Establishment of new informal transport service

Carole Turley Voulgaris, Transportation Economics and Finance (SES 5437), Harvard GSD

Background

This case is based on research conducted by Tamara Kerzhner.

To test a theory that there may be a market for minibus routes that aren't currently being served, researchers paid operators a subsidy to operate a new radial route in Kampala, Uganda.

Operators were paid 211,000 shillings (about $56 USD) per day to operate the new route during the first half of a three-week pilot, and 150,000 shillings (about $40 USD) per day during the second half of the pilot. After the pilot concluded, some drivers continued to operate the route without a subsidy.

Operating data

The following table summarizes the following operating data for each day during the pilot.

- Day: The day of the pilot program (a value of 1 is the first day of the pilot)
- Day of week: The day of the week
- Vehicles operating: The number of vehicles serving the route on that day
- Runs per day: The total number of runs (a vehicle's trip from one end of th route to the other in either direction) by all vehicles that day
- Passengers: The total number of passengers served by all vehicles that day, based on data reported by the vehicle operators (operators probably misrepresented this data to be lower than the actual number of passengers)
- Fare collected: The total fare collected by all vehicles on that day, based on data reported by the vehicle operators (operators probably underreported these values)
- Subsidy payment: The total payment by researchers to all vehicle operators to cover vehicle operating costs.

Day	Day of week	Vehicles operating	Runs per day	Passengers	Fare collected	Subsidy payment
1	Monday	8	37	148	194500	1688000
2	Tuesday	9	34	129	120000	1899000
3	Wednesday	8	32	159	174500	1688000
4	Thursday	6	24	142	141000	1266000
5	Friday	7	28	185	207000	1477000
6	Saturday	7	28	129	121500	1477000
7	Sunday	7	28	183	184000	1477000
8	Monday	6	24	171	165500	1266000
9	Tuesday	6	24	128	121500	1266000
10	Wednesday	6	24	163	142500	1266000
11	Thursday	6	24	136	128500	900000
12	Friday	6	24	141	141000	900000
13	Saturday	6	24	109	125000	900000
14	Sunday	6	22	115	154500	900000
15	Monday	5	20	79	71500	750000
16	Tuesday	5	20	124	123000	750000
17	Wednesday	4	16	84	88000	600000
18	Thursday	3	12	73	78500	450000
19	Friday	3	12	50	49500	450000
20	Saturday	5	20	144	165000	750000
21	Sunday	5	20	110	109500	750000
22	Monday	6	24	82	92500	900000

After the pilot program (and associated subsidies) ended, the route continued to operate with 5 vehicles per day on week days and market days and 3 vehicles per day on all other days.

Questions for discussion

1. What was the average daily revenue per run (including both fares and subsidies) during the first week of the study?
2. What was the average daily revenue per run (including both fares and subsidies) during the last week of the study?
3. What was the average number of daily runs during the first week of the study?
4. What was the average number of daily runs during the last week of the study?

```
change <- veh_by_day |>
  mutate(week = c(rep(1, 7), rep(2, 8), rep(3, 7))) |>
  filter(week == 1 | week == 3) |>
  mutate(rev_per_run = (`Fare collected` + `Subsidy payment`)/ `Runs per day`) |>
  group_by(week) |>
  summarise(`Average revenue per run` = mean(rev_per_run),
            `Average daily runs` = mean(`Runs per day`))

kable(change)
```

week	Average revenue per run	Average daily runs
1	57663.2	30.14286
3	43199.4	17.71429

5. Based on the data presented here, what would be a reasonable estimate for total number of daily runs that continued in a typical week after the conclusion of the study?

Assuming one weekend day is a market day? 33 vehicles per week, each making 4 runs per day? So 132 runs per week, or 18.9 runs per day?

6. Assuming a constant price elasticity of supply, what is a reasonably guess for the fare revenue that the route generated after the pilot concluded?

Percent change in price:

```
pct_price <- ((change$`Average revenue per run`[1] -
                 change$`Average revenue per run`[2]) * 2) /
  (change$`Average revenue per run`[1] +
                 change$`Average revenue per run`[2])
```

Percent change in supply:

```
pct_supply <- ((change$`Average daily runs`[1] -
                 change$`Average daily runs`[2]) * 2) /
  (change$`Average daily runs`[1] +
                 change$`Average daily runs`[2])
```

Elasticity:

```
elast = pct_supply / pct_price

elast
```

```
## [1] 1.811016
```

A 28% reduction in revenue per trip resulted in a 51% reduction in supply. This is very elastic supply.

Increase in supply after pilot:

```
inc_supply <- ((132/7 -
                change$`Average daily runs`[2]) * 2) /
  (132/7 +
                change$`Average daily runs`[2])
```

Likely increase in revenue per trip:

```
inc_rev = inc_supply / elast

inc_rev
```

```
## [1] 0.03451102
```

Revenue per trip probably increased by 3.5%

```
new_rev_per_trip = change$`Average revenue per run`[2]*(1+inc_rev)

new_rev = new_rev_per_trip*(132/7)
```

None of this makes much sense, since there's probably some substantial underreporting of fares.

7. Given that there appears to have been a market for this route, how would you explain why operators had not already begun to serve it?

   Risk