How to improve our on-campus parking system?

Team C

Silvia Manolache, Nicholas Thieme, Shu Wang, Yijia Zhou

Agenda

- Research Question and Motivation
- Questionnaires
- Sample Design and Selection
- Survey Methodologies
- Data Analysis
- Discussions and Conclusions

Motivation

- Over the past year, the rates at the metered parking spots on Frew Street, Tech Street, and around Schenley Park have increased to $2 per hour and payment times increased up until 10 PM
- Research and personal evidence suggests this caused discontent and a large decrease in use of the spaces
  - Article citing CMU Marketing Professor Jeff Galak
  - Meter rates higher than US average

Research Question

- Research question: how satisfied is the CMU community with the current metered parking?
  - Effects on use of spaces?
  - What attributes specifically cause dissatisfaction, if any?
  - Are there any solutions we can propose to ameliorate the situation?
    - Acceptance of coins other than quarters at meters
    - Fewer times when meters must be paid
    - Acceptance of credit/debit cards at meters

Questionnaire

- 3 types of questions
  - Demographic (eg. Gender, year of study at CMU)
  - Satisfaction-measuring
  - Gathering information about use of spaces
- Measure satisfaction for different solutions as well as for current system

Questionnaire - Example

5. Do you use a friend's or family member's car to commute to and from CMU (either regularly or occasionally)?

- ◯ Yes
- ◯ No

For the following questions, please think about how often in THIS SEMESTER (starting January 16, 2012), you have parked at the METERED parking spots on Tech Streets, Frew Street, or surrounding Schenley Park.

6. How many times in an average week in the past semester have you parked at a metered spot on Tech Street, Frew Street, or surrounding Schenley Park? If you leave campus and return on the same day please count each distinct number of times you have parked. Please enter your answer in the blank below.

[ ]

7. How fair do you think the rates for the metered spots on Tech Street, Frew Street, or surrounding Schenley Park are? The rate is $1 for 30 minutes ($2 per hour).

- ◯ Very unfair
- ◯ A bit unfair
- ◯ Neither fair nor unfair
- ◯ A bit fair
- ◯ Very fair
- ◯ No opinion

8. How many times have you gotten a ticket in this semester (since January 16, 2012) because you have parked at a metered spot on Tech Street, Frew Street, or surrounding Schenley Park and the meter has run out or you have failed to pay? Please enter your answer in the blank below.

[ ]

Sample Selection

- *Target Population*:
  - Active and current undergraduate and graduate students and faculty members of the Carnegie Mellon Community
- *Sampling Frame*: Carnegie Mellon C-book
- *Methods*: Random number generator

Survey Methodologies

Student Emails

Generator			
Identifier	Page	Column	Line
74-2-27	74	2	27
12-2-39	12	2	39
93-1-9	93	1	9
31-2-1	31	2	1
100-2-31	100	2	31
34-2-17	34	2	17
53-1-14	53	1	14
86-2-25	86	2	25
68-1-2	68	1	2

Silvia			
Identifier	Page	Column	Line
11-1-23	11	1	23
11-1-35	11	1	35
12-1-12	12	1	12
12-2-25	12	2	25
13-1-36	13	1	36
13-2-1	13	2	1
13-2-16	13	2	16
14-1-22	14	1	22
14-1-31	14	1	31
14-2-37	14	2	37

Nick			
Identifier	Page	Column	Line
11-2-16	11	2	16
11-2-24	11	2	24
11-2-28	11	2	28
12-1-20	12	1	20
12-1-32	12	1	32
12-2-31	12	2	31
13-2-12	13	2	12
14-2-9	14	2	9
14-2-10	14	2	10
14-2-14	14	2	14

Faculty Emails

Have extra numbers for nonresponse purpose

Shu			
Identifier	Page	Column	Line
126-2-27	126	2	27
134-2-14	134	2	14
133-2-40	133	2	40
139-2-19	139	2	19
127-2-8	127	2	8

Yijia			
Identifier	Page	Column	Line
128-1-19	128	1	19
140-1-1	140	1	1
136-1-32	136	1	32
135-2-24	135	2	24
124-1-11	124	1	11

Data Analysis

- Deleted 6 data
  - Missing important items (cost satisfaction/overall satisfaction)
- People who do not own a car
  - Cannot answer questions like “How many times in an average week do you park in XX street ”
  - Still valid if they answered all opinion-based questions
- Fixed some responses
  - For the question above: (numerical values)
    - Once every two weeks → 0.5
    - Several times → average of all car owners

Data Analysis

- Two Response Variables
  - Cost Satisfaction and Overall Satisfaction
  - Unsurprisingly, highly correlated

Model Summary[b]

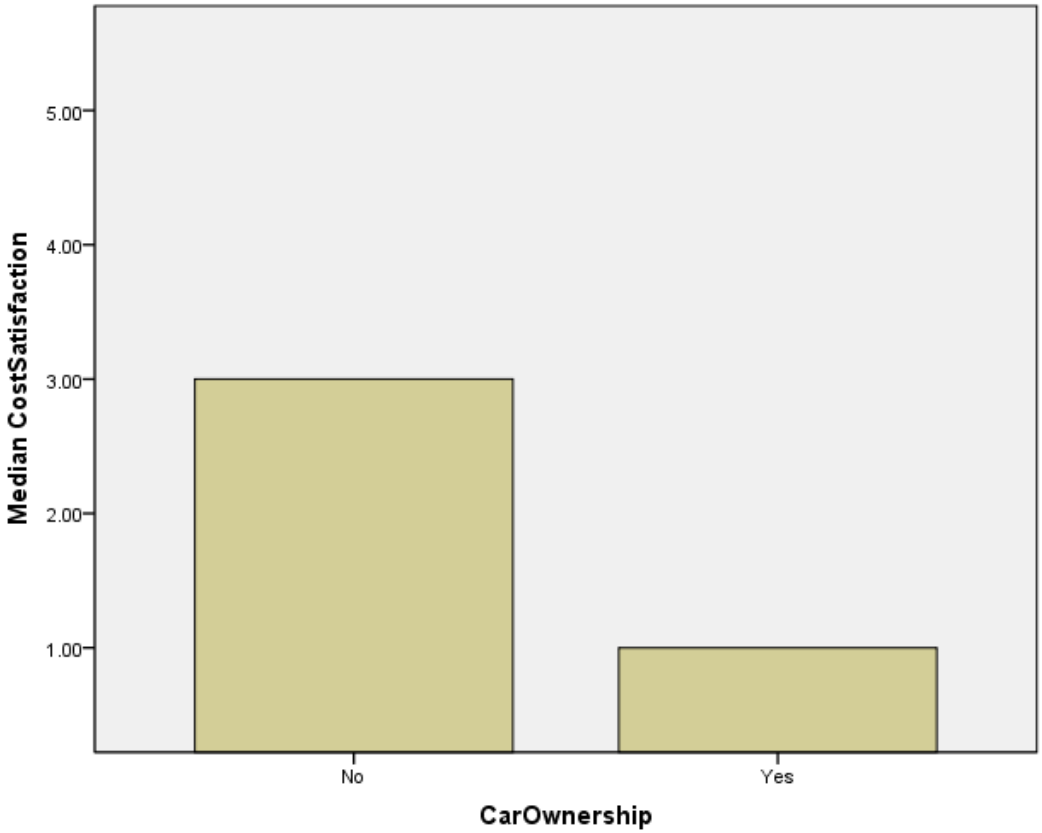
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.833[a]	.695	.692	.49059

a. Predictors: (Constant), OverallSatisfaction
b. Dependent Variable: CostSatisfaction

  - Much more interesting, relationships between explanatory variables and response variables

Data Analysis

- Car Owners were significantly (at the .00 alpha level) less satisfied with the Price of Parking on Campus
- There were very large outliers, so median was used rather than mean (mean is +.3 for yes, and -.7 for no)
- 95% Confidence Interval of the mean is (1.68,2.02)

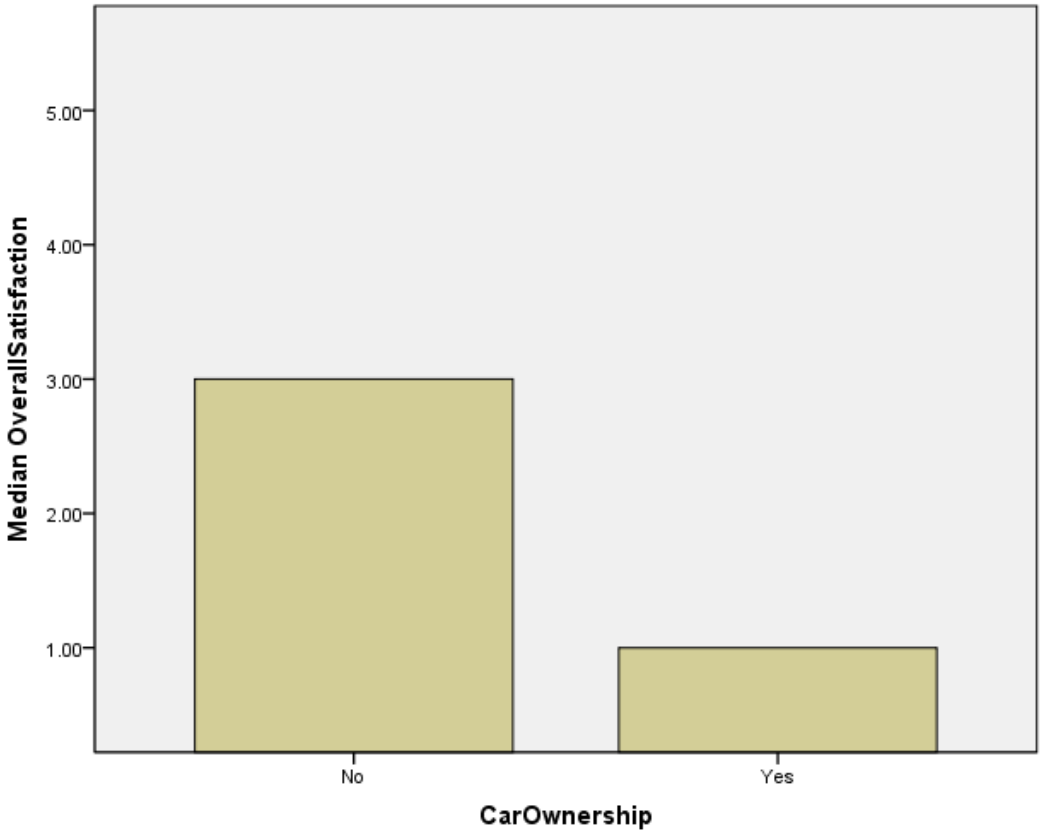


Group Statistics

	CarOwnership	N	Mean	Std. Deviation	Std. Error Mean
CostSatisfaction	No	56	2.3757	.74715	.09965
	Yes	54	1.3107	.66207	.09020

Data Analysis

- Car Owners were significantly (at the .00 alpha level) less satisfied with the Quality of Parking on Campus
- There were very large outliers, so median was used rather than mean (mean is +.51 for yes, and -.59 for no)
- 95% Confidence Interval of the mean is (1.80, 2.14)

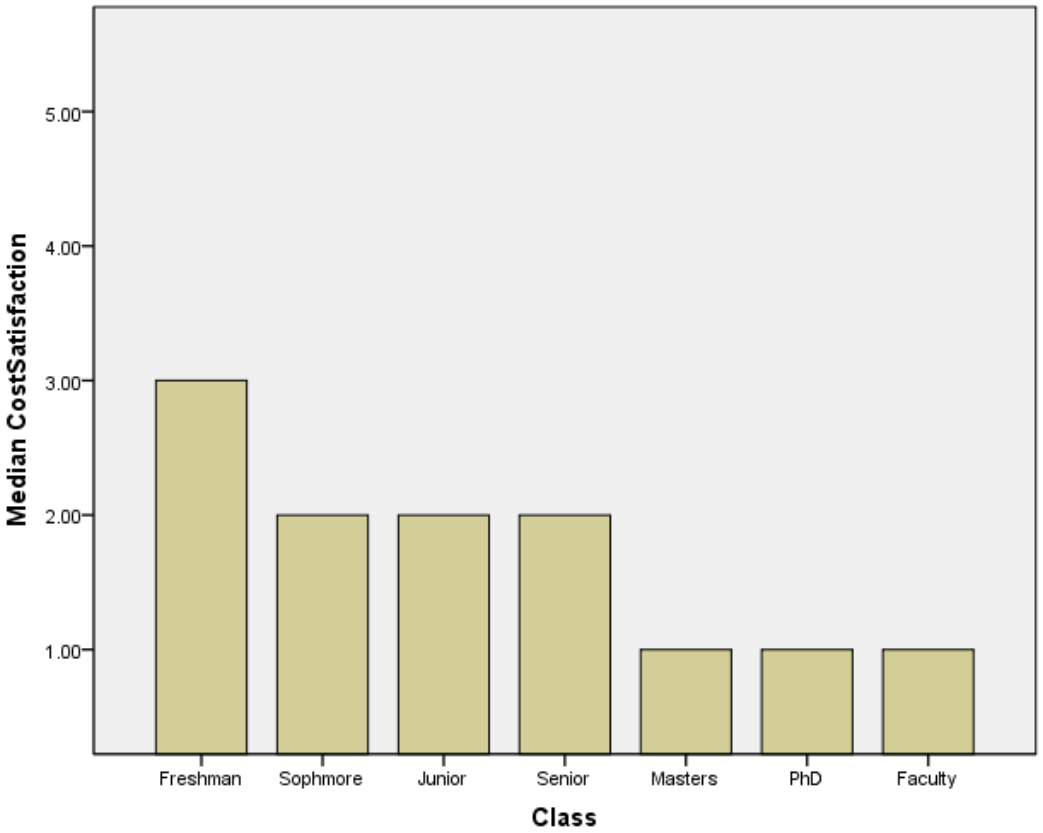


Group Statistics

	CarOwnership	N	Mean	Std. Deviation	Std. Error Mean
OverallSatisfaction	No	56	2.4173	.75300	.10043
	Yes	54	1.5122	.77281	.10528

Data Analysis

- Median Cost satisfaction has a significant relationship (alpha=.00) for every class with Freshman.
- 95% CI for the mean
  - Freshman (2.67,3.09)
  - Sophmore (1.57,2.42)
  - Junior (1.42,2.11)
  - Senior (1.43,2.39)
  - Masters (.88,1.77)
  - Ph.D (1.05,1.71)
  - Faculty (1.13,2.59)
- Significant difference from Freshman and Freshman CI allows us to say that all groups have negative cost satisfaction



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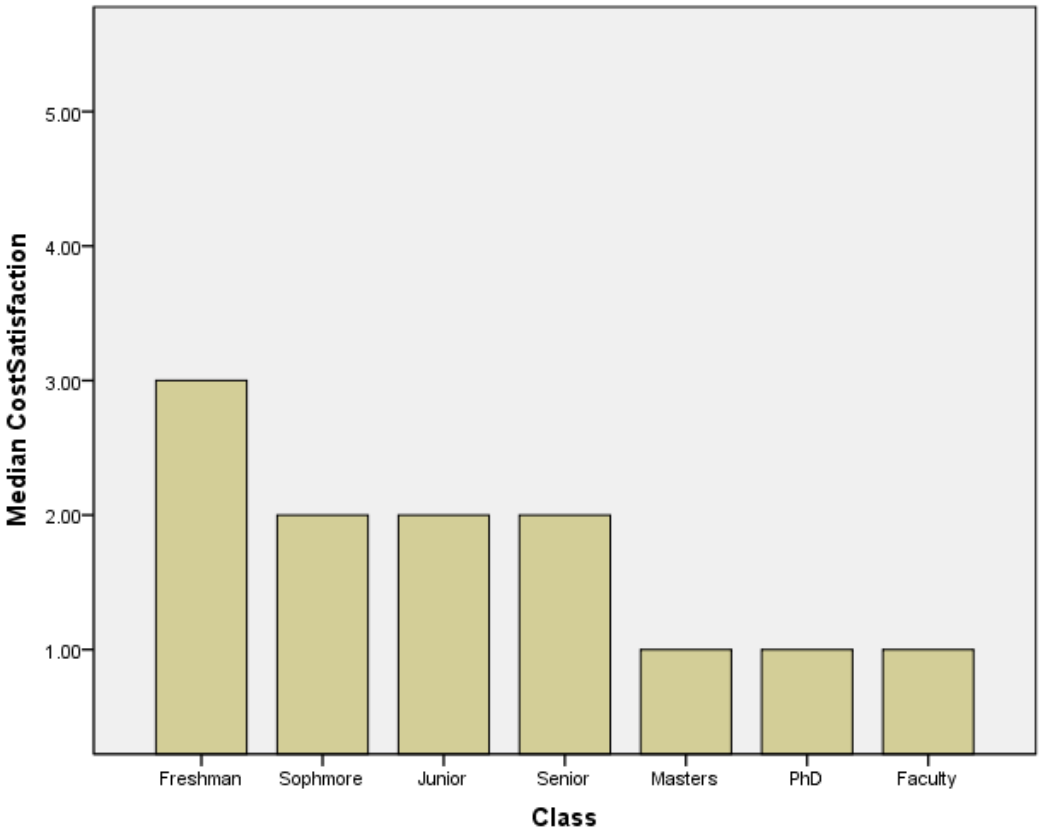

Data Analysis Results

- Car Owners are less satisfied both with the cost and with the quality of the parking on campus.
- All members of the CMU community by class have negative opinions of both the cost of parking, as well as the quality of parking.

Data Collection

- Initial email:
  - students: 799; faculties: 274
  - response rate: 87/1073=8.1%→Extremely Low!!
- Reminder:
  - students: 700, faculties: 164
  - response rate:
  - 53/274=19.3% (faculty); 60/799=7.5% (student)
- Overall: $\frac{113}{1073}$= **10.5%**

Data Collection Period

- Initial email:
  - April 1 – 14 (2 weeks)
  - Only 87 responses
- Reminder email and extra emails:
  - April 15 – 25 (1.5 weeks)
  - Additional 26 responses

Non-responses Analysis

- 10.5% response rate → extremely low
- Unit non-response
  - failure of making contact with the sample units
- Item non-response
  - Approximately 60% skipped questions regarding the situations of parking metered spaces
  - Did not own cars or have relevant parking experience
  - Own campus parking permit → don't care

Take-home message

- Overall: dissatisfaction
  - the cost and the quality of the metered parking spots on campus
- Low response rate: lack of sufficient incentives (i.e. raffle of gift cards)
- Potential conflicts with other parking locations available around the campus

Future work

- Finish our post-survey analysis and complete all writing parts of project
- Design posters and present at MoM ☺