

MGTA 453 Business Analytics Case Study #2

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Problem

A field experiment has been conducted on the riders of the roller coaster. Participants are photographed during the ride and will choose whether or not to purchase the photo afterward. In this experiment, each participant is offered four different pricing options for these photographs. We have been approached to analyze the effectiveness of these different pricing strategies.

Recommendation

We concluded that the roller coaster company should implement the Name Your Own Price with 50% of revenue going to charity pricing strategy.

Known Attributes

The four pricing strategies for the experiment are provided below.

\$12.95 flat-rate price, i.e., FR \$12.95 flat-rate price with 50% of revenue going to charity, i.e., FR Charity
Name Your Own Price, i.e., NYOP Name Your Own Price with 50% of revenue going to charity, i.e., NYOP
Charity

Assumption:

Assume the nationally recognized patient-support foundation is well known by all riders

Economics Analysis

We analyzed profits, purchase revenues, merchandise revenues, and charity revenues per total and unit revenue per rider for all four pricing strategies. Through analyzing profits, the highest contributor was NYOP with 50% charity pricing, which resulted in \$2.7K net profits and \$0.06 per rider. The lowest contributor was NYOP pricing, which resulted in negative profits, -\$668 net profit and -\$0.02 per rider.

For merchandise revenues, the strategy that attracted riders to purchase the most merchandise of \$2K was NYOP with 50% charity. Other pricing strategies didn't affect merchandise revenue by the same level. Also, merchandise revenue per rider was higher by 11.5%. When the audience is spending large amounts of money for pictures, they also tend to buy other merchandise in the amusement park. We inferred that NYOP with 50% charity added the most value to the society compared with that of FP with 50% charity pricing strategy. The foundation received five times the money from NYOP pricing condition.

Analysis Testing

We conducted a compare means test for fixed rate pricing conditions by comparing the purchase proportions between \$12.95 fixed rate and fixed rate with 50% charity. We concluded that the two fixed price options don't impact a rider's purchasing behavior. Therefore, the gesture to give to charity didn't impact a rider's decision when the picture price was the same. Next, we analyzed the difference in proportion of purchases under NYOP and NYOP Charity conditions. We concluded that the gesture to give to charity did impact a rider's decision when he was given the freedom to buy a picture at any price.

Since we decided NYOP pricing conditions created an impact, we compared the average unit price under the two NYOP conditions. We concluded that the gesture to give to a charity impacted the pricing strategy of each customer. People were willing to pay more for each picture if they knew half of the money was going to charity.

We then analyzed the unit prices for NYOP and NYOP charity. The NYOP unit price is \$1.04 and NYOP charity unit price is \$5.68. The difference is \$4.64 unit price per picture and is substantial because the average unit price of NYOP Charity is around four times larger than the average unit price of NYOP. We concluded riders offered high unit prices and were more generous when charity is involved. Riders offered low unit prices and became economical when outside factors aren't involved. We also analyzed the number of buyers who bought one picture and six pictures and inferred that the revenue from customers who bought six pictures wasn't significant for the company's growth.

Conclusion

NYOP charity is the best strategy since it generated the highest profit and merchandise revenue. The gesture to give to a charity attracted most riders to bid a high unit price, resulting in a high charity unit price. If the company wants to improve its revenue, attracting more customers is a better strategy than letting a customer buy more photos.

Appendix

Please refer to rmd file for code

Flat Rate Pricing Comparison

Suppose:

- H0: The difference between FR and FR Charity in proportion of purchases is equal to zero
- H1: The difference between FR and FR Charity in proportion of purchases is not equal to zero

[1] "The p-value for fixed rate pricing conditions is 0.12689648269386"

The p-value for this test is 0.1268965 and at the 5% significance, it is not significant.

NYOP Pricing Comparison

Suppose:

- H0: The difference between NYOP and NYOP Charity in proportion of purchases is equal to zero
- H1: The difference between NYOP and NYOP Charity in proportion of purchases is not equal to zero

```
[1] "The p-value for Name Your Own Price conditions is 1.44461634380974e-114"
```

The p-value for this test is 1.444616e-114 and at the 5% significance, it is very significant.

NYOP and NYOP Charity Average Unit Price Comparison

Suppose:

- H0: The difference between NYOP and NYOP Charity in the average unit purchase price is equal to zero.
- H1: The difference between NYOP and NYOP Charity in the average unit purchase price is not equal to zero.

Pairwise mean comparisons (t-test)

```
Data      : nyop_data
Variables : Condition, UnitPrice
Samples   : independent
Confidence: 0.95
Adjustment: None
```

Condition	mean	n	sd	se	me
NYOP	1.040	1,641	1.305	0.032	0.063
NYOP Charity	5.680	1,457	4.670	0.122	0.240

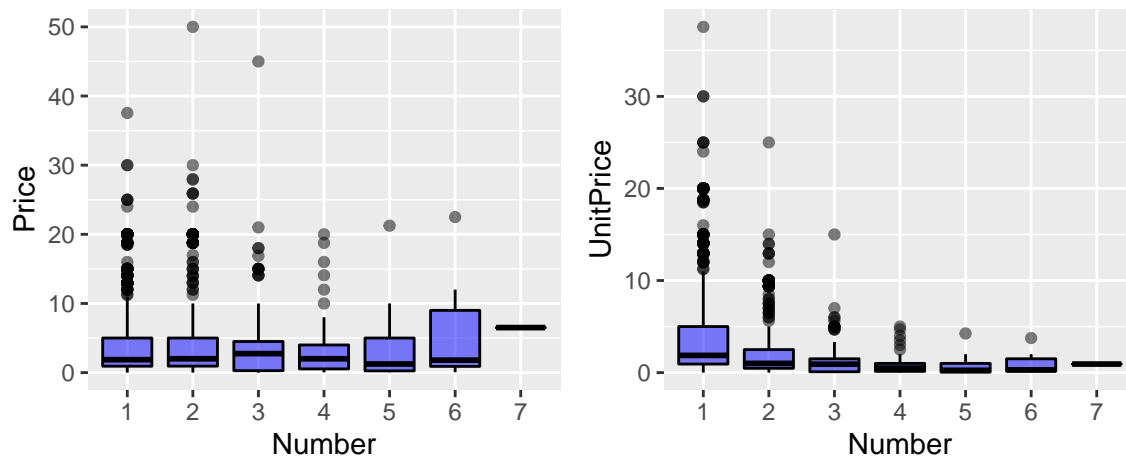
Null hyp.	Alt. hyp.	diff	p.value
NYOP = NYOP Charity	NYOP not equal to NYOP Charity	-4.64	< .001 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

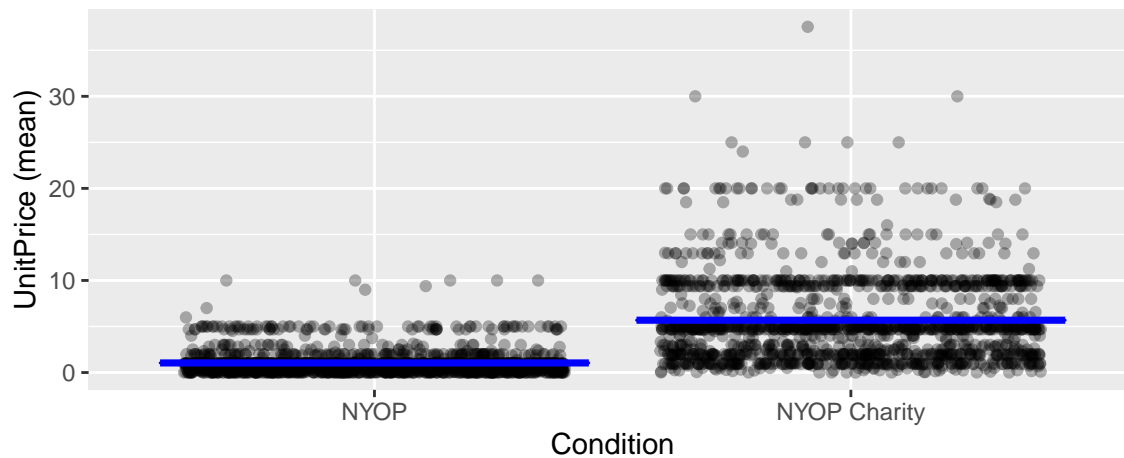
The p-value for this test is <0.001 and at the 5% significance level, it is very significant. This was a [compare means] test of the null hypothesis that the difference between NYOP and NYOP Charity in the average unit purchase price is equal to zero. Using a significance level of 0.05, we do reject the null hypothesis, and conclude that the difference between two average unit purchase prices is not equal to 0.

Since we reject the null hypothesis, it is only possible for us to make type 1 error, which is mistakenly rejected the null hypothesis. The likelihood of committing type I error is 0.05, which is the level of significance we set for hypothesis test. 0.05 indicates that we are willing to accept a 5% chance that we falsely reject the null hypothesis. If we do the analysis by hand for the group that purchased 6 pictures, our results are not exactly the same as those produced in Radiant. We will have the same mean values but different standard deviation and standard error values. It is because we use normal distribution while radiant uses t distribution.

Price and Unit Price



Unit Price by NYOP and NYOP Charity



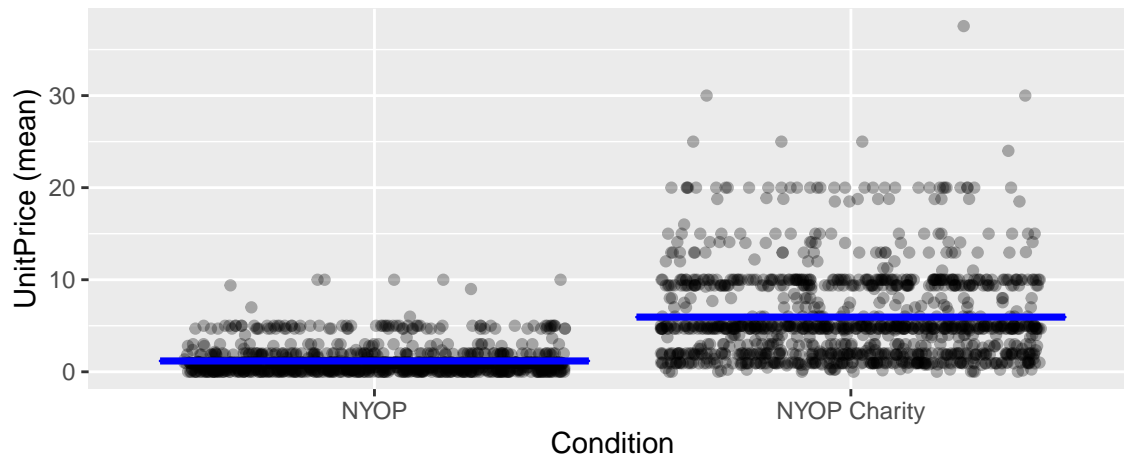
UnitPrice in NYOP Condition

- The range of NYOP unit price is 0 to 10 dollars.
- Most of the data lies between 0 dollars to 5 dollars, except 10 outliers.
- People are willing to pay only a small amount of money(around \$1/picture) under NYOP conditions.

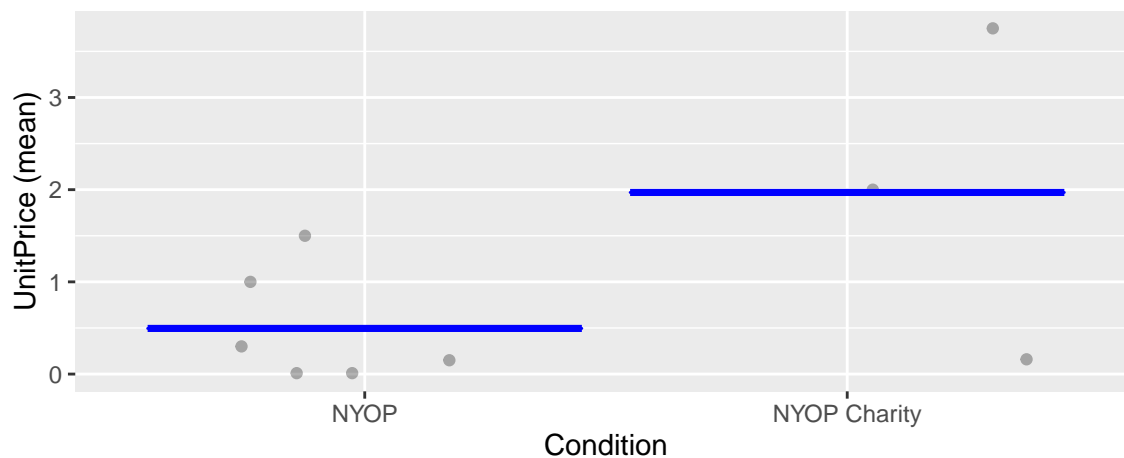
UnitPrice vs NYOP Charity Condition

- The range of NYOP Charity unit price is 0 to 38 dollars.
- Most of the data lies between 0 dollars to 20 dollars, except 8 outliers.
- People are willing to pay a fair amount of money(around \$5/picture) under NYOP charity conditions

Differences in means for people that purchased 1 picture



Differences in means for people that purchased 6 picture



According to the chart, under both conditions, the mean of 1-picture group is larger before filtering the dataset. Conversely, the mean of 6-picture group is significantly smaller than the original data. We can persuasively conclude that the more pictures people are willing to buy, the smaller the amount of money they would like to pay for each picture.

Economics

```
print(p_table)
```

	Condition	Profit	Profit.Rider	Merchandise_Revenue
1	FR	1645.000	0.05828373	11280.98
2	NYOP	-668.200	-0.02364222	11883.90
3	FR Charity	949.500	0.03103753	12322.72
4	NYOP Charity	2656.555	0.06025984	20251.50
	Merchandise_Revenue.rider			
1			0.3996946	
2			0.4204755	
3			0.4028086	

```
4                0.4593739
```

```
print(Charity_Revenue_FR)
```

```
[1] 1165.5
```

```
print(Charity_Revenue_FR/FRC_Riders)
```

```
[1] 0.0380982
```

```
print(Charity_Revenue_NYOP)
```

```
[1] 4808.155
```

```
print(Charity_Revenue_NYOP/NYOPC_Riders)
```

```
[1] 0.1090656
```