**MARKETING SCIENCE**
Vol. 00, No. 0, Xxxxx 0000, pp. 000–000
ISSN 0732-2399 | EISSN 1526-548X | 00 | 0000 | 0001

**INFORMS**
DOI 10.1287/xxxx.0000.0000


# Supplementary Material for: Predicting Individual Behavior with Social Networks

Sharad Goel, Daniel G. Goldstein
Microsoft Research, New York, New York, 10011

## Appendix A: Additional Figures and Model Parameters

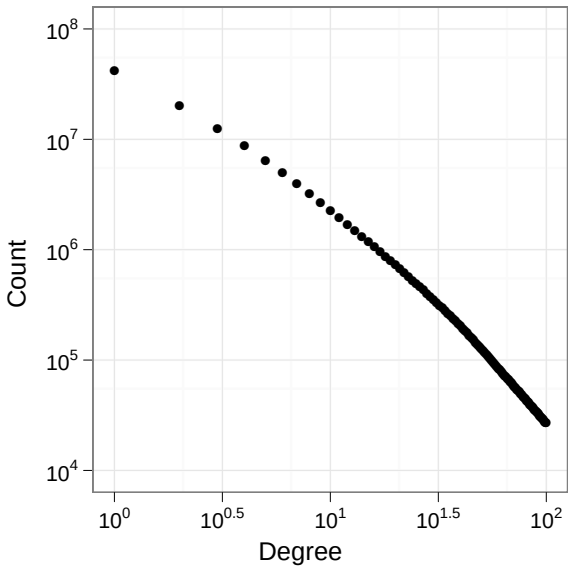


**Figure A1** **Distribution of the number of social contacts per individual (degree) in the social network. To avoid counting mailing lists, a connection was only established between users if messages were exchanged in both directions during the two-month period.**

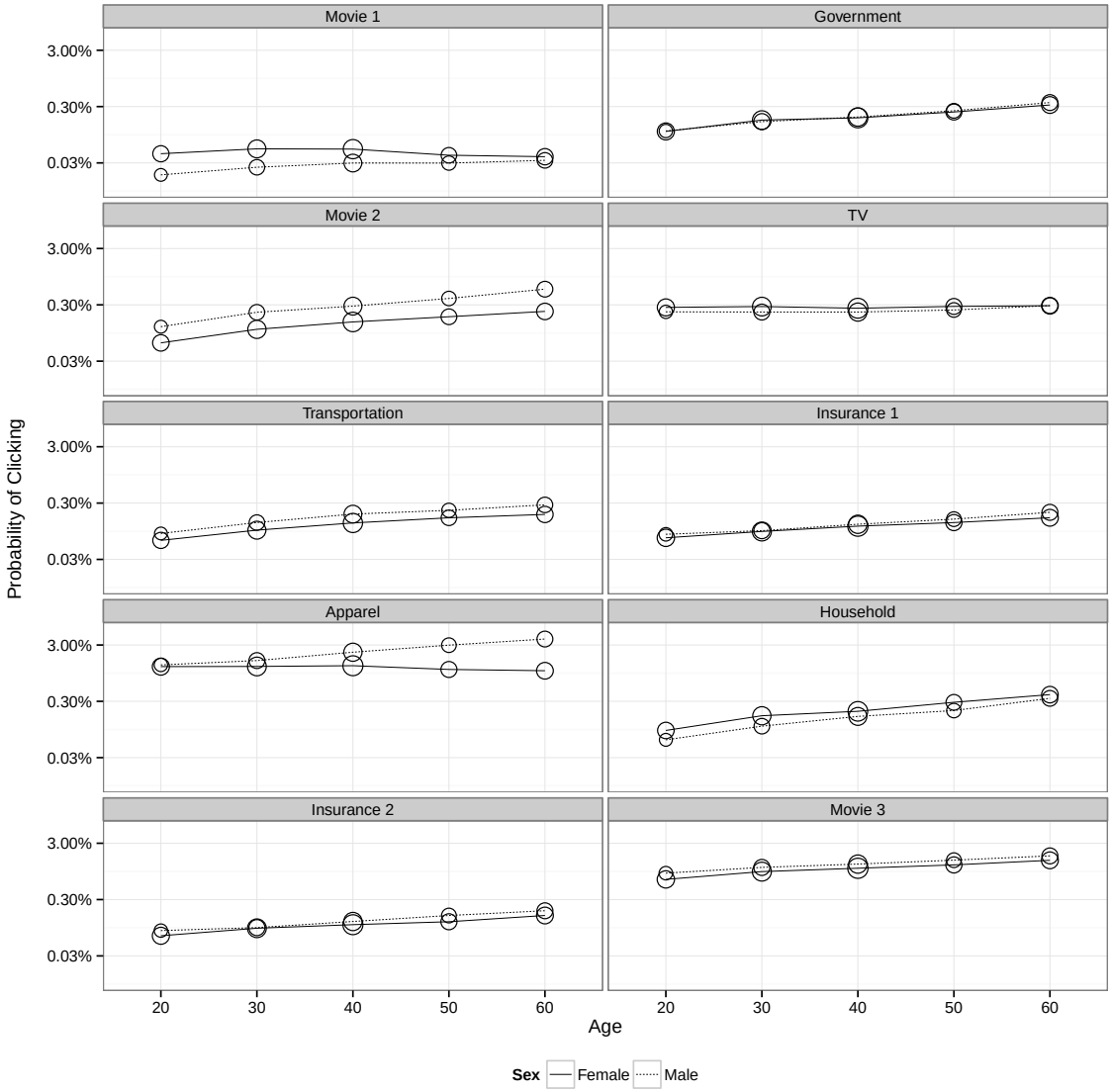


**Figure A2** **Distribution of age and sex in the advertising domain and how both variables relate to probability of clicking on the ad. The area of each point is proportional to the number of individuals in the corresponding category.**

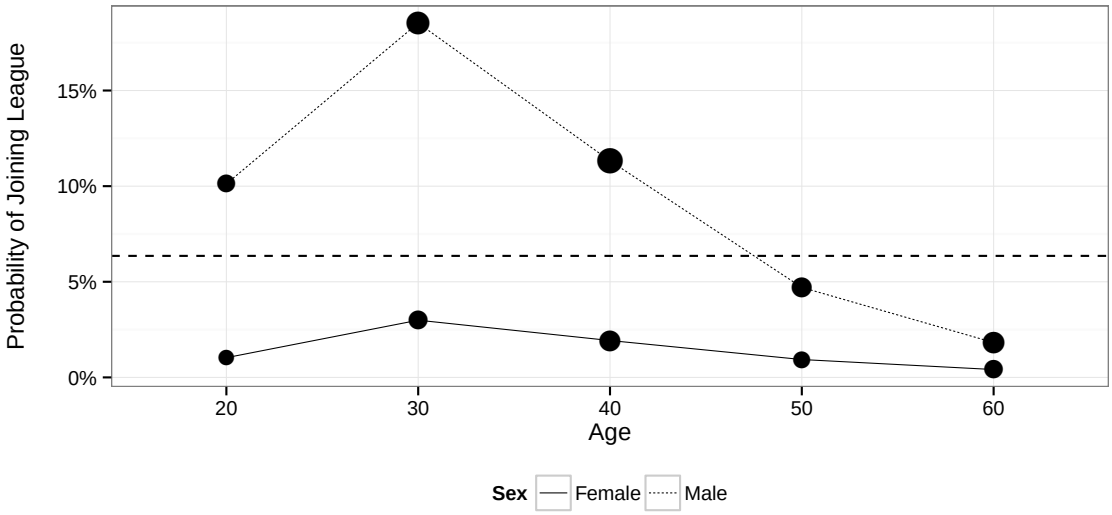


**Figure A3** **Distribution of age and sex in the fantasy football domain and how both variables relate to probability of joining the league. The area of each point is proportional to the number of individuals in the corresponding category. The dashed line indicates the overall average participation rate.**

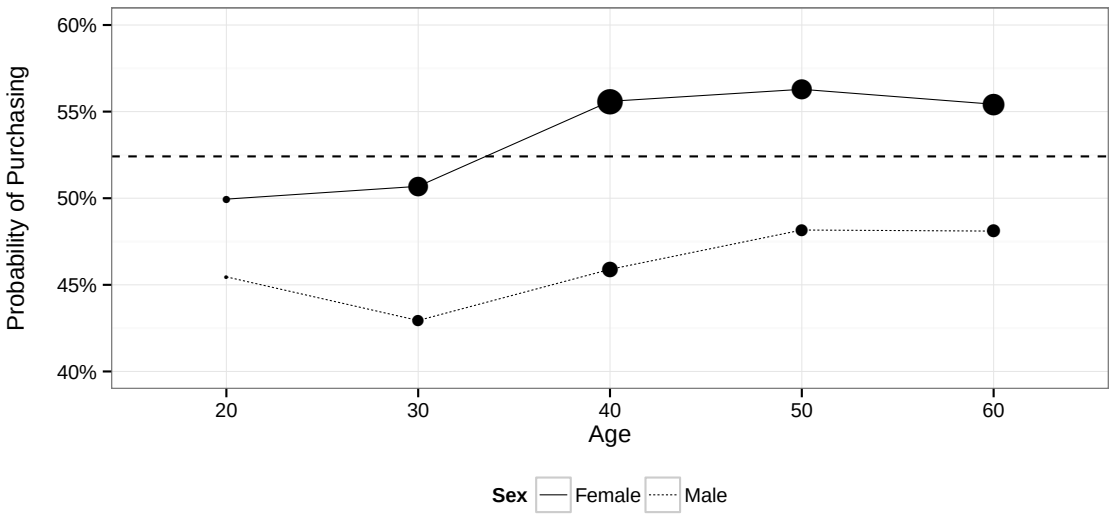


**Figure A4** **Distribution of age and sex in the retail domain and how both variables relate to probability of purchase in the latter, six-month prediction period. The area of each point is proportional to the number of individuals in the corresponding category. The dashed line indicates the overall average purchasing probability.**

| | Demo | Demo+Social |
|---|---|---|
| Intercept | −4.38 (.01)*** | −4.38 (.01)*** |
| Male | .07 (.02)*** | .07 (.02)*** |
| Age30 | .01 (.01) | .01 (.01) |
| Age40 | .04 (.01)*** | .03 (.01)*** |
| Age50 | −.12 (.01)*** | −.12 (.02)*** |
| Age60 | −.17 (.01)*** | −.17 (.01)*** |
| Male:Age30 | .17 (.02)*** | .17 (.02)*** |
| Male:Age40 | .49 (.02)*** | .49 (.02)*** |
| Male:Age50 | .94 (.02)*** | .95 (.02)*** |
| Male:Age60 | 1.26 (.02)*** | 1.26 (.02)*** |
| AdoptingContacts | | .54 (.08)*** |
| Male:AdoptingContacts | | .11 (.12) |
| Age30:AdoptingContacts | | −.26 (.10)** |
| Age40:AdoptingContacts | | −.22 (.09)** |
| Age50:AdoptingContacts | | −.23 (.10)** |
| Age60:AdoptingContacts | | −.36 (.10)*** |
| Male:Age30:AdoptingContacts | | .00 (.15) |
| Male:Age40:AdoptingContacts | | −.05 (.14) |
| Male:Age50:AdoptingContacts | | −.17 (.14) |
| Male:Age60:AdoptingContacts | | −.07 (.14) |
| AIC | 549.09 | 228.11 |
| BIC | 559.05 | 248.02 |
| Log Likelihood | −264.54 | −94.05 |
| Deviance | 340.98 | .00 |
| Num. obs. | 20 | 20 |

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

**Table A1** **Models predicting advertising response in the apparel domain. For computational efficiency, we fit the models via binomial regression with a logistic link function, with observations having identical values for the predictors represented as a single observation. Thus, the number of nominal observations listed in table are considerably smaller than the actual number of people in our dataset.**

| | Demo | Demo+Social | Demo+Past Participation | Demo+Past Participation+Social |
|---|---|---|---|---|
| Intercept | −4.56 (.01)*** | −4.60 (.01)*** | −5.02 (.02)*** | −5.05 (.02)*** |
| Male | 2.38 (.01)*** | 2.30 (.01)*** | 1.98 (.02)*** | 1.95 (.02)*** |
| Age30 | 1.09 (.01)*** | 1.02 (.02)*** | .76 (.02)*** | .74 (.02)*** |
| Age40 | .64 (.02)*** | .56 (.02)*** | .27 (.02)*** | .25 (.02)*** |
| Age50 | −.10 (.02)*** | −.15 (.02)*** | −.47 (.03)*** | −.48 (.03)*** |
| Age60 | −.92 (.02)*** | −1.10 (.02)*** | −1.38 (.03)*** | −1.41 (.03)*** |
| Male:Age30 | −.38 (.02)*** | −.43 (.02)*** | −.50 (.02)*** | −.51 (.02)*** |
| Male:Age40 | −.51 (.02)*** | −.51 (.02)*** | −.54 (.02)*** | −.54 (.02)*** |
| Male:Age50 | −.72 (.02)*** | −.70 (.02)*** | −.66 (.03)*** | −.66 (.03)*** |
| Male:Age60 | −.88 (.02)*** | −.78 (.03)*** | −.72 (.04)*** | −.72 (.04)*** |
| AdoptingContacts | | .28 (.01)*** | | .21 (.01)*** |
| Male:AdoptingContacts | | .83 (.01)*** | | .48 (.02)*** |
| Age30:AdoptingContacts | | .20 (.01)*** | | .02 (.02) |
| Age40:AdoptingContacts | | .28 (.01)*** | | .06 (.02)*** |
| Age50:AdoptingContacts | | .37 (.02)*** | | .09 (.02)*** |
| Age60:AdoptingContacts | | 1.10 (.03)*** | | .43 (.04)*** |
| Male:Age30:AdoptingContacts | | −.38 (.02)*** | | −.21 (.02)*** |
| Male:Age40:AdoptingContacts | | −.52 (.02)*** | | −.28 (.02)*** |
| Male:Age50:AdoptingContacts | | −.52 (.02)*** | | −.22 (.03)*** |
| Male:Age60:AdoptingContacts | | −.89 (.03)*** | | −.31 (.05)*** |
| PastAdoption | | | 5.37 (.04)*** | 5.34 (.04)*** |
| Male:PastAdoption | | | −1.28 (.04)*** | −1.29 (.04)*** |
| Age30:PastAdoption | | | −.35 (.04)*** | −.39 (.04)*** |
| Age40:PastAdoption | | | .18 (.04)*** | .15 (.04)*** |
| Age50:PastAdoption | | | .90 (.05)*** | .89 (.05)*** |
| Age60:PastAdoption | | | 2.05 (.06)*** | 1.97 (.07)*** |
| Male:Age30:PastAdoption | | | .57 (.04)*** | .59 (.04)*** |
| Male:Age40:PastAdoption | | | .50 (.04)*** | .54 (.05)*** |
| Male:Age50:PastAdoption | | | .55 (.06)*** | .59 (.06)*** |
| Male:Age60:PastAdoption | | | .40 (.07)*** | .50 (.07)*** |
| AdoptingContacts:PastAdoption | | | | −.06 (.03)* |
| Male:AdoptingContacts:PastAdoption | | | | −.20 (.02)*** |
| Age30:AdoptingContacts:PastAdoption | | | | .06 (.02)* |
| Age40:AdoptingContacts:PastAdoption | | | | .03 (.02) |
| Age50:AdoptingContacts:PastAdoption | | | | −.03 (.03) |
| Age60:AdoptingContacts:PastAdoption | | | | −.26 (.04)*** |
| AIC | 1714171.39 | 1557774.28 | 30056.14 | 10730.02 |
| BIC | 1714211.40 | 1557854.31 | 30136.17 | 10874.07 |
| Log Likelihood | -857075.69 | -778867.14 | -15008.07 | -5329.01 |
| Deviance | 1713131.02 | 1556713.91 | 28995.77 | 9637.65 |
| Num. obs. | 404 | 404 | 404 | 404 |

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

**Table A2** **Models predicting joining the recreational league. As in the advertising domain, for computational efficiency we fit models via binomial regression with a logistic link function, so the number of nominal observations in the table is considerably smaller than the number of individuals modeled.**

| | Demo | Demo+Social | Demo+Past Sales | Demo+Past Sales+Social |
|---|---|---|---|---|
| Intercept | −.002 (.019) | −.030 (.019) | −.313 (.022)*** | −.328 (.023)*** |
| Male | −.180 (.041)*** | −.176 (.042)*** | .001 (.045) | −.006 (.046) |
| Age30 | .030 (.020) | −.008 (.021) | .006 (.023) | −.017 (.024) |
| Age40 | .227 (.019)*** | .153 (.020)*** | .130 (.023)*** | .093 (.024)*** |
| Age50 | .255 (.020)*** | .198 (.021)*** | .171 (.023)*** | .144 (.024)*** |
| Age60 | .220 (.020)*** | .173 (.021)*** | .169 (.023)*** | .142 (.024)*** |
| Male:Age30 | −.132 (.043)*** | −.092 (.045)** | −.107 (.048)** | −.077 (.049) |
| Male:Age40 | −.209 (.042)*** | −.147 (.043)*** | −.161 (.047)*** | −.126 (.048)*** |
| Male:Age50 | −.146 (.043)*** | −.103 (.044)** | −.114 (.047)** | −.086 (.049)* |
| Male:Age60 | −.114 (.043)*** | −.085 (.044)* | −.120 (.047)** | −.101 (.048)** |
| AdoptingContacts | | .239 (.046)*** | | .148 (.056)*** |
| Male:AdoptingContacts | | .083 (.128) | | .158 (.129) |
| Age30:AdoptingContacts | | −.003 (.047) | | .009 (.057) |
| Age40:AdoptingContacts | | −.052 (.047) | | −.035 (.056) |
| Age50:AdoptingContacts | | −.012 (.047) | | −.016 (.057) |
| Age60:AdoptingContacts | | −.017 (.047) | | −.010 (.057) |
| Male:Age30:AdoptingContacts | | −.177 (.130) | | −.207 (.132) |
| Male:Age40:AdoptingContacts | | −.147 (.128) | | −.183 (.129) |
| Male:Age50:AdoptingContacts | | −.167 (.129) | | −.200 (.130) |
| Male:Age60:AdoptingContacts | | −.135 (.129) | | −.168 (.130) |
| PastSales | | | .003 (.000)*** | .003 (.000)*** |
| Male:PastSales | | | −.002 (.000)*** | −.002 (.000)*** |
| Age30:PastSales | | | .000 (.000)* | .000 (.000)** |
| Age40:PastSales | | | .000 (.000)*** | −.001 (.000)*** |
| Age50:PastSales | | | −.001 (.000)*** | −.001 (.000)*** |
| Age60:PastSales | | | −.001 (.000)*** | −.001 (.000)*** |
| Male:Age30:PastSales | | | .000 (.000) | .000 (.000) |
| Male:Age40:PastSales | | | .000 (.000)** | .001 (.000)** |
| Male:Age50:PastSales | | | .001 (.000)*** | .001 (.000)*** |
| Male:Age60:PastSales | | | .001 (.000)*** | .001 (.000)*** |
| AdoptingContacts:PastSales | | | | .000 (.000) |
| Male:AdoptingContacts:PastSales | | | | .000 (.000) |
| Age30:AdoptingContacts:PastSales | | | | .000 (.000) |
| Age40:AdoptingContacts:PastSales | | | | .000 (.000) |
| Age50:AdoptingContacts:PastSales | | | | .000 (.000) |
| Age60:AdoptingContacts:PastSales | | | | .000 (.000) |
| AIC | 789964.575 | 785463.448 | 737893.363 | 735918.064 |
| BIC | 790077.173 | 785688.646 | 738118.560 | 736323.419 |
| Log Likelihood | −394972.287 | −392711.724 | −368926.681 | −367923.032 |
| Deviance | 789944.575 | 785423.448 | 737853.363 | 735846.064 |
| Num. obs. | 573701 | 573701 | 573701 | 573701 |

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

**Table A3 Models predicting retail purchases**