Impact of Unlimited Mobile Data Plan on Media Cosumption: A Natural Experiment

"I would add that consumer demand is not changing the appetite for quality, professionally produced content. Hits drive viewership and consumers live comfortably in this new media world…..In reality, media companies, digital players and measurement are at a crossroad. Content remains king and consumers are steering their own content discovery experience. Length and access are not top of mind for the viewer looking for that quality content; they look for what they want, when they want."

- Dounia Turrill, Senior Vice President for insights at Nielsen[1]

During the third quarter of 2015, the average American adult spent 4 hours and 27 minutes watching live TV, 1 hour 18 minutes browsing Internet on a PC and 1 hour 37 minutes on mobile or web apps on smartphones (Nielsen, 2015). Comparing these values with that of 2013's, we see that live TV time decreased 17 minutes while time spent consuming video on other platforms went up by 45 minutes (Nielsen, 2015). This trend shows that Television has been steadily losing prominence to other media platforms, a trend that is particularly accentuated among the younger generation[2]. The future of TV as a preferred channel to consume media seems to have been challenged.

While the media markets are in a state of transition, we do not know much about how consumers choose to consume content in different media channels – TV, smartphone, and PC. Most of the research studying the impact of Internet on media industries have focused on the music industry e.g. (Zentner, 2006; Oberholzer-Gee and Strumpf, 2007; Liebowitz, 2008) to determine the connection between digital file-sharing and revenues of music record companies. More recently, researchers have started to investigate the impact of Internet on movie sales (Rob and Waldfogel, 2007; Smith and Telang, 2009, 2010) and box-office revenues (Danaher and Waldfogel, 2012).

There is an emerging field of literature (Reis et al. 2015) that aims to study the different channels of media consumption. Still, there is a lot we don't know about how consumers choose between different channels and how this is affected by the conent type. We hope to fill this gap by exploring a natural experiment that occurred in a leading telecommunications company.

Context

Since 2014, I have been collaborating with a leading wireless company in the US that also has satillite TV entertainment division. In January 2015, they announed that all of

[1] http://www.nielsen.com/us/en/insights/reports/2014/the-total-audience-report.html

[2] http://www.nytimes.com/2014/09/08/business/media/nielsen-finds-older-adults-are-embracing-digital-video.html?_r=0

their wireless customers, who have a certain shared plan type, who also have TV subscription will get unlimited mobile data plan. This created an exogenous shock to some customers, who were now free to stream any content in their mobile devices without any data restrictions. We exploit this exogenous shock to setup a Difference-in-Difference famerowk to find the impact of this unlimited plan on the following outcomes:

- Channel of consumption media
    - TV vs. mobile – how do customers choose to watch their content in TV as compared to mobile devices?
- Preferred device of consumption
    - Type of device – mobile, tablet or TV – which type of device is the preferred mode of content consumption?
- Type of content consumed
    - Live content (sports), movies, TV series – Do consumers preference for the channel of consumption as well as the device preference change as per the type of content consumed?

We plan to use those customers who were unaffected by this change as control group. Interestingly, there were several customers who switched to this plan later. We hope to sutdy if the consumption behavior is different for the self selected and auto selected customers. We plan to use different matching techniques to get control and treated groups for the second part of the study.

Major References

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broadcasts on dvd sales and internet piracy 1. mis Quarterly, 33(2):321–338.

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Education

Scheller College of Business, Georgia Tech — **Atlanta, GA, USA**

Ph.D. student in Information Technology Management (3.91 GPA) — 8/2012 – ongoing

Selected coursework: econometrics, machine learning, multivariate statistics, advanced econometrics, survival analysis, microeconomics, industrial organization, game theory, theory construction, PhD seminar – experimental methodology, PhD seminar – operations strategy, PhD seminar – e-commerce, PhD seminar – identification strategies for casual reasoning.

College of Engineering, Guindy - Anna University — **Chennai, India**

Bachelor of Engineering, Mechanical Engineering (8.1/10 CGPA) — 1998-2002

Employment and Professional Affiliations

Student Intern at Advanced Analytics group, AT&T Mobility, Atlanta, GA — 8/2014-ongoing

Georgia Institute of Technology, Graduate Research Assistant Atlanta, GA — 8/2012-ongoing

Tata Consultancy Services, Assistant Consultant — 6/2002–12/2011
Locations: Chennai, India; Greenville, SC; Milpitas, CA; Atlanta, GA.

Research Interests

Topics: Economics of digitization, economics of mobile and Wi-Fi connectivity, digital media consumption across platforms, social media, Big Data, social network analysis, online advertising, Word-Of-Mouth

Methodologies: Econometrics, field experiments, machine learning

Conference Proceedings

Nattamai Kannan, Karthik Babu, Hu, Yu (Jeffrey), and Narasimhan, Sridhar. **"Influence of Social Media in New Product Diffusion: An Exploratory Study**." 2014 Winter Conference on Business Intelligence, February 27 – March 1, 2014

Nattamai Kannan, Karthik Babu, Hu, Yu (Jeffrey), and Narasimhan, Sridhar. **"Influence of Social Media on Flash Sales: An Exploratory Study**." INFORMS Annual Meeting 2014, November 8th, 2014

Nattamai Kannan, Karthik Babu, Hu, Yu (Jeffrey), and Narasimhan, Sridhar. **"Impact Of Technology Upgrade On Customer Satisfaction – A Natural Experiment**." 2015 ISMS Marketing Science June 18-20th, 2015

Nattamai Kannan, Karthik Babu, Hu, Yu (Jeffrey), and Narasimhan, Sridhar. **"Mobile data usage under flexible usage plan**." 2016 Production and Operations Management conference, Orlando, FL - May 2016

Working Papers

Nattamai Kannan, Karthik Babu, Hu, Yu (Jeffrey), and Narasimhan, Sridhar. **"Influence of Social Media in New Product Diffusion: An Exploratory Study**."

Abstract: With the emergence of social media, e-commerce firms are increasingly embedding social media widgets for Facebook likes, Pinterest pins etc. into online product pages in the hopes of creating awareness or Word Of Mouth (WOM) through the spread of likes and pins. In this article we examine the role played by these social media activities in promoting sales of new products in a e-commerce site that uses a limited time period flash sale business model. To study this relationship, we collected both sales and aggregate social media activity data for all new products launched from June 1st, 2013 to July 31st, 2013 by a popular e-commerce platform that specializes in introducing products made by local artisans and craftsman to the US national market. This data covers more than 20,000 products that were on sale for either three or seven days. We use the standard fixed effects model, Arellano-Bond dynamic panel model and Fixed Effects with Instrumental variable estimation to quantify the effect of each social media channel – Facebook Likes, Pinterest Pins and Faves – on sales. Our initial results suggest that while these social media activities do have a statistically significant impact on product sales, their magnitude of impact varies for each channel. These findings would be useful for e-commerce managers as well as site designers to decide on the type of social networks to integrate with the site to get the greatest benefit.

Nattamai Kannan, Karthik Babu, Hu, Yu (Jeffrey), and Narasimhan, Sridhar. **"Impact Of Technology Upgrade On Customer Satisfaction – A Natural Experiment**."

Wireless penetration in the US now exceeds 104%, and 97% of consumers have a choice of at least 3 carriers to choose from[1]. With such high penetration levels and intense competition, wireless companies are trying to gain customer loyalty by introducing promotions[2] and improving service quality[3]. In this article, we examine how the introduction of a technology – Voice Over LTE or VoLTE – impacts customer satisfaction of a leading national mobile carrier in the USA[4]. Since VoLTE allows transmission of voice data through the LTE network instead of the traditional 3G networks, customers enjoy High Definition (HD) voice quality with fewer dropped calls. Since the firm introduced this service in a staggered manner and only customers who have VoLTE enabled phones can enjoy HD calls, we have a natural separation of control group that is not impacted by this upgrade and the treatment group that experiences better quality of calls. We utilize this natural experiment to examine how this increase in call quality impacts customer's satisfaction and loyalty towards this firm by studying two measures – churn and the Net Promoter Score. After controlling for customer heterogeneity and socio economic factors, we find that VoLTE calls do have higher quality. We also segment customers based on their lifecycle with the carrier to understand if there is any variation of this impact across the lifecycle. We contribute to the literature on predictive and causal models of customer churn by developing a framework for a natural experiment that can be utilized for similar technology upgrades.

Nattamai Kannan, Karthik Babu, Hu, Yu (Jeffrey), and Narasimhan, Sridhar. **"Mobile data usage under flexible usage plan**."

In this paper we examine the impact of flexible data usage plan, in which customers can use current month's unused data in the next month – on the daily data consumption. We study daily data usage patterns for randomly selected single line accounts and develop advanced

[1] http://www.ctia.org/your-wireless-life/how-wireless-works/wireless-quick-facts
[2] http://www.wsj.com/articles/sprint-escalates-wireless-price-war-with-half-off-bills-1417533378
[3] http://www.theverge.com/2014/5/22/5742006/tmobile-launches-volte
[4] The company wishes to remain anonymous

econometric models to describe data-usage behavior. We find that under the flexible usage policy, we find consumers increase their data consumption towards the end of the billing cycle. We also develop structural model to identify those customers who are forward looking from the rest.

Nattamai Kannan, Karthik Babu, Hu, Yu (Jeffrey), and Narasimhan, Sridhar. **"Impact of Promoting Free Wi-Fi on Mobile Data Usage: Evidence from a Field Experiment**"

In this research project, we worked with leading national mobile carrier in the USA[5] that provides thousands of Wi-Fi hotspot locations throughout the US in a number of publicly accessible locations. In addition to serving the customers of the individual establishments, our Wi-Fi provider also provides this service free of charge to all of its mobile customers. However, this company does not advertise or promote this service. We seek to understand how promoting the free availability of Wi-Fi hotspots impacts consumer churn, Wi-Fi data consumption, mobile data consumption and upgrades/downgrades to mobile data plan. Initial analysis indicates that promoting hotspots does not adversely affect mobile data usage for most plans.

Teaching

- MGT 4803 Business Analytics – Fall 2014, Fall 2015

Key academic achievements

- Recipient of President/Dean's Fellowship at Georgia Tech
- Created course material for web scraping and delivered lecture for the Business Analytics class
- Served as teaching assistant (TA) for Business Intelligence (Evening MBA), Business Analytics (Masters level course).
- Served as anonymous referee for 2013, 2015 Conference on Information Systems and Technology (CIST)
- Served as anonymous referee for 2013 International Conference on Information Systems (ICIS)

Professional experience summarized by *key functional areas*

TECHNOLOGY CONSULTING:

- I helped clients solve business problems by architecting and implementing IT applications that were built around re-designed business processes. To name a few, I worked in the development of eMatrix Product Data Management at GE, Learning Management System at Johnson & Johnson, Information Security Administration at Primerica Financial Services (Citigroup), and Point of Sale & ProRewards application at The Home Depot (THD).
- I have hands-on experience in developing cross-platform cloud based applications that can run in PC, Mac and mobile devices. I have used technologies such as Java, HTML5, jQuery, JavaScript, SQL, Adobe Flex, RESTful webservice and JUnit for building these enterprise applications.

PROJECT MANAGEMENT:

- As the delivery owner, I managed a 20+ member team working on an onsite-offshore model. I worked with the clients to understand high-level requirements, prepared estimates and created project

[5] The company wishes to remain anonymous

plans. I reviewed business/functional requirements, design documents, code and test cases. I worked with the stakeholders to monitor the team's progress and risks to ensure that the team delivers as per schedule.

- Displayed outstanding results in conducting evaluation and appraisal through comprehensive reviews pertaining to the performance of a team.'

OPERATIONAL EXCELLENCE:

- As a Six Sigma Black Belt, I trained and mentored associates in implementing process improvement initiatives. I received appreciation, including 'Star of the Month' and TCS Gems award, for mentoring 50+ projects and for guiding 30+ associates to earn their Green Belt certifications.
- As an Internal Quality Auditor, I audited projects across TCS to ensure compliance on ISO 9000, SEI CMM and Tata Business Excellence (TBEM) model. I was part of the team that was audited for enterprise CMM certification in 2004.
- I developed curricula and training material for Six Sigma DMAIC/DFSS training and conducted 300+ hours of training on Six Sigma and advanced statistics.
- I served as a judge in the 1st round of International Team Excellence competition held by ASQ in 2010 and 2011. I took part in the item-writing workshop and helped ASQ design its Green Belt examination.

Reference _____

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