is valued.

Most **Divvy** trips **substitute** for **walking** or **public transportation.** Substitute trips for **walking** were likely to be motivated by **convenience.** Substitutes for the **train** were likely to be motivated by **expense** and substitutes for **automobiles** were likely to be motivated by **exercise** and **expense**.

Take a picture to **download** the **full paper**



Locations of surveyed kiosks.



Results from Binary Logistic Regression Models

	Divvy substituted for the following modes:				
	Transit	Bus	Train	Automobile	Walking
Gender- Male	0.171	0.119	0.195	-0.341	0.127
	(0.256)	(0.377)	(0.287)	(0.324)	(0.278)
Member	-0.248	-0.563	-0.067	-0.144	0.322
	(0.264)	(0.387)	(0.295)	(0.341)	(0.288)
Owns Bike	-0.384	-0.182	-0.317	-0.002	-0.347
	(0.263)	(0.390)	(0.294)	(0.337)	(0.281)
Wearing Helmet	0.766**	0.339	0.700**	-0.242	-0.379
	(0.314)	(0.459)	(0.334)	(0.418)	(0.364)
Convenience	-0.292	-0.255	-0.144	-0.582	1.013**
	(0.331)	(0.446)	(0.372)	(0.406)	(0.426)
Exercise	0.055	-0.352	0.332	0.962**	-0.629**
	(0.310)	(0.430)	(0.360)	(0.485)	(0.321)
Safety	-0.072	0.552	-0.481	-0.054	-0.410
	(0.288)	(0.402)	(0.335)	(0.369)	(0.319)
Less Expensive	0.274	-0.367	0.582*	0.580*	-0.289
	(0.266)	(0.397)	(0.299)	(0.351)	(0.283)
Environment	-0.325	-0.507	-0.073	-0.376	0.467
	(0.288)	(0.398)	(0.326)	(0.378)	(0.318)
Constant	-0.161	-0.936	-1.452***	-1.631***	-1.372***
	(0.437)	(0.572)	(0.511)	(0.593)	(0.519)
Observations	297	297	297	297	297
Log Likelihood	-191.183	-106.695	-162.620	-128.827	-171.729
Akaike Inf. Crit.	402.366	233.390	345.239	277.655	363.457
Note:					*p<0.1; **p<0.05; ***p<0.01

Odds Ratios

	Divvy substituted for the following modes:				
	Transit	Bus	Train	Automobile	Walking
Gender- Male	1.187	1.126	1.215	0.711	1.136
	(0.304)	(0.424)	(0.349)	(0.230)	(0.316)
Member	0.781	0.570	0.935	0.866	1.380
	(0.206)	(0.220)	(0.276)	(0.295)	(0.397)
Owns Bike	0.681	0.833	0.728	0.998	0.707
	(0.179)	(0.325)	(0.214)	(0.337)	(0.199)
Wearing Helmet	2.152**	1.403	2.015**	0.785	0.684
	(0.675)	(0.644)	(0.673)	(0.328)	(0.249)
Convenience	0.747	0.775	0.866	0.559	2.754**
	(0.247)	(0.346)	(0.322)	(0.227)	(1.174)
Exercise	1.057	0.703	1.393	2.616**	0.533**
	(0.328)	(0.303)	(0.502)	(1.269)	(0.171)
Safety	0.931	1.737	0.618	0.948	0.664
	(0.268)	(0.698)	(0.207)	(0.350)	(0.212)
Less Expensive	1.316	0.693	1.790*	1.786*	0.749
	(0.350)	(0.275)	(0.535)	(0.626)	(0.212)
Environment	0.722	0.602	0.930	0.687	1.595
	(0.208)	(0.239)	(0.303)	(0.259)	(0.508)
Constant	0.851	0.392	0.234***	0.196***	0.254***
	(0.372)	(0.224)	(0.120)	(0.116)	(0.132)
Observations	297	297	297	297	297
Log Likelihood	-191.183	-106.695	-162.620	-128.827	-171.729
Akaike Inf. Crit.	402.366	233.390	345.239	277.655	363.457
Note:					*p<0.1; **p<0.05; ***p<0.01

CONCLUSIONS

- This study is one of the few examples of direct surveying of bike share users in the field and suggests that users are substituting Divvy for a variety of different modes.
- Next steps for this research include extending the geographic area for data collection. Comparing motivational factors in different neighborhoods with different levels of multimodal accessibility could yield different results.