The demand for advertising on television: What guides firms' decisions and how their choices change during highly rated telecasts

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The Demand for Advertising on Television
What Guides Firms' Decisions and How Their Choices Change During Highly Rated Telecasts

Peter Stein

Adviser: Professor Julie Holland Mortimer

Statement of the Topic

My thesis primarily revolves around advertiser demand, examining the choices of individual advertisers and trying to determine why they make the choice to advertise during a given telecast. To begin, I try to determine patterns both within and across industries, looking at firms' choices and trying to figure out the underlying mechanics guiding their decision to advertise. After gaining some initial insight, I will conduct my research within the context of telecasts that typically have very high ratings, like the Super Bowl, World Series, or Grammy Awards. My hope is to compare the advertising decisions of firms within an industry both during highly rated telecasts and during "control" telecasts with average ratings in order to draw some insights into the demand for advertising on TV.
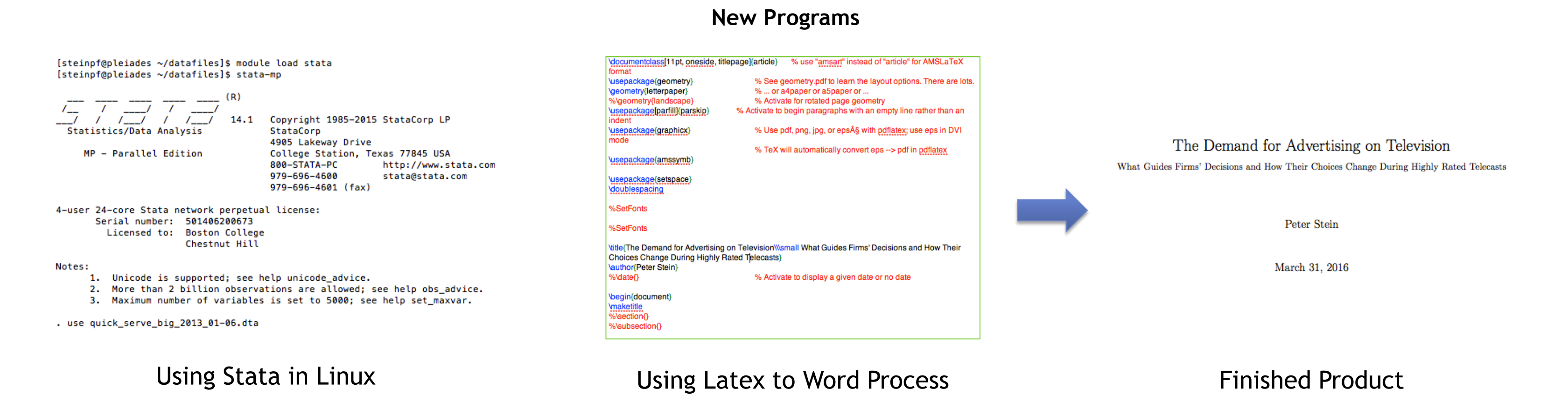
Objectives

I hope to complete this research across multiple industries that advertise a reasonable amount, so I've geared my time towards studying the Quick Serve Restaurant, Candy, and Wireless Telecommunications industries. In addition to analyzing each industry on its own, I do inter-industry comparisons as well, looking at whether firms tend to break from their advertising patterns during a highly rated telecast in some industries more than others. The Stata output below displays how much each of my chosen industries advertises compared to others in the market. The three I've chosen are three of the biggest television advertisers.

```
            ad_category_name |    Freq.   Percent      Cum.
          Chocolate Candy Bars |   74,893     0.79     16.60
           Cigars & Tobacco |        2     0.00     16.60
               Citrus Fruits |    2,292     0.02     16.63
        Non-Bar Chocolate Candy |   74,444     0.78     55.29
Non-Carbonated Soft Drinks Corporate .. |      225     0.00     55.29
Non-Carbonated Soft Drinks General Pr.. |       35     0.00     55.29
      Non-Carbonated Soft Drinks NEC |        5     0.00     55.29
          Non-Carbonated Waters |    2,596     0.03     55.32
            Non-Chocolate Candy |   41,907     0.44     55.76
         Quick Serve Restaurants |  241,519     2.54     88.10
Radio Networks & Syndicated Programmers |      769     0.01     88.11
Radio Networks & Syndicated Programme.. |        4     0.00     88.11
               Radio Stations |        5     0.00     88.11
       Railroad (Incl Industrial Dev) |    4,716     0.05     88.16
              Railroad Travel |        4     0.00     88.16
        Wireless Telecom Providers |  127,816     1.34     99.68
Women's Scents, Fragrances, Perfumes |    7,788     0.08     99.76
Womens Electric Shavers & Hair Removers |        5     0.00     99.76
       Womens Health Care Products |   11,214     0.12     99.87
```

This table displays statistics from the first 6 months of 2012

Methods

New Programs

```
[steinpf@pleiades ~/datafiles]$ module load stata
[steinpf@pleiades ~/datafiles]$ stata-mp

   /__    /   ____/   /   ____/
  /   /   /   /___/   /   /___/   14.1   Copyright 1985-2015 StataCorp LP
 /___/   /   /___/   /   /___/          StataCorp
   Statistics/Data Analysis             4905 Lakeway Drive
        MP - Parallel Edition           College Station, Texas 77845 USA
                                        800-STATA-PC        http://www.stata.com
                                        979-696-4600        stata@stata.com
                                        979-696-4601 (fax)

4-user 24-core Stata network perpetual license:
       Serial number: 501406200673
         Licensed to:  Boston College
                       Chestnut Hill

Notes:
      1.   Unicode is supported; see help unicode_advice.
      2.   More than 2 billion observations are allowed; see help obs_advice.
      3.   Maximum number of variables is set to 5000; see help set_maxvar.

. use quick_serve_big_2013_01-06.dta
```

Using Stata in Linux	Using Latex to Word Process	Finished Product

Revising my Strategy: From Regressions to Tables

Table 1: Taco Bell Rival Effects Regression

Variable	Coefficient
McDonald's	-.035
	(.056)
Sonic	.171
	(.061)
Subway	.179
	(.059)
Constant	.679
	(.062)
Number of Observations	R-Squared	Adjusted R-Squared
171	.081	.065

Table 3: Quick Serve Restaurant Crossover Data (NBA)

Restaurants	Ad %	BK	DQ	KFC	LJS	McD	Son	Sub	TB	Wendy's
Burger King	.455	1	.098	.438	.008	.371	.363	.531	.816	.195
Dairy Queen	.067	.658	1	.368	.053	.184	.368	.421	.737	.237
KFC	.520	.382	.048	1	.003	.324	.338	.515	.850	.211
Long John Silver's	.025	.143	.143	.071	1	.857	0	.143	.214	.429
McDonald's	.373	.452	.033	.452	.057	1	.281	.519	.786	.257
Sonic	.307	.538	.081	.572	0	.341	1	.457	.908	.168
Subway	.513	.471	.055	.522	.007	.377	.273	1	.889	.284
Taco Bell	.810	.458	.061	.546	.007	.362	.344	.564	1	.226
Wendy's	.226	.394	.071	.488	.047	.425	.228	.646	.811	1

Results

Top Genres in the Wireless Industry

TOP GENRES	AT&T	Boost Mobile	Consumer Cellular Wireless
Genre 1	Reality (36,078)	Comedy (1,741)	Documentary (1,814)
Genre 2	Movies (25,127)	Movies (1,479)	News (1,094)
Genre 3	Sports (20,652)	Reality (1,427)	Reality (733)
Total Telecasts	160,422	8,253	6,421

TOP GENRES	Sprint	Straight Talk Wireless	T-Mobile
Genre 1	Sports (12,639)	Reality (4,154)	Reality (13,356)
Genre 2	Reality (8,822)	Movies (3,278)	Movies (10,023)
Genre 3	Movies (3,638)	Documentary (1,658)	Sports (9,058)
Total Telecasts	44,597	15,665	60,835

TOP GENRES	Verizon	Virgin Mobile
Genre 1	Sports (25,190)	Reality (3,886)
Genre 2	Reality (18,620)	Music (2,241)
Genre 3	Movies (13,110)	Movies (1,894)
Total Telecasts	109,049	12,962

Looking at Genre and Day Part: two tables that illustrate some key summary statistics in the Wireless Telecommunications and Quick Serve Restaurant industries

Overall Wireless Top Genres
Reality (91,225)
Sports (69,467)
Movies (62,325)
Comedy (43,108)
Documentary (35,049)
Drama (30,466)
News (29,140)
Music (29,022)
Total: 438,203

Overall Quick Serve Top Day Parts
Daytime (150,757)
Prime (142,189)
Late Fringe (93,612)
Early Morning (83,122)
Early News (81,655)
Early Fringe (78,178)
Total: 756,372

Top Day Parts in the Quick Serve Restaurant Industry

TOP DAY PARTS	Burger King	Dairy Queen	KFC
Day Part 1	Prime (21,767)	Daytime (9,678)	Daytime (13,474)
Day Part 2	Daytime (21,085)	Late Fringe (5,379)	Prime (10,427)
Day Part 3	Late Fringe (14,778)	Early Fringe (5,189)	Early Fringe (6,573)
Total Telecasts	113,631	40,994	57,880

TOP DAY PARTS	Long John Silver's	McDonald's	Sonic
Day Part 1	Daytime (12,967)	Daytime (22,068)	Prime (9,469)
Day Part 2	Prime (9,004)	Prime (18,177)	Daytime (8,304)
Day Part 3	Early Morning (5,817)	Early Morning (16,031)	Late Fringe (6,510)
Total Telecasts	49,820	101,909	49,296

TOP DAY PARTS	Subway	Taco Bell	Wendy's
Day Part 1	Daytime (24,463)	Prime (16,280)	Daytime (18,934)
Day Part 2	Prime (23,635)	Daytime (11,274)	Prime (15,497)
Day Part 3	Late Fringe (16,536)	Late Fringe (10,395)	Late Fringe (11,609)
Total Telecasts	123,482	73,931	83,633

The largest firms do not vary much at all from the industry trends when it comes to selecting genres and day parts. Small firms, on the other hand, will distinguish themselves from the larger firms when it comes to top genres and day parts. Logically, such behavior makes sense, as the smaller firms may try to find a new market segment in which to compete so as to avoid being overshadowed by larger competitors.

Data

I have been provided the data I need for my research from professor Julie Holland Mortimer. Professor Mortimer obtained an extremely extensive dataset that covers every advertisement run on every network for three years straight (2011-2013). The data contain all the relevant information about the ad, about when and where the ad ran, as well as a plethora of demographic information, covering 105 demographic cuts with 4 variables each. A successfully merged copy of all telecasts, demographics, and ads from the first 6 months of 2012 has over 9 million observations and over 450 variables. These figures don't even count the ~7 million unmatched telecast observations.

Sample Observation

```
           unique_id |  program_name  | progra~o |  series~o
10_21898282_1685242800000 | 2013 NBA Playoffs | 21898282 | 2211891

episode_title
Eastern Conference Finals: Game 3: Miami Heat at Indiana Pacers from Bankers Life ..

episod~o |  year | tv_rat~g |  genre | networ~e | networ~o | national_airdat~e
   ECF3  |  2013 |   NONE   | Sports |   TNT    |    10    | 20130527 03:00:00

runti~es |  original_airdate  |  type | hh_rat~g | average~e | actual~e |   share
    150  | 20130526 00:00:00  |       | .0039735 | 453663.4 | 32956.17 | .0177797

num_hhs  | num_stbs | num_a~bs | num_ho~s | num_a~rs | averag~d |  eventtime
933230.3 | 955575.1 |  111659  | 1134159  | 82390.42 | .2951501 | 1.685e+12

dem~x376 | dem~g376 | dem~e376 | dem~s376 | dem~x377 | dem~g377 | dem~e377
1.007632 | .0040038 | 50793.78 | 12686477 | .9357886 | .0037183 | 44954.71
```

Gap in the Observation for 420 demographic variables...

```
de~g5070 | de~e5070 | de~s5070 | de~x5071 | de~g5071 | de~e5071 | de~s5071
.004479  | 114127.9 | 25480486 | 1.069009 | .0042477 | 96507.83 | 22720265

_merge1  | ad_national_air~e | ad_pod~n | ad_rat~g | ad_ave~e |  ad_no
matched (3) | 20130527 03:28:01 |  3.4.7  | .0047364 | 540777.6 | 519916

   ad_name    |  ad_id   | ad_parent_name | ad_advertiser_name | ad_bran~e
The Craving is Back | 12489442 | Yum Brands Inc | Taco Bell Restaurant | Taco Bell

  ad_product_name  | runti~ds | ad_category_name  |  _merge2
Taco Bell Beefy Crunch Burrito | 30 | Quick Serve Restaurants | matched (2)

  _merge3  | bad_ra~g | bad_in~x | bad_avg | bad_hhue | daypar~3 | daypar~1
matched (3) |         |          |         |          |   03    |    3

daypar~2          daypart
  03:00           Overnight
```

Next Steps and Acknowledgments

Moving forward from here, I will begin work on looking at how ratings affect ad placement and build a decision tree to start predicting how these firms should react given a particular highly rated telecast. Following that, I will create a dataset of highly rated programs and see if I can identify whether or not firms are breaking out of pre-established patterns.

I would like to sincerely thank Professor Julie Holland Mortimer for her help and support throughout this process. Without her, none of this research would have been possible.

I would also like to thank Professor Bob Murphy for encouraging me to write a thesis last fall. Thanks for the support!