

- 1) What would you choose as the key measure of success of this experiment in encouraging driver partners to serve both cities, and why would you choose this metric?

One thing to keep in mind about the two cities is the different working hours during weekdays. Whatever metric that is measured is different for weekends, where the possibility of sharing driver partners is highest. We can seek inspiration from the East/West coast of the US in a service that is shared like telecom or travel. What would these companies do to ensure that a shared service is maximized?

The easiest metric is net revenue after the reimbursement and all other service charges. If we want to encourage service in one city during off hours, then we can measure the amount and frequency of reimbursement. We can also use location data to show an increase in off hours in a city, or simply tally the use of toll from driver partners during off hours in each city. If success is measured in increased service between cities instead of profit, the key metric should be toll-use during off hours in each city.

- 2) Describe a practical experiment you would design to compare the effectiveness of the proposed change in relation to the key measure of success. Please provide details on:
 - a. how you will implement the experiment

We first obviously need data on key measures before implementing any changes. A few metrics were put forward above, but the key measure should be increased activity between cities. Using the term “driver partner” implies that an app is involved, so barring any restrictions, the location data should be sufficient to implement this experiment. Tolls can also use cameras to tally registered vehicles that are driver partners.

- b. what statistical test(s) you will conduct to verify the significance of the observation

We can conduct a hypothesis test to see if reimbursement is effective in increasing activity between cities.

H_0 : Toll use before reimbursement = Toll use after reimbursement (we can compare mean total reimbursement, or population proportion of toll use count compared to the total number of drivers)

H_a : Toll use before reimbursement < Toll use after reimbursement

We use a z-test or t-test depending on how much we know about the population variance.

- c. how you would interpret the results and provide recommendations to the city operations team along with any caveats

After choosing an appropriate significance level, the hypothesis test should show whether or not there is statistically significant change after implementing reimbursement. The failure to reject the null hypothesis would just mean that we do not have sufficient evidence to conclude an effect exists. Tolls are meant to reduce traffic by discouraging drivers from using a route. One recommendation is to offer a different incentive to driver partners that increases their use of the toll bridge besides reimbursement. Another recommendation may be to reduce tolls on weekends, when the possibility of intercity traffic is highest.