

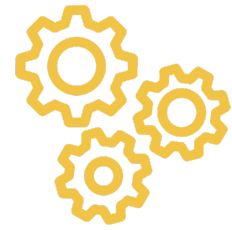
8/28/2018

## Analysis Plan

Project Name: Increasing Survey Responses to Improve USAGov Email Content

Project Code: 1801

Date Finalized: 8/28/2018



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### Data and Data Structure

This section describes variables that will be analyzed, as well as changes that will be made to the raw data with respect to data structure and variables.

#### Outcome Variables to Be Analyzed:

Our primary outcome is a dichotomous indicator for survey completion defined as submitting the survey regardless of responses to individual survey items. The survey will be open to submissions for two weeks after the survey request emails are sent.

Secondary and process outcomes will include dichotomous indicators for:

- survey email open;
- survey email bounce back;
- survey email click through on survey link; and
- survey email click through on unsubscribe from USAGov emails.

#### Transformations of Variables:

We will have aggregated count data on survey completion within treatment status and randomization block. We will disaggregate the count data to create a subscriber-level data set. The subscriber data set will be created so that:

$$Y_{ibt} = 1 \text{ if } i \leq c_{bt} \text{ and } Y_{ibt} = 0 \text{ if } i > c_{bt}$$

where:

- $Y_{ibt}$ : is an indicator for survey submission for individual  $i$  in block  $b$  and treatment  $t$ ; and
- $c_{bt}$ : is the count of survey submissions for block  $b$  and treatment  $t$ .

#### Imported Variables:

We will have raw data from three sources: a randomization and blocking file, an email interaction file (e.g., open and click through), and a survey submission file. We may have access to additional baseline covariates that are associated with email interaction outcomes and survey submission rates, which when included in our model would enhance precision. If available, we will test the sensitivity of our analysis to the inclusion of covariates for email interaction outcomes (secondary

outcomes), for which we will have individually identifiable data. If the results differ, we will consider the model that includes baseline covariates as our preferred model.

**Transformations of Data Structure:**

Because we cannot merge the disaggregated count data on survey submission with the subscriber-level email interaction files, we will have two data files for analysis. For our primary analysis, we plan to disaggregate the count data on survey submission into a subscriber-level data file that includes information on treatment and randomization block (as described above).

For our secondary analysis, we will use a subscriber-level file that links block and email version information with email interaction data for each subscriber. To create this file, we may need to append data from each email version by block group. For descriptive analysis, we will merge together email interaction data to create a panel data set for email subscribers assigned to the group that receives two emails (a thank you email and a survey request email). All other email subscribers will be sent one email and will only have email interaction data at one point in time.

**Data Exclusion:**

In practice, we will have missing data when an email bounces back. In this case, email subscribers do not have a chance to complete the survey. We will test for differential bounce-back rate between the treatment arms, based on the first email sent and the survey email sent (since one treatment group will receive two emails). We do not plan to adjust our estimates of treatment effects unless bounce-back rates on the first email send statistically differ between assignment groups. In that case, we will show a set of results that include subscribers who had emails bounce back and another set that excludes email subscribers who had emails bounce back. If results differ, for our primary analysis, we will exclude email subscribers who had the first email sent bounce back.

We not expect to need to exclude data for other reasons. Because all outcomes are dichotomous indicators for a behavior and recorded automatically, the outcomes are not at risk for having outliers or data-recording errors.

**Clarification April 1st, 2019**

Because of an unknown glitch, a small proportion of subscribers assigned to the personal email group were not successfully uploaded into HubSpot. Since this is a necessary step to be sent the survey email, these 5,589 subscribers had no opportunity to complete the survey. As a result, these subscribers were excluded from the primary analysis. While there is no evidence of selection on the subscribers who were omitted, in an alternative two-stage least squares approach we instrument for uploaded to be sent the personal email by assignment to the personal email group.

**Treatment of Missing Data:**

We treat missing data on survey submission as an indicator that someone did not submit a survey.

**Statistical Models & Hypothesis Tests**

This section describes the statistical models and hypothesis tests that will make up the analysis – including any follow-ups on effects in the main statistical model and any exploratory analyses that can be anticipated prior to analysis.

**Statistical Models:**

Our research question is: Do response rates to a government feedback survey improve compared to a business-as-usual email request when the email request includes a personal appeal, a personal appeal with a thank you email to prime reciprocity, or the process by which the survey will be used?

Our empirical model to answer this research question is an Ordinary Least Squares (OLS) model where:

$$Y_{ib} = \beta_0 + \beta_1(P_{ib}) + \beta_2(T_{ib}) + \beta_3(PR_{ib}) + \alpha_b + \varepsilon_{ib}$$

where  $i$  indexes email subscribers and  $b$  indexes blocks, and

- $Y_{ib}$ : is an indicator for survey submission;
- $P_{ib}$ : is an indicator for assignment to the personal appeal email;
- $T_{ib}$ : is an indicator for assignment to the personal appeal and thank you emails;
- $PR_{ib}$ : is an indicator for assignment to the process transparency email;
- $\alpha_b$ : are block fixed effects (indicators for active or inactive email subscriber, English- or Spanish-speaking subscriber, and subscriber to English business emails); and
- $\varepsilon_{ib}$ : is a subscriber error term.

We will estimate heteroskedastic robust (HC2) standard errors. Our coefficients of interest are  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$ , which measure the (ITT) intent-to-treat effect of subscribers being emailed a survey request with a personal appeal, with a personal appeal and thank you email reciprocity prime, and with information about the process by which the survey will be used.

**Follow-Up Analyses:**

As robustness checks, we will compare click through and open rates within blocks and treatment status to survey submission rates.

**Inference Criteria, Including Any Adjustments for Multiple Comparisons:**

We will use standard inference criteria. We will use two-tailed tests and three threshold  $p$ -values: 1%, 5%, and 10%. Since our primary analysis includes three statistical tests, we will adjust for multiple comparisons using the Holm step-down family-wise error rate adjustment.

**Limitations:**

One limitation in this study is that we have only count data for our primary outcome, survey submission. Thus, we cannot link survey submission to email open and click through behaviors at the subscriber level. Moreover, we are unable to limit the number of times a subscriber can submit the survey, which could mean that we are counting the same subscriber submitting multiple surveys as multiple subscribers submitting surveys. Given our sample size, we do not expect that multiple submissions from the same subscribers will meaningfully influence our results. Moreover, we will conduct robustness checks that compare open and click through rates to submission rates.

In addition, we are interested in whether results differ based on the preferred language of subscribers and their status as active or inactive subscribers;<sup>1</sup> however, we expect that we may be underpowered to detect differences in treatment effects between these groups.

**Exploratory Analysis:**

Because our primary analysis only compares survey submission rates between each treatment group to the business-as-usual group, our exploratory analysis will test for differential effects between the treatment groups on survey submission rates and on secondary outcomes.

We also will examine whether there are heterogeneous treatment effects based on the preferred language of the email subscriber (English or Spanish) and their status as active or inactive email subscribers.

If the sample of survey respondents is large enough, we will explore whether there are demographic differences in who submits a survey (and responds to demographic questions) by survey request assignment group.

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<sup>1</sup> Inactive email subscribers are those who have not opened a USAGov email in the last 16 email sends.