Getting to the Ground(s) Truth:

An analysis of coffee shop tipping behavior

W241 - Final Project
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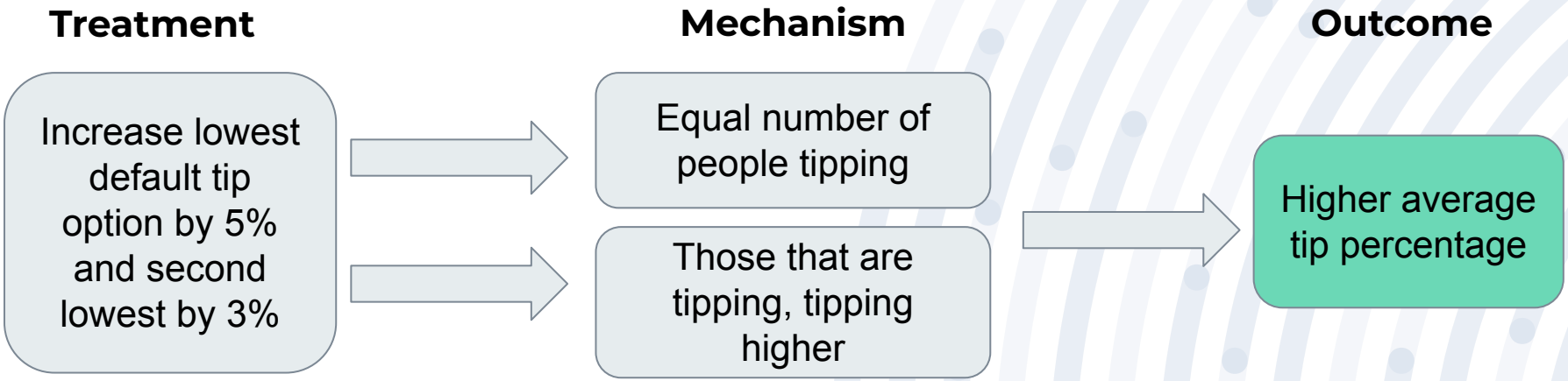
Research Question

- Among those that work at counter service restaurants in the US (such as coffee shops), it's estimated that as high as 60% of their income can come in the form of tips (Azar, 2020)
- As of 2011, it was estimated that annual tips are ~$47 billion in the US food industry (Azar, 2020)

How does changing default gratuity settings impact pre-service tipping behavior?

Hypothesis

Prior research shows that increasing the range of default tipping recommendations on point of sale systems leads to fewer tips but higher overall revenue from those that do tip.



Experimental Design

- We conducted a between subjects, two group, post-test only, randomized experiment at two coffee shops: Mercury Cafe & Ryan Bros.
- **Potential outcomes of interest:** Tip percentage in the treatment and control groups
- **Randomization strategy:**
  - Mercury transactions randomized every hour
  - Ryan Bros transactions randomized at the day level

ROXO diagram:

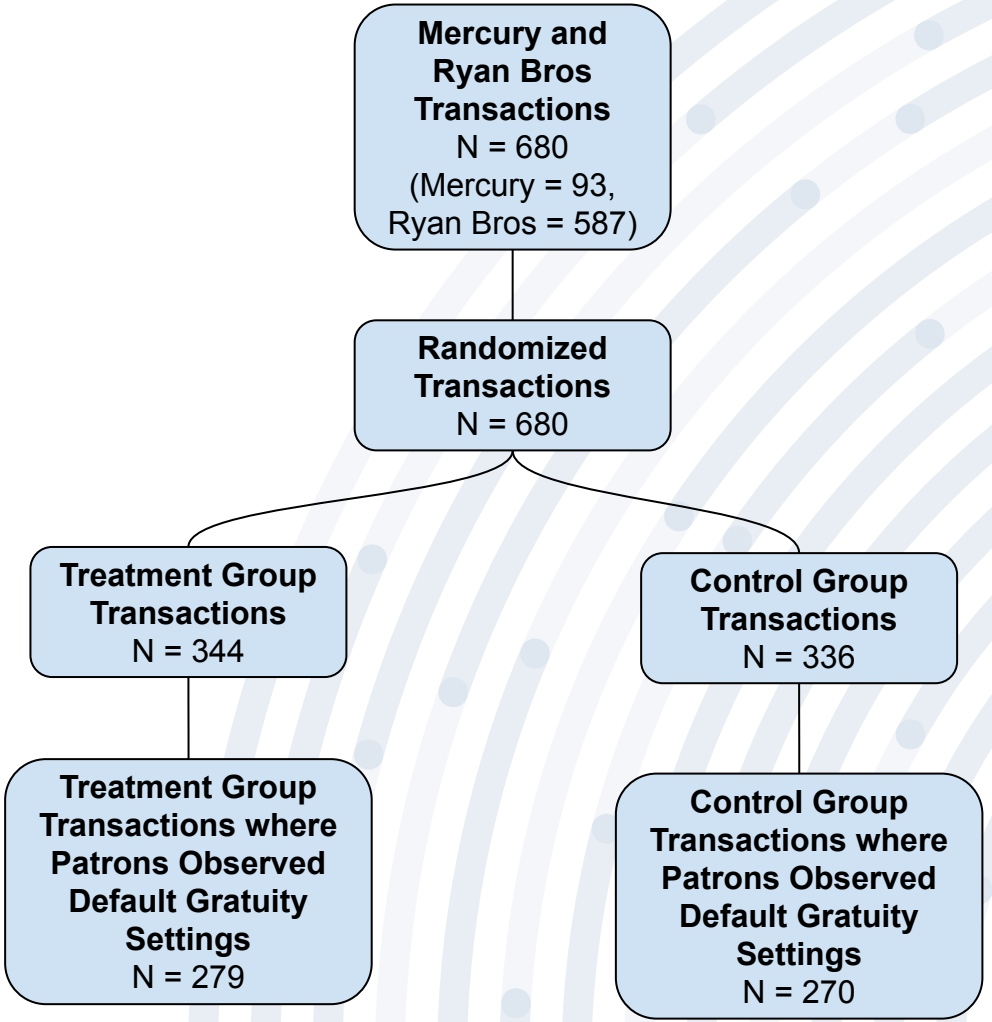
Treatment Assignment

The treatment involved increasing the lowest default tip option by 5% and the second lowest option by 3%.

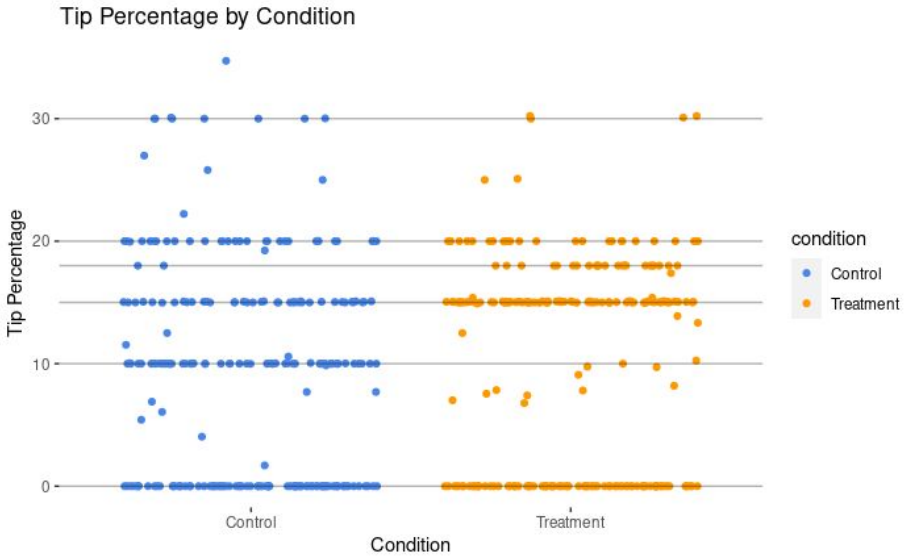
Coffee Shop	Control [Current default settings]	Treatment
Ryan Bro's	**10%**	**15%**
	15%	**18%**
	20%	**20%**
	30%	**30%**
	Custom Tip	**Custom Tip**
	No Tip	**No Tip**
Mercury Cafe	**15%**	**20%**
	20%	**23%**
	25%	**25%**
	Custom Tip	**Custom Tip**
	No Tip	**No Tip**

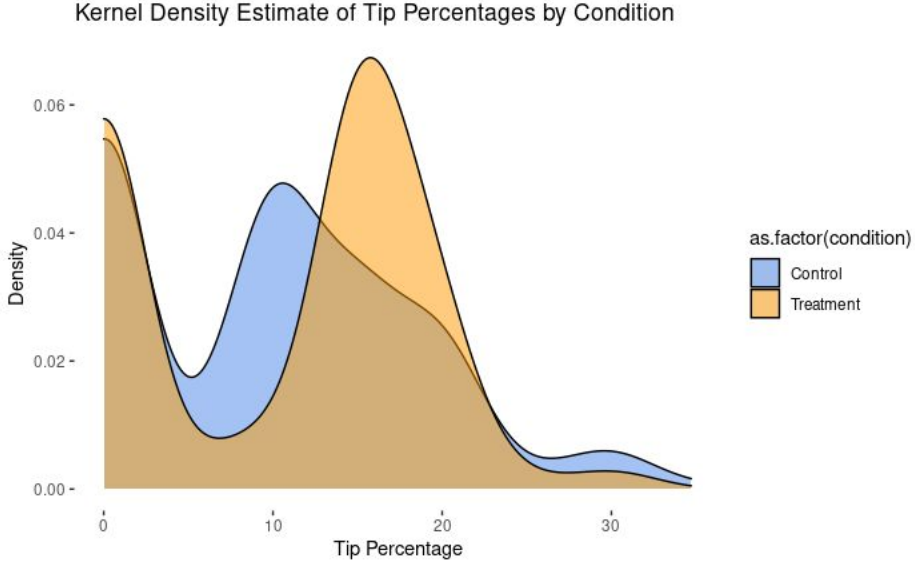
Experimental Flow

- All transactions from Mercury and Ryan Bros patrons that visited the coffee shops on the days of the experiment were randomized in the experiment.
- There was non-compliance driven by individuals who did not pay with a debit or credit card.



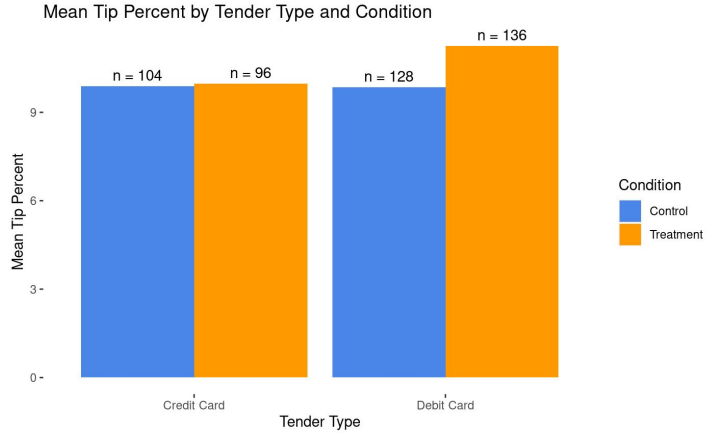
Distribution of Outcome Variables

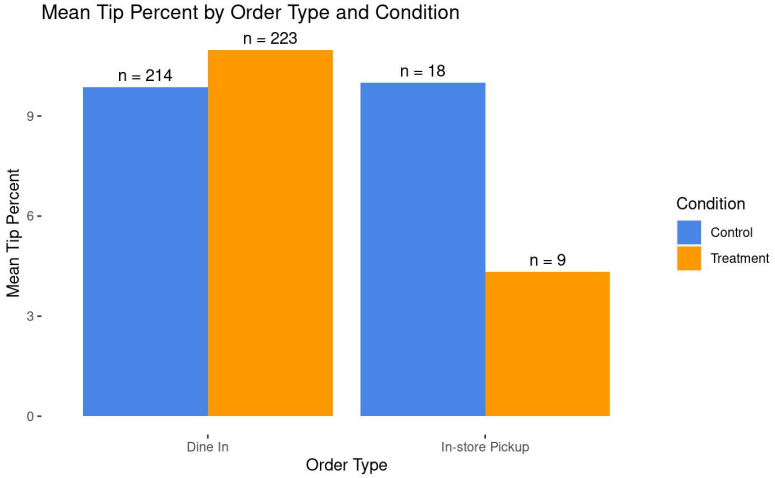


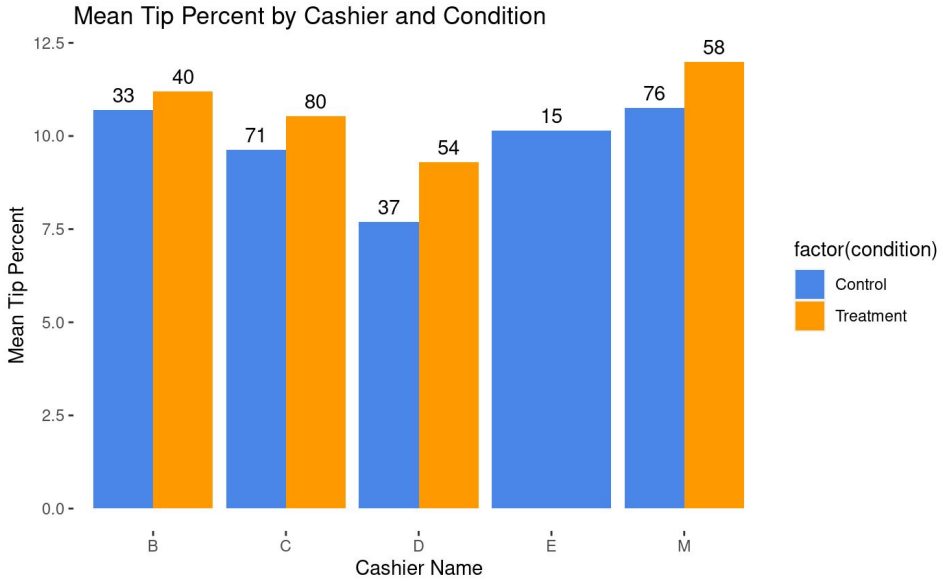


Average tip percent in the treatment group was 1.4% higher than in the control group.

Covariate Analysis







Modeling Plan

Model	Specification	Rationale
1) Baseline	**Tip_percent ~ treat**	Overall treatment effect
2) Location Effect	**Tip_percent ~ treat + location + (treat x location)**	Determine whether there is a statistically significant difference between locations.
3a) Covariates ***Omitted in the following table***	**Tip_percent ~ covariates** Ryan Bros & Mercury modeled separately	Model impact of covariates of each coffee shop on average tip percentage.
3b) Final Model	**Residuals of Model 3 ~ treat + location**	Model treatment effect leveraging covariates from both locations.

Regression Results

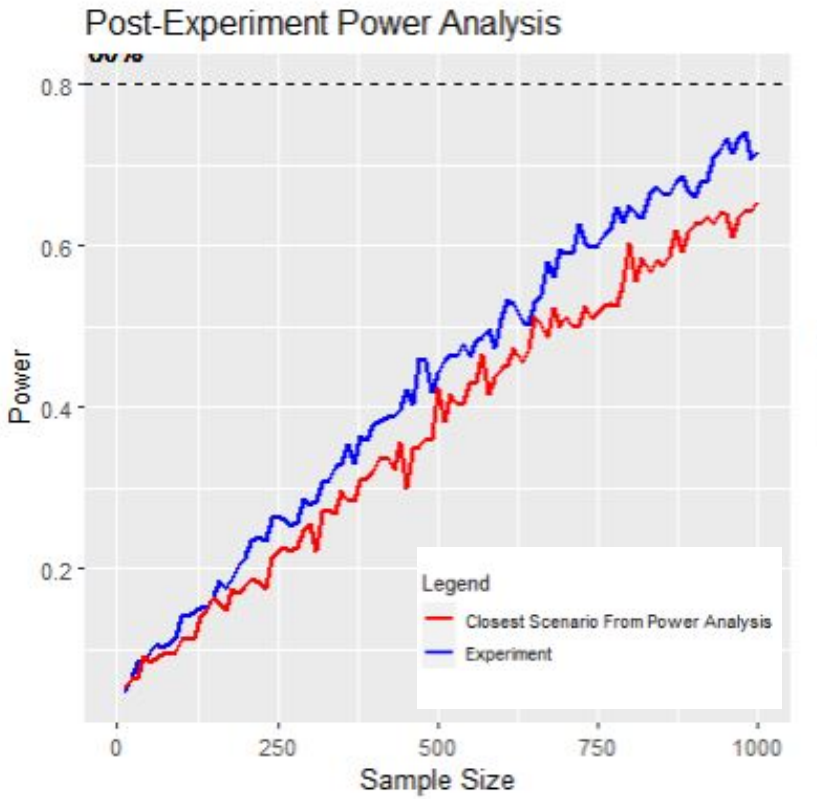
Table 1: Regression Results (Abbreviated)

	Dependent variable:		
	tip_percent		residuals
	Base	Base Interaction	Final
	(1)	(2)	(3)
treat	1.353*	3.829**	1.272*
	(0.713)	(1.665)	(0.703)
is_ryan		0.165	0.076
		(1.349)	(0.918)
treat:is_ryan		−2.972	
		(1.841)	
Constant	9.845***	9.703***	−0.712
	(0.509)	(1.229)	(0.923)
Covariates	No	No	Yes, but in first stage only
Observations	548	548	548
R^2	0.007	0.015	0.006
Adjusted R^2	0.005	0.009	0.002
Residual Std. Error	8.343 (df = 546)	8.324 (df = 544)	8.210 (df = 545)
F Statistic	3.601* (df = 1; 546)	2.691** (df = 3; 544)	1.641 (df = 2; 545)

Note: *p<0.1; **p<0.05; ***p<0.01

All coefficients are reported using robust standard errors.

Post Experiment Power Analysis



- Our experiment was underpowered; assuming there is a statistically different tip percentage between treatment and control, there is only a 50% chance we would have been able to observe it.

- We would have needed to see a treatment effect that was 1-2% higher than what we observed or have collected ~300 additional observations in order to achieve ~70% power.

Conclusions

We did not see a significant difference in average tip percentage when increasing some of the default tip settings.

- There were a similar percentage of non-tippers in both the treatment and control groups as hypothesized.
- Those that did tip, tipped on average ~1.4% higher in the treatment group than in the control group.
- However, this increase in the treatment group was not high enough to be statistically meaningful at a 5% level.

For future research, we would recommend:

- Increasing the treatment tip percentages even more or collecting a much larger sample.
- Identifying coffee shops that have historical customer level tip percentage data, given this is likely a key covariate that would help reduce standard errors of the treatment effect.
- Exploring other treatments that are likely to impact tip percentage such as displaying a sign (“Tips are appreciated!”), or adjusting barista behavior.

Questions for the Class

- Do you have any recommendations for how we might improve or enhance our analysis?

- For future research, are there any experimental design improvements you might make to better understand the impact of default tip settings on tip percentage?

Citations

Azar, Ofer H. 2020. "The Economics of Tipping." Journal of Economic Perspectives, 34 (2): 215-36. DOI: 10.1257/jep.34.2.215 https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.34.2.215

Original Power Analysis