

The Demographics of the Do-Not-Call List*

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1 Introduction

At least as far back as the first door-to-door salesman, consumers have had to deal with uninvited solicitations. Over time, new technologies have greatly expanded the portals into consumers' lives. Today, commercial and nonprofit interests can reach individuals through fixed and mobile phones, fax machines, email and web cookies, and instant and short text messaging. While not costless to the marketer, evidence suggests that access to these portals is underpriced. The result has been junk mail, junk phone calls, junk faxes, and now junk email, or "spam."

Consumers have responded by adopting strategies and technologies to limit unwanted invasions of their privacy. The simple answering machine can be effective in screening telemarketing calls; so too are privacy calling features such as automatic number identification (ANI) and call blocking. Use of these technologies represents expressions of consumers' demand for privacy.

This paper attempts to measure empirically consumer demand for protection from one particular kind of privacy invasion: telemarketing phone calls. We analyze the pattern of consumer signups with a centralized means to block telemarketing calls, the do-not-call registry.

For some time state and federal governments, trade associations and private companies have collected addresses and phone numbers from consumers wishing not to be bothered by marketers. Recently, the Federal Trade Commission (FTC) created a national registry of phone numbers that would be blocked from non-exempt telemarketers. The FTC's do-not-call (DNC) registry has been very popular: over 60 million phone numbers have been registered since it was first launched.

We view individuals' decisions to register with a DNC list as the outcome of an optimization problem. Individuals maximize the benefit of blocking telemarketing calls net of the costs of signing up and foregone transactions. On their end, telemarketers make calls so as to maximize the return on a call net of their costs. Telemarketers are likely to target individuals based on demographic characteristics that also affect individuals' willingness to sign up. As a result the signup decision depends on the characteristics of the subscriber owning the phone line.

To understand this decision, we merge the (redacted) phone numbers collected by the FTC with household Census and demographic information aggregated to the county level. We find that the majority of the variance in DNC signups can be explained with a relatively few variables. Comparing the frequency of signup to the DNC list across U.S. counties against averages for demographic characteristics reveals both expected and surprising insights:

- Signups are increasing in average household income and educational attainment.
- County racial, linguistic and household composition go a long way in explaining the signup pattern.

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- Age of head of household affects signups differently, with young households having low participation in the DNC program, and senior citizens a high rate.
- Internet access is not a good predictor of DNC signup frequencies.
- A state DNC registry acts as a substitute for the federal list, unless the two are merged.
- States that charge for registration experience lower signup rates than those who offer the service for free.

Our estimation results also permit us to estimate the monetary value of the DNC registry to U.S. consumers. While our estimates are crude, and the range of values is wide, the benefits of such programs appear to be significant.

2 Analysis

We have obtained redacted information on the nearly 60 million phone numbers that were entered into the FTC’s do-not-call registry between June 26, 2003 and November 1, 2003 (along with the time and date each number was registered). To ensure privacy, only the area code and exchange prefix of the number (the so-called “NPA-NXX,” or more simply, “the exchange”) was reported in the dataset and exchanges with 10 or fewer observations have been dropped from the analysis. Using a database purchased from the Melissa Data Corporation, one often used by telemarketing firms themselves, we mapped the exchange into the county.

Figure 1: DNC sign-ups over time

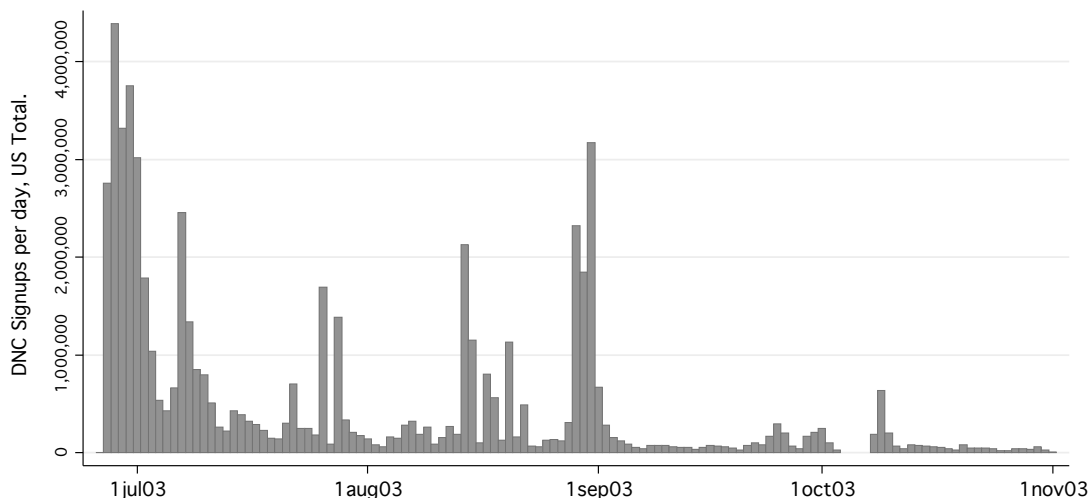


Figure 1 plots the number of phone numbers added to the national registry in each of the 129 days for which we have data. The large portion of sign-ups in the first few days of the program suggests a pent up demand for the do-not-call list. During the first week only consumers in states west of the Mississippi (including Minnesota and Louisiana) could sign up using the toll-free number (but anyone could sign up over the Internet).¹ A spike occurs starting July 7, the first day that states east of the Mississippi could register using the toll-free number. Another spike can be found right before September 1, 2003. Sign-ups made prior to that day would be included when the list first went into effect on October 1, 2003 rather than waiting 90 days for numbers to be blocked.

The FTC registry is not the only, or the first, do-not-call list. When it was launched, 28 states already had provided some type of DNC list for their residents. Of these, 15 states eventually decided to merge

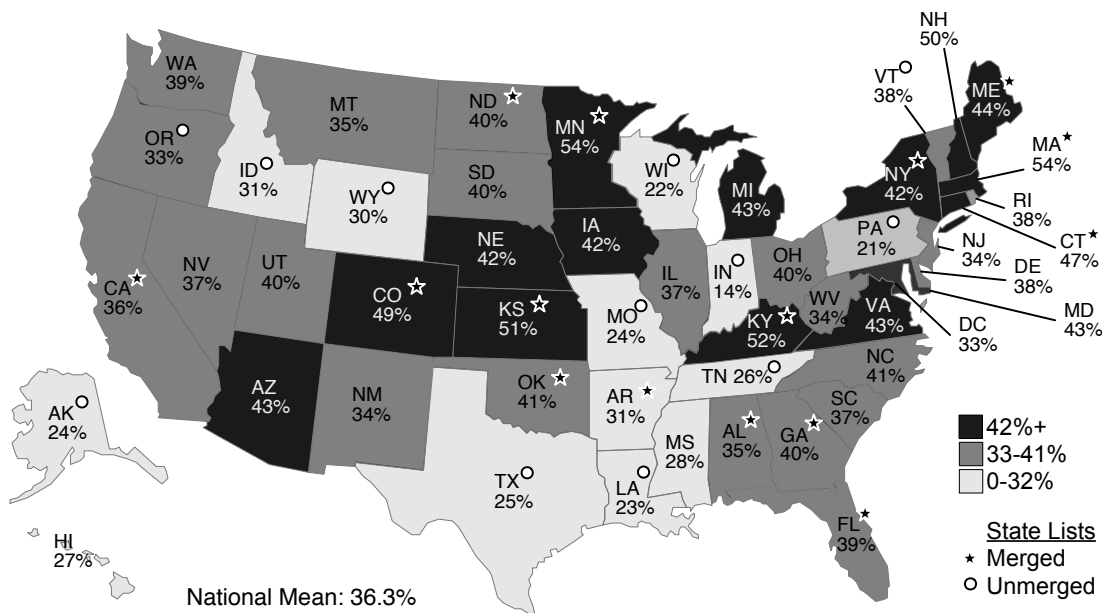
¹From an FTC news flash June 2003: <http://www.ftc.gov/ocr/ftcv2n6.htm>.

their lists with the FTC's. States that declined to merge their list with the national list often continued to run their registries in parallel. Several other smaller spikes occurring throughout the sample period come disproportionately from specific states. We use this correlation, along with independent information, to attribute each of 15 dates to the merger of a state list with the national list.

The DNC data are recorded *by phone number* but decisions to register are made *by individuals*, or more likely, *by households*. Since both individuals and households often have more than one phone number (multiple fixed lines and cellular phones), we examine both the number of households per county as well as an estimate of the number of fixed lines per county as the denominator to form sign-up frequencies.

We begin by looking at the responses to the do-not-call list on a state by state basis. Figure 2 shows the proportion of households that have signed up for the FTC DNC list. The total sign-ups have been adjusted to exclude numbers on non-wired exchanges and to adjust for the average number of lines per household in each state. State specific do-not-call lists are identified in the figure as well as states that chose not to merge their lists.

Figure 2: DNC registrations per household as of November 1, 2003.



Five of the 28 states with their own DNC initiative simply used the Direct Marketing Association's TPS list which has a charge if registration was done on line. Additionally, six other state programs charged for their service. We find that charging for a do-not-call list depresses the frequency of sign-up. Of all the signups on the national list that occurred in our sample period, we attribute 11.8% to the merger of state lists. Looking just at free state programs, 14.3% of the signups came from state lists. Compare that with 7.2% for states that used the DMA's TSP, and also the mere 1.0% for those states that charged for signups.

Most of our demographic variables are extracted from the 2000 Census, including household income, size, race and composition as well as home value and mortgage. These data are supplemented with survey information from household-level panels run by the Census Bureau's Current Population Survey and TNS Telecom's ReQuest Survey dataset. Those panels are also rolled up to the county level to generate the

average Internet usage and lines per household.² Our main demographics variable include the race, age and education of the head of the household; the number of children and their ages; number of members in the household; whether or not the household has a male present and whether or not it is a household of unmarried partners; household poverty status and linguistic isolation (lack of basic English skills); home ownership and mortgage status and household income.

We perform some simple regression analysis examining one demographic variable at a time, using the proportion of households within a country that falls within a given category. Let us assume that a constant fraction of each demographic group signs up for the DNC list in each county. We can now set up a linear relationship where the signup frequency in each county is a function of the demographic groups in that county. The coefficients in these regressions should *not* be interpreted as the incremental effect of one variable, holding everything else constant. Rather they should be interpreted in the sense of a marginal frequency distribution—how would we expect the frequency of sign-up to change when we move from a county with one distributions of races to another county with a different distribution of races, where other variables (income, housing, age, etc.) also change. These regressions are purely descriptive in nature and should not be given a causal interpretation.³

Table 1 depicts the effect of race on the frequency of sign-up, where we have normalized by households. Roughly speaking, it appears that about 40% of Whites signed up, 15% of Blacks and low percentages of Native Americans, Pacific Islanders, and Others. However, a substantial percentage of Asians and Multi-race households signed up. This should be compared to the national average of 38.2%. The column in the table labeled “Mean” indicates the fraction of the population represented by each demographic group. Table ?? looks at the frequency of sign-up as a function of household size, with 2 and 4-person households having a high probability of signing up. Curiously households with 5 or more people seem to have a lower frequency of signing up. Perhaps larger households have a lower baseline level of privacy, so the incremental addition to overall privacy from DNC is low. Alternatively it may be the case that the annoyance of telemarketer’s calls is spread over a larger number of people.

Table 1: Race of Householder

| Variable | Coeff. | Std. Err. | Mean |
|---------------|-----------|-----------|-------|
| White | 0.396** | 0.004 | 0.870 |
| Black | 0.155** | 0.019 | 0.077 |
| Native Amer. | -0.066 | 0.046 | 0.016 |
| Asian | 2.688** | 0.218 | 0.006 |
| Pac. Islander | -14.072** | 1.422 | 0.000 |
| Other | -0.499** | 0.079 | 0.018 |
| Multiple | 2.125** | 0.353 | 0.011 |

Table 2: Household Annual Income (’000 dollars)

| Variable | Coeff. | Std. Err. | Mean |
|------------|----------|-----------|-------|
| Below 10 | -0.472** | 0.093 | 0.121 |
| 10–15 | 0.369 | 0.242 | 0.081 |
| 15–20 | 0.732** | 0.249 | 0.078 |
| 20–25 | 0.230 | 0.260 | 0.079 |
| 25–30 | 0.283 | 0.275 | 0.075 |
| 30–35 | 0.379 | 0.276 | 0.072 |
| 35–40 | 1.060** | 0.299 | 0.065 |
| 40–45 | -0.023 | 0.325 | 0.060 |
| 45–50 | 0.491 | 0.350 | 0.052 |
| 50–60 | 0.891** | 0.251 | 0.088 |
| 60–75 | 0.219 | 0.235 | 0.090 |
| 75–100 | -0.085 | 0.235 | 0.074 |
| 100 and up | 1.528** | 0.109 | 0.066 |

We found that counties with a high percentage of Internet users tended to have higher sign-ups rates, but not by a dramatic amount (table 3). We find that a high degree of urbanization increases the likelihood of sign-up, but that farming communities tend to have a higher sign-up than any other area (table 4).

For a more thorough analysis we specify a choice model where the decision to sign up for the DNC is

²Complete description of variable creations, data sources etc. can be found in the full version of this paper, available at <http://sims.berkeley.edu/~fredrik/research/papers/DncNber.pdf>.

³Here we will only highlight some the results of a few interesting variables. A full set of results is available in the long version of the paper.

Table 3: Internet Access at Home

| Variable | Coeff. | Std. Err. | Mean |
|--------------|---------|----------------------|-------|
| Has Internet | 0.431** | 0.012 | 0.486 |
| No Internet | 0.335** | 0.011 | 0.514 |
| Diff. | 0.096** | $F(1, 3092) = 18.94$ | |

Table 4: Urban/Rural Area

| Variable | Coeff. | Std. Err. | Mean |
|---------------|---------|-----------|-------|
| Urban | 0.466** | 0.006 | 0.396 |
| Urban Area | 0.492** | 0.008 | 0.164 |
| Urban Cluster | 0.427** | 0.010 | 0.232 |
| Rural | 0.327** | 0.005 | 0.604 |
| Farm | 0.611** | 0.070 | 0.040 |
| Non-Farm | 0.315** | 0.007 | 0.564 |

a function of multiple demographics and state wide variables. Table 5 provides the regression results for a number of different model specifications. We report odds ratios (e^b) rather than b . T-tests are similarly transformed.⁴ The Kitchen Sink model includes all our demographic variables whereas the Parsimonius I and II models reduce the number of explanatory variables in an attempt to isolate the most important variables.

Table 5: Full model grouped logit results, odds ratios

| | Kitchen Sink | | Parsimonius I | | Parsimonius II | |
|----------------------|--------------|---------|---------------|---------|-------------------|---------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| log[Median Inc] | 4.561** | 2.634** | 2.746** | 2.772** | 2.017** | 2.028** |
| p[Latino] | 1.887** | 2.017** | 3.976** | 2.759** | | |
| p[Kids 12–18] | 0.017** | 0.050** | 0.082** | 0.084** | 0.224** | 0.258** |
| p[Ling.Iso.] | 0.034** | 0.045** | 0.007** | 0.011** | | |
| p[Low Edu.] | 0.110** | 0.079** | 0.034** | 0.035** | 0.004** | 0.002** |
| Has List | 0.482** | 0.773 | 0.499** | 0.804 | 0.507** | 0.674* |
| Merged List | 2.568** | 1.564* | 2.459** | 1.580* | 2.344** | 1.572* |
| Ksink Controls | Yes | Yes | | | | |
| State Dummies | | Yes | | Yes | | Yes |
| Adjusted R^2 | 0.61 | 0.75 | 0.58 | 0.72 | 0.55 | 0.70 |
| Significance levels: | †: 10% | *: 5% | **: | 1%; | 3094 Observations | |

The probability of signing up for the FTC DNC list is larger in counties comprised of households with higher incomes. Not surprisingly, low education (*i.e.* never finished high-school) and household linguistic isolation have negative impacts on registration. It is harder to explain the consistent positive impact by a high proportion of Latino households in the county. The effect of children in the household is not intuitively clear. It is possible that someone is likely to be at home with the very young children and the probability of being home when a telemarketer calls is thus higher and, in the case of teenagers, that they frequently answer the phone (but their annoyance is not valued by / communicated to the head of the household who would be making the decision to sign up for the DNC. Unexpectedly, once we control for these other variables, Internet penetration does not make much of a difference on DNC sign-ups and is not explicitly reported.

Perhaps the most interesting result is how much explanatory power can be derived from only three variables: Income, Teenagers and Low Education. Compared models that only use state level variables (not shown in this paper), these three variables raise the adjusted R^2 by 27% and 25% for the models without and with state dummies, respectively. Even throwing in the full kitchen sink contributes only an additional

⁴Odds ratios measure the impact of the variable on the relative odds of signing up for the DNC list. No effect is measured by an odds ratio of 1.

5–6%.

One could estimate the value of the DNC list in a variety of ways. According to the FTC, prior to the its do-not-call registry, about 104 million telemarketing calls were attempted per day.⁵ If each of these calls imposed, say, a net 10 cents worth of annoyance on the recipients, then this amounts to \$10 million per day, or about \$3.6 billion per year of annoyance.

Alternatively, one could argue that consumers could get themselves removed from most lists by sending a postcard to the Direct Marketing Association (DMA) or registering on the DMA website for \$5 per year, or by signing up on a state DNC list. Most state lists, the DMA list and the national DNC list are valid for 5 years. In that case the 7.5 million people registered on the DMA’s list would cost consumers a maximum of \$7.5 million if each were to pay \$5 for 5 years on the list, or \$1 per year. About 48 million more people signed up on the national DNC list, which was free. If we assume that people were aware of their options prior to the FTC’s DNC list—a heroic assumption to be sure—those additional 48 million people presumably valued the freedom from being called at something more than \$1 per year. However, the DMA reports 80% efficiency from the TPS list. If we assume a 100% efficiency by the DNC it would imply a lower bound for the value of \$1.25 per year. This would put a lower bound on the extra value of the DNC list at \$60 million per year.

To be sure, there is an enormous gap between \$60 million and \$3.6 billion. However, even the lower number indicates that the national do-not-call list has generated significant consumer benefits.

3 Conclusion

Consumers value their privacy and they take actions to filter unwanted solicitations including signup to do-not-call lists. The value they place on this kind of privacy varies by consumer characteristics in understandable patterns. We believe that the same would be true were a do-not-spam registry created—though its popularity would depend critically on its specific implementation and enforcement.

Not all unsolicited messages are unwanted, however. A surprisingly large portion of the population does not find telemarketing calls and spam email to be annoying.⁶ While the likelihood these solicitations result in a successful transaction is extremely low, it is not zero, suggesting consumers in the aggregate place a value of these marketing channels. The FTC’s DNC list is a rather indiscriminate in its blocking of incoming calls unlike, for instance, ANI or a spam filter in the case of email.

Individuals—and governments seeking to protect their citizens’ privacy—face a tradeoff: to allow unobstructed access to consumers’ mailboxes or to attempt to filter incoming messages. As long as the true social cost of this access is not accurately born by the marketer, too many messages will be sent and too much time and money will be spent by the receivers. The propensity to sign up for a “do not spam” list among demographic groups might well be similar that that observed for the do not call list. However, the popularity do-not-spam list would depend critically on how well it worked, how it was implemented, and how it was enforced.

⁵*Notice of Proposed Rulemaking and Memorandum Opinion and Order*, dated September 18, 2002, pp. 6–7.

⁶In June 2003 the Pew Internet & American Life Project conducted a national telephone survey of 2,200 adults on their attitudes toward spam. Summary results of the survey are available at: http://www.pewinternet.org/pdfs/PIP_Spam_Topline.pdf. A companion report entitled “Spam: How it is hurting email and degrading life on the Internet” by Deborah Fallows is posted at: http://www.pewinternet.org/pdfs/PIP_Spam_Report.pdf