Project Title: Consumer Dynamic Usage Allocation and Learning: Theory and Empirical Evidence

Arun Gopalakrishnan (working with Raghuram Iyengar and Robert Meyer)

Signed by: Raghuram Iyengar

<u>Research Motivation</u>

Consumers frequently face multi-part tariffs (or non-linear pricing plans) when purchasing and using services such as wireless telecommunications, utilities, and online gaming. In comparison to linear pricing, where one pays proportional to usage, multi-part tariffs entail a marginal cost that is often a non-linear function of the consumer's cumulative usage within a fixed time frame. How firms should optimally price with such tariffs has been well studied (Bagh and Bhargava 2012; Iyengar and Gupta 2009; Lim and Ho 2007), but less attention has been given to behavioral effects of such pricing tariffs, specifically on dynamic consumer usage allocation and learning.

Recent empirical evidence suggests that consumers are inattentive to cumulative usage under three-part tariffs (Grubb and Osborne 2012), consumers who switch to three-part-tariffs over-consume wireless minutes (Ascarza, Lambrecht and Vilcassim 2012), and consumers make overspending mistakes with cell-phone usage (Bar-Gill and Stone 2009). Regulators such as the Federal Communication Commission in the United States are therefore interested to know how consumer welfare is affected by multi-part tariff pricing so they can appropriately regulate firms and help consumers make better decisions.

<u>Objectives of this study</u>

We seek to better understand the following questions:

- Do consumers differ in how they navigate linear versus non-linear pricing plans?
- Do consumers learn to navigate such plans more effectively over time?
- What explains behavior within the duration of a plan?
- What aspects of behavior are stable versus transient (such as risk and temporal preferences) ?
- Does plan choice affect subsequent behavior?

We have already conducted a set of three studies to gain an initial feel for how consumers navigate three-part-tariffs, in accordance with our study objectives. The working paper (available at http://ssrn.com/abstract=2152157) that we wrote based on these studies is now under revision, and we seek to conduct additional studies that provide additional insights to improve the paper's contributions.

<u>Methodology</u>

Studying how consumers make dynamic usage choices can be challenging with field data since a multitude of factors can be at play, including consumers' information set, switching costs, beliefs about future utility, plan selection bias, and how much they value each usage opportunity. In particular, the

missing information about the value consumers place on usage opportunities makes it difficult to assess the optimality of their decisions.

We therefore use lab experiments in which subjects play a simulation game in which usage opportunities (e.g. an arriving "simulated" phone call) arrive randomly with utility values from a known probability distribution. We develop the normative optimal policy that a rational consumer should use to make decisions, and use that as the benchmark to understand behavioral deviations observed in the data.

The simulation programs for the new studies are currently under development – we have decided to move to a web-based application to allow for recruitment of subjects from both the Wharton Behavioral Lab and online platforms such as MTurk.

We have lab studies in the Wharton Behavioral Lab commencing the weeks of March 19 and April 2, 2013.

References

Ascarza, Eva, Anja Lambrecht, and Naufel J. Vilcassim, Naufel J. (2012), "When Talk is "Free": The Effect of Tariff Structure on Usage under Two and Three-Part Tariffs," *Journal of Marketing Research*, forthcoming.

Bagh, Adib and Hemant K. Bhargava (2012), "How to Price Discriminate When Tariff Size Matters," *Marketing Science*, forthcoming.

Bar-Gill, Oren and Rebecca Stone (2009), "Mobile Misperceptions," *Harvard Journal of Law & Technology*, 23 (1), 51-118.

Grubb, Michael D. and Matthew Osborne (2012), "Cellular Service Demand: Biased Beliefs, Learning and Bill Shock," Working Paper, Massachusetts Institute of Technology.

Iyengar, Raghuram and Sunil Gupta (2009), "Nonlinear Pricing," in *Handbook of Pricing Research in Marketing*, V. Rao (ed.), Edward Elgar Publishing, 355-383.

Lim, Noah and Teck-Hua Ho (2007), "Designing Price Contracts for Boundedly Rational Customers: Does the Number of Blocks Matter?" *Marketing Science*, 26 (3), 312-326.

<u>Funding needs</u>

The main purposes of requesting Ackoff funding are three-fold. The first is to present the working paper at conferences in order to elicit critical feedback that will improve both the experimental procedure and the analysis/models used in this research. The project is at the stage where such feedback will be highly valuable as we look to revise the paper for second-round submission. The second purpose is to attend conferences where I can enhance my knowledge base by better understanding related literature on structural estimation of models using field data to address similar research questions. The third purpose is to obtain funds to use for experimentation on the MTurk platform, in order to test a variety of manipulations in quick fashion. The details of fund usage are outlined below.

Theory + Practice in Marketing Conference ($1800):

- Our paper has been accepted at the TPM conference held in London May 31-June 1.
- Expected travel expenses: Airfare ($1200 – current pricing on Philadelphia-London route for a return ticket); Hotel (300 pounds for 2 nights or ~$450); Conference registration (100 pounds or ~$150)

Summer Institute in Competitive Strategy (SICS) - $1125:

- I will be attending this conference at UC Berkeley, June 24-28 to engage in collaborative discussions with other researchers, attending the presentation of 15 research papers over the course of a week.
- Expected travel expenses: Airfare ($500 return ticket Philadelphia-San Francisco); Hotel ($625 for 5 nights)

Experiments budget for using online platforms (MTurk) - $500

- Each experiment will require about 200 subjects, at an approximate cost of $0.50 per subject for 10-15 minutes of their time. This results in about $100 cost per experiment.
- 5 different studies exploring different manipulations of three-part-tariffs, allowing for plan choice, and interventions to help consumers will be explored, resulting a total expected cost of $500 on this platform.

The total funding requested is $3,425. Other funding sources I have include an annual PhD research support – however, I have used $700 out of the $1000 allocated for the period July 2012 – June 2013 for previous conferences and expect to have limited remaining funds from this source for the purposes outlined above.

I did not receive Ackoff funding in 2012.