Ultimate Takehome Challenge

Part 2

1. I would use a ratio of away packages to home packages applied to the total packages delivered which simply equals the amount of away packages.

This would incentivize the drivers to make deliveries in the away city. It would need to be tracked to ensure that drivers weren’t deciding to work exclusively in the away city as they get more credit there. A minimum number of packages should be set on home deliveries required and/or a maximum allowable ratio multiplier.

* 1. Run concurrent experiments on randomly selected sets of drivers from each city. They should be separate as the particularities of the cities will likely affect each city differently. Each driver in the sets would be reimbursed for tolls based upon the return of receipts after each shift. The amount paid would be equal to the toll costs times 105% for all drivers in the control group. The experimental group would be reimbursed an amount equal to the 100% of the toll costs plus 10% for each package delivered in the away city with a minimum multiplier value of 105% and a maximum value 230%. The drivers would be required to deliver at least 1 home package and 25 packages total (assuming an arbitrary number that is equivalent to an average number of shift deliveries). So a 24 away to 1 home ratio would earn 230% as a multiplier and a 13 away to 12 home ratio would earn 230 as a multiplier, while a 0 away to 25 home ratio would equate to a 105% multiplier. This means that experimental group would start benefiting at 1 package delivered to the away city. The amount of crossings that would be paid for would be capped at ¼ of total packages delivered to prevent incentivizing the drivers to simply crossover between each deliver to increase their toll costs and thereby their bonus pay. (this assumes it is reasonable they can make multiple deliveries on a single crossing, if not the case then would have to adjust)
  2. At the end of the experiment you would run a hypothesis test on the results from each city with a null hypothesis of:
     1. Ho - The incentive did not change the average number of packages delivered to the away city (each city is separately calculated)
     2. Ha – The incentive increased the average number of packages delivered to the away city (each city is separately calculated)
  3. A normal distribution would be setup with sample mean and standard deviation taken from the control group and mean of the experimental group would be checked to see if it fell in the out of the 97.5 percentile. If so, then the null hypothesis would be rejected and the incentive would be considered to have a affect. If the incentive was found to have an affect then the city could be told that they have a way to encourage drivers to delivery to the away city off-hours, but would need to factor in an increased rate for packages. It also would be prudent to determine what additional costs the customer would be willing to bear, whether the novelty affect played a role (providing an 105% to the control group should help with this, but should continue to gather information over time) and selecting individual drivers to only deliver to the away city is more efficient.

1. This information could be used to determine what incentive level would need to be used to have drivers deliver more packages to the away city. If a simple flat rate could be found then that rate could be added to the package charges for off-hours deliveries in the away city.