

SUPPLEMENTAL INFORMATION

A.1. Statistical Modelling

A.1.1 Existing User Trip Frequency Analysis

Intent-to-Treat (ITT) Model

$$\begin{aligned}
 y_i &\sim \text{ZINB}(p_i, k_i, \emptyset) \\
 \text{logit}(p_i) &= \alpha_p + \alpha_{p_person[i]} + \sum_{m=1}^M \beta_{pm} X_{mi} \\
 \log(k_i) &= \log(\text{exposure}_i) + \alpha_k + \alpha_{k_person[i]} + \sum_{m=1}^M \beta_{km} X_{mi} \\
 \alpha_k &\sim \text{Normal}(-2, 1) \\
 \alpha_p &\sim \text{Normal}(0, 2) \\
 (\beta_{k1}, \dots, \beta_{km}) &\sim \text{Normal}(0, 0.5) \\
 (\beta_{p1}, \dots, \beta_{pm}) &\sim \text{Normal}(0, 1) \\
 \alpha_{k_person} &\sim \text{Normal}(0, \sigma_{k_person}) \\
 \alpha_{p_person} &\sim \text{Normal}(0, \sigma_{p_person}) \\
 \sigma_{k_person} &\sim \text{HalfStudentT}(2, 0, 1) \\
 \sigma_{p_person} &\sim \text{HalfStudentT}(3, 0, 1) \\
 \emptyset &\sim \text{Gamma}(1, 1)
 \end{aligned}$$

where y_i is the number of Lime trips for respondent i , k_i is the expected number of trip for respondent i in the count component, and p_i is the probability of excess zeros for respondent i , which captures respondents not using Lime at all (zero inflation). α_p and α_k are the intercepts, $\alpha_{p_person[i]}$ and $\alpha_{k_person[i]}$ are vectors of intercepts that vary by person, β_{pm} and X_{mi} are the slopes for their products of predictor variables (m) including interactions and $\emptyset$ is the shape parameter which controls overdispersion. We selected all priors based on prior predictive visual checks to ensure reasonable results before looking at the data.

As-Treated (AT) Model

$$\begin{aligned}
 y_i &\sim \text{NegBinomial}(\mu_i, \emptyset) \\
 \log(\mu_i) &= \log(\text{exposure}_i) + \alpha_k + \alpha_{k_person[i]} + \sum_{m=1}^M \beta_{km} X_{mi} \\
 \alpha_k &\sim \text{Normal}(-1.5, 1) \\
 \alpha_{k_person} &\sim \text{Normal}(0, \sigma_\theta) \\
 \sigma_\theta &\sim \text{HalfStudentT}(3, 0, 1) \\
 (\beta_{k1}, \dots, \beta_{km}) &\sim \text{Normal}(0, 0.1) \\
 \emptyset &\sim \text{Gamma}(2, 1)
 \end{aligned}$$

where y_i is the number of Lime trips for respondent i , μ_i is the expected number of trip count for respondent i , exposure_i is the known observation exposure for respondent-days, α_k is the intercept, β_{km} are the slopes on predictors X_{mi} , and $\emptyset$ is the reciprocal dispersion parameter. We selected all priors based on prior predictive visual checks to ensure reasonable results before looking at the data.

A.1.2. New User Usage Analysis Intent-to-Treat (ITT) Model

$$\begin{aligned}
y_i &\sim \text{HurdleNegBinomial}(\mu_i, \emptyset, \theta_i) \\
\text{logit}(\theta_i) &= \alpha_\theta + \sum_{m=1}^M \beta_{\theta m} X_{mi} \\
\log(\mu_i) &= \log(\text{exposure}_i) + \alpha_\mu + \sum_{m=1}^M \beta_{\mu m} X_{mi} \\
\alpha_\mu &\sim \text{Normal}(0, 1.5) \\
\alpha_\theta &\sim \text{Normal}(2, 2) \\
(\beta_{\mu 1}, \dots, \beta_{\mu M}) &\sim \text{Normal}(0, 1) \\
(\beta_{\theta 1}, \dots, \beta_{\theta M}) &\sim \text{Normal}(0, 2) \\
\emptyset &\sim \text{Gamma}(3, 1)
\end{aligned}$$

where y_i is the number of Lime trips for respondent i , θ_i is the probability that respondent i does not use Lime at all in the observation window, μ_i is the expected number of trips for respondent i , conditional on having at least one trip (excluding excess zero captured by θ_i), exposure_i is the known observation exposure for respondent-days, α_θ and α_μ are the intercepts, $\beta_{\theta m}$ and $\beta_{\mu m}$ are the slopes for their products of X_{mi} (predictor variables, m) including interactions, and $\emptyset$ is the shape parameter which controls overdispersion. We selected all priors based on prior predictive visual checks to ensure reasonable results before looking at the data. It is known *a priori* that most new users do not adopt the service. On the logit scale, a prior centered at 0 corresponds to a 50% zero probability, which does not reflect this prior knowledge. We therefore centered the intercept prior (α_θ) at 2 while the moderately wide standard deviation keeps the prior weakly informative.

As-Treated (AT) Model

$$\begin{aligned}
y_i &\sim \text{NegBinomial}(\mu_i, \emptyset) \\
\log(\mu_i) &= \log(\text{exposure}_i) + \alpha_k + \sum_{m=1}^M \beta_{km} X_{mi} \\
\alpha_k &\sim \text{Normal}(0, 1.5) \\
(\beta_{k1}, \dots, \beta_{kM}) &\sim \text{Normal}(0, 1) \\
\emptyset &\sim \text{Gamma}(3, 1)
\end{aligned}$$

where y_i is the number of Lime trips for respondent i , μ_i is the expected number of Lime trips for respondent i , exposure_i is the known observation exposure (number of respondent-days), α_k is the intercept, β_{km} are the slopes on predictors X_{mi} , and $\emptyset$ is the reciprocal dispersion parameter. We selected all priors based on prior predictive visual checks.

A.1.3. Trip Level Analysis (Trip Distance and Duration)

$$y_i \sim \text{Gamma}(p_i, \emptyset)$$

$$\log(p_i) = \alpha_p + \alpha_{p_person[i]} + \alpha_{p_date[i]} + \sum_{m=1}^M \beta_{pm} X_{mi}$$

Prior for Trip Distance Model

$$\begin{aligned} \alpha_p &\sim \text{Normal}(0, 0.5) \\ (\alpha_{p_person}, \alpha_{p_date}) &\sim \text{Normal}(0, \sigma_\theta) \\ \sigma_\theta &\sim \text{HalfStudentT}(3, 0, 1) \\ (\beta_{p1}, \dots, \beta_{pm}) &\sim \text{Normal}(0, 0.25) \\ \emptyset &\sim \text{Gamma}(2, 0.5) \end{aligned}$$

Prior for Trip Duration Model

$$\begin{aligned} \alpha_p &\sim \text{Normal}(0, 1.5) \\ (\alpha_{p_person}, \alpha_{p_date}) &\sim \text{Normal}(0, \sigma_\theta) \\ \sigma_\theta &\sim \text{HalfStudentT}(3, 0, 0.5) \\ (\beta_{p1}, \dots, \beta_{pm}) &\sim \text{Normal}(0, 0.1) \\ \emptyset &\sim \text{Gamma}(3, 0.5) \end{aligned}$$

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where y_i is the trip distance/duration of Lime trips for respondent i , p_i is the expected trip distance/duration for respondent i . α_p are the intercepts, $\alpha_{p_person[i]}$ are vectors of intercepts that vary by person, $\alpha_{p_date[i]}$ are vectors of intercepts that vary by date, β_{pm} are the slopes for their products of X_{mi} (predictor variables, m) including interactions, and $\emptyset$ is the shape parameter which controls overdispersion. We selected all priors based on prior predictive visual checks.

A.2 Model Parameter Summaries

Table A.1 Estimates of ITT Models for Existing User Trip Frequency Analysis

	Summer Trial (obs=7920)	Winter Trial (obs = 33700)
<i>Count Component</i>		
Intercept	-1.88 (0.17)	-2.7 (0.2)
Time (0/1)	-0.08 (0.05)	0.01 (0.07)
Treatment: \$1.75 flat rate	-0.02 (0.08)	0.01 (0.09)
Treatment: \$2.50 flat rate	-0.13 (0.08)	0.06 (0.09)
Treatment: \$3.25 flat rate	-0.06 (0.08)	-0.12 (0.09)
City (Reference= Bay Area)		
Los Angeles	0.11 (0.06)	0.08 (0.06)
Sacramento	0.01 (0.08)	-0.34 (0.1)
Proportion Weekend	0.01 (0.5)	0 (0.51)
Time (0/1) x Treatment: \$1.75 flat rate	-0.03 (0.06)	0.07 (0.08)
Time (0/1) x Treatment: \$2.50 flat rate	-0.01 (0.06)	-0.02 (0.08)
Time (0/1) x Treatment: \$3.25 flat rate	0.06 (0.06)	0.23 (0.08)
Std. Dev. Intercept	1.2 (0.03)	1.21 (0.03)
<i>Zero Component</i>		
Intercept	-4.79 (0.65)	8.98 (0.64)
Time (0/1)	2.42 (0.34)	0.21 (0.21)
Treatment: \$1.75 flat rate	-0.45 (0.42)	-0.02 (0.28)
Treatment: \$2.50 flat rate	-0.74 (0.43)	0.14 (0.28)
Treatment: \$3.25 flat rate	-0.33 (0.42)	-0.14 (0.28)
City (Reference= Bay Area)		
Los Angeles	0.61 (0.31)	-0.77 (0.2)
Sacramento	0.54 (0.41)	-0.12 (0.32)
Proportion Weekend	-0.09 (1)	-0.01 (0.99)
Time (0/1) x Treatment: \$1.75 flat rate	0 (0.41)	0.14 (0.28)
Time (0/1) x Treatment: \$2.50 flat rate	0.57 (0.42)	0.04 (0.28)
Time (0/1) x Treatment: \$3.25 flat rate	0.22 (0.4)	0.26 (0.29)
Std. Dev. Intercept	6.15 (0.6)	8.05 (0.47)
shape	3.59 (0.21)	3.83 (0.36)

Table A.2 Estimates of AT Models for Existing User Trip Frequency Analysis

	Summer Trial (obs=4046)	Winter Trial (obs = 5446)
Intercept	-1.46 (0.64)	-2.09 (0.72)

Time (0/1)	-0.01 (0.07)	0.34 (0.15)
\$1.75 flat rate Non-Adopter	-0.12 (0.07)	-0.01 (0.06)
\$1.75 flat rate Adopter	0.09 (0.13)	0.08 (0.12)
\$2.50 flat rate Non-Adopter	-0.19 (0.07)	-0.03 (0.06)
\$2.50 flat rate Adopter	0.19 (0.13)	0.22 (0.13)
\$3.25 flat rate Non-Adopter	-0.19 (0.07)	-0.16 (0.06)
\$3.25 flat rate Adopter	0.33 (0.13)	-0.11 (0.14)
City (Reference= Bay Area)		
Los Angeles	0.11 (0.05)	0 (0.04)
Sacramento	0.02 (0.07)	-0.26 (0.07)
Proportion Weekend	0.05 (1.99)	-0.01 (2.02)
Time (0/1) x \$1.75 flat rate Non-Adopter	-0.01 (0.03)	0 (0.05)
Time (0/1) x \$1.75 flat rate Adopter	0.04 (0.05)	0.17 (0.09)
Time (0/1) x \$2.50 flat rate Non-Adopter	0.02 (0.03)	-0.04 (0.05)
Time (0/1) x \$2.50 flat rate Adopter	0 (0.05)	-0.04 (0.09)
Time (0/1) x \$3.25 flat rate Non-Adopter	0.09 (0.03)	0.17 (0.05)
Time (0/1) x \$3.25 flat rate Adopter	0.02 (0.05)	0.4 (0.11)
Std. Dev. Intercept	0.97 (0.02)	0.87 (0.02)

Table A.3 Estimates of Models for New User Trip Frequency Analysis (Summer only)

	ITT Model (obs=1320)	AT Model (obs=69)
<i>Count Component</i>		
Intercept	-2.93 (0.48)	1.15 (0.3)
Treatment: \$1.75 flat rate	0.28 (0.52)	
Treatment: \$2.50 flat rate	0.87 (0.51)	
Treatment: \$3.25 flat rate	0.83 (0.53)	
City (Reference= Bay Area)		
Los Angeles	0.27 (0.46)	0.12 (0.33)
Sacramento	-0.18 (0.56)	-0.15 (0.41)
\$1.75 flat rate Non-Adopter		0.13 (0.49)
\$1.75 flat rate Adopter		0.53 (0.46)
\$2.50 flat rate Non-Adopter		0.99 (0.41)
\$2.50 flat rate Adopter		0.74 (0.43)
\$3.25 flat rate Non-Adopter		0.86 (0.41)
\$3.25 flat rate Adopter		0.1 (0.79)
<i>Zero Component</i>		
Intercept	3.02 (0.29)	
Treatment: \$1.75 flat rate	0.12 (0.34)	

Treatment: \$2.50 flat rate	-0.22 (0.32)
Treatment: \$3.25 flat rate	0.34 (0.37)
City (Reference= Bay Area)	
Los Angeles	-0.22 (0.27)
Sacramento	-0.15 (0.37)

shape	0.29 (0.13)	1.01 (0.18)
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Table A.4 Estimates of Trip Level Models

	Distance Model (obs=64320)	Duration Model (obs=64320)
Date-level Std. Dev.	0.02 (0.00)	0.01 (0.00)
Person-level Std. Dev.	0.49 (0.01)	0.28 (0.00)
Intercept	-0.06 (0.02)	1.81 (0.01)
City (Reference= Bay Area)		
Los Angeles	-0.17 (0.02)	-0.05 (0.01)
Sacramento	-0.03 (0.02)	-0.02 (0.01)
Time of Day (Base: Midnight)		
AM Peak	-0.05 (0.01)	-0.01 (0.01)
Off Peak	-0.04 (0.01)	0.06 (0.01)
PM Peak	0.00 (0.01)	0.09 (0.01)
Night	-0.02 (0.01)	0.07 (0.01)
Weekend (0/1)	0.04 (0.01)	0.01 (0.00)
Temperature (Base: Mild)		
Cold	-0.02 (0.01)	0.00 (0.01)
Hot	-0.01 (0.01)	-0.02 (0.01)
Rainy (0/1)	-0.02 (0.02)	0.04 (0.01)
E-bike (0/1)	0.27 (0.02)	0.06 (0.01)
Time (0/1)	0.01 (0.01)	0.01 (0.01)
\$1.75 flat rate Non-Adopter	0.02 (0.02)	0.02 (0.01)
\$1.75 flat rate Adopter	0.05 (0.04)	0.03 (0.02)
\$2.50 flat rate Non-Adopter	-0.02 (0.02)	0.00 (0.01)
\$2.50 flat rate Adopter	0.03 (0.05)	-0.02 (0.03)
\$3.25 flat rate Non-Adopter	-0.01 (0.02)	0.00 (0.01)
\$3.25 flat rate Adopter	0.11 (0.05)	-0.04 (0.03)
Group Ride (0/1)	0.42 (0.03)	0.11 (0.01)
Time (0/1) x City (Los Angeles)	-0.01 (0.01)	0.01 (0.01)
Time (0/1) x City (Sacramento)	-0.06 (0.02)	0.00 (0.01)
Time (0/1) x \$1.75 flat rate Non-Adopter	0.00 (0.02)	-0.03 (0.01)
Time (0/1) x \$1.75 flat rate Adopter	0.09 (0.03)	-0.03 (0.02)

Time (0/1) x \$2.50 flat rate Non-Adopter	-0.01 (0.02)	-0.01 (0.01)
Time (0/1) x \$2.50 flat rate Adopter	0.07 (0.03)	-0.02 (0.01)
Time (0/1) x \$3.25 flat rate Non-Adopter	0.00 (0.02)	-0.04 (0.01)
Time (0/1) x \$3.25 flat rate Adopter	0.08 (0.03)	-0.01 (0.01)
Distance (log)		0.77 (0.00)
shape	2.95 (0.02)	10.49 (0.06)

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