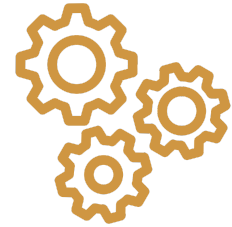# Analysis Plan

Project Name: Encouraging the Use of USCIS' Online Services
Evaluation A: Text Message Notifications to Increase Online Filing of
Green Card Renewals
Project Code: 2208-A
Date Finalized: 02/16/2023

Project Description

The purpose of the project is to support the goals of US Citizenship and Immigration Services (USCIS) to reduce barriers to accessing immigration benefits and efficient adjudications. A priority for USCIS is increasing the number of customers who utilize online services. Overall, this project aims to (1) build evidence on effective methods of encouraging the use of online tools; (2) build evidence on who is most responsive to this type of intervention in order to inform future efforts and policies; and (3) improve our understanding of how online systems can be used to reduce burdens on customers and/or employees.

In this evaluation, we aim to test methods of encouraging USCIS customers to file green card renewal forms (known as Form I-90, Application to Replace Permanent Resident Card) online rather than by mail. While the Digital Services Division (DSD) currently sends outreach by text and email to inform customers with upcoming green card renewal dates about the availability of online form filing, only around 60 percent of those who file to replace or renew their green card do so online.

Customers may underutilize online tools for a variety of reasons, including a lack of awareness that they exist, a (mis)belief that such tools are not secure, or a perception that online tools are complicated or cumbersome. This evaluation will test variations in the text message language that target potential barriers to online filing among customers with upcoming renewal deadlines and with a phone number in USCIS' records. We will then measure the impact of receiving any communication and modified communications on the filing channel (online or by mail) and related filing outcomes (forms accepted, requests for evidence, etc.). Because there is a cost to the agency to conduct outreach by text message, a priority for this evaluation is to learn whether outreach by text message is an effective method of increasing online filing.

This study will take advantage of the outreach currently conducted two months prior to a customer's green card renewal deadline. Rather than sending all customers the same text message–as is the existing status quo–we will randomly assign customers to one of three experimental conditions:
1. Control group (no text message)

2. Status quo message group (the current, standard text message language emphasizing ease of use)
3. Benefits message group (modified text message language emphasizing the benefits of online filing)

Preregistration Details

This Analysis Plan will be posted on the OES website at oes.gsa.gov before randomization.

Hypotheses

The experiment is designed to address the following primary research questions (RQ) and hypotheses (H):

- **RQ 1:** Does conducting informational outreach via text message increase online filing?
  - **H1:** Customers who receive a text message will be more likely to file their I-90 renewal online than customers who receive no text message.
  - **H2**: Customers who receive the *status quo* text message will be more likely to file their I-90 renewal online than customers who receive no text message.
  - **H3**: Customers who receive the *benefits* message will be more likely to file their I-90 renewal online than customers who receive no text message.
- **RQ 2:** Does emphasizing the benefits of filing green card renewals online via text message outreach increase online filing compared to emphasizing the ease of use?
  - **H4:** Online filing rates will differ for customers who receive the *benefits* message compared to customers who receive the *status quo* message.

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.

Data Source(s):
The raw data for this project will come from the following USCIS systems: Electronic Immigration System (ELIS), Central Index System 2 (CIS2), Electronic Correspondence Handling Online (ECHO), and GovDelivery.

We expect a data snapshot to be taken roughly two months after the last filing deadline in the sample, but the timing may change based on the timelines of the USCIS data and evaluation teams.[1] We are also requesting a second data snapshot at a later time to allow for a longer follow-up period, but the timing and USCIS capacity for this data request have not been finalized.

Outcomes to Be Analyzed:
The primary outcome for this evaluation is a binary indicator where 1 indicates the online filing channel and 0 indicates the mailed paper form filing channel for the customer's Form I-90.

The exploratory outcomes will be as follows:
- The length of time to Form I-90 filing
- A binary indicator for case resolution by end of data collection period
- The length of time to case resolution
- A binary indicator for the presence of a Request(s) for Evidence (RFE_PRESENT)
- Number of Requests for Evidence (RFE) a customer receives
- The length of time to customer response to RFE(s)

Imported Variables:
The agency project team will randomize customers into the treatment conditions using SAS. They will maintain the randomization datasets created during this process on their agency's internal server until they are ready to transfer the datasets to OES. The treatment condition indicators will be merged with the raw dataset that includes covariates and outcome variables exported from USCIS databases.

Transformations of Variables:
<u>Independent variables</u>
We will create the following new independent variables using a transformation on the raw data:
- TREAT_TXT: A binary indicator for assignment to either of the two treatment conditions that receive a text message (status quo message or emphasizing benefits message)
- TREAT_BENEFIT: A binary indicator for assignment to the treatment condition that receives a text message emphasizing the benefits of filing online
- TREAT_SQ: A binary indicator for assignment to the treatment condition that receives the status quo text message
- TREAT_CONTROL: A binary indicator for assignment to the treatment condition that receives no text message

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[1] Two months after the last filing deadline is roughly four months after the last outreach intervention.

Outcome variables

The following outcome variable will be created to evaluate the primary research questions:

- ONLINE_FILE: a binary indicator reflecting online filing of Form I-90, will be created by transforming the categorical variable labeled CHANNEL (which identifies the filing channel of the Form I-90 - online or by mail) in the raw dataset, so that the binary indicator is equal to 1 when the CHANNEL variable indicates online filing, and 0 for any other filing modality (i.e., by mail), and is null when the customer did not file for renewal.

The following outcomes for exploratory analyses will be created through transformations or calculations on the raw data:

- FILED_I90: a binary indicator for customer filing a Form I90 prior to the expiration date
- CASE_RESOLVE: A binary indicator for case resolution by the end of the data collection period will be created by transforming the categorical variable for case decision labeled DECISION to create a new variable equal to 1 when renewal application has a decision status (approved, denied, etc) and 0 if the field is blank or has a status indicating that the case is still processing
- NUM_RFE: The number of RFEs received by a customer, calculated by summing the number of RFEs received per customer, assigning customers who file an I-90 but do not receive any RFEs a value of 0

We will receive an outcome data snapshot that reflects data approximately 2 months after the last filing deadline in the outreach sample. We may receive a second snapshot 4 to 6 months later, but the timing and capacity for the second snapshot has not been determined.

Covariates/additional variables

We will create the following additional variables using transformations or calculations on the raw data:

- TIME_MSG2EXP: The length of time between the intervention text message sent date (or, for the control group, the date they were pulled from the database and would have been contacted had they been randomized into an intervention group), MESSAGE_DATE, and the customer's green card renewal deadline (GC_EXP)
- AGE: The length of time in years between the date the data was transferred to OES and customer's date of birth (DOB). Since DOB will be provided as month and year to protect privacy, the first day of the customer's birth month will be used to calculate age
- TIME_LPR: The length of time in years that a customer has been a lawful permanent resident (LPR), calculated as the length of time between the date the data was transferred to OES and the customer's date of granted LPR status (DOA)

Other covariates may be transformed depending on the format of the raw data. For instance, if there are too few observations within categorical variable labels, labels may be combined to form groups of larger sizes.

Expected Sample Sizes:
The agency currently conducts this outreach on a monthly basis, so customers will be randomized into treatment conditions on an ongoing basis until the necessary sample to detect the expected minimum treatment effect has been collected or until it is no longer feasible to continue implementing the evaluation. According to power analyses based on the agency's historical outreach data, to detect a minimum effect of 1.5 percentage points between the control group and either group 2 or group 3, we must accrue a total sample size of at least 48,366 customers (power = .8, alpha = 0.05, equal probability of group assignment).

Transformations of Data Structure:
At this time, we do not expect to transform the data structure for the primary analyses.

Data Exclusion:
For the primary analyses, the analytic universe will include all customers who are randomized and who renew their green cards prior to their expiration date (i.e., within approximately 2 months). Customers who choose not to renew their green card will be excluded, since the outcome (filing channel) will not be observed for this group.

Our analyses rest on the assumption that customers' decisions to file the Form I-90 will not differ by treatment condition. The intervention is not intended to impact customers' decisions to file, and customers receive reminders about green card renewal through various other channels, including email and letter. Prior to conducting the primary analyses, we will perform a check on this assumption using a linear model where FILED_I90 is regressed on treatment indicators for the two message conditions and the same set of covariates used in the models outlined in the Statistical Models section. If the coefficient on either treatment indicator is statistically significant, we will contextualize our results with a discussion of the differences in decision to file among the treatment conditions. If the assumption is not met, we will also check for balance among the treatment groups on the indicator for filing a Form N-400/600 (Application for Naturalization), which may explain some variation in Form I-90 filing decision.

Treatment of Missing Data:
If any covariate required for the analyses is missing for over 5% of the sample, we will run two models: (1) one model that excludes that covariate; and (2) one model that includes the covariate, with missing data imputed with multiple imputation. We will report results from both models, noting any meaningful differences.

Descriptive Statistics, Tables, & Graphs

- A table reporting descriptive statistics and balance tests for baseline covariates among the treatment groups, including customer demographics and time from intervention date to green card renewal deadline (TIME_MSG2EXP). We will conduct an omnibus F-test for differences along these characteristics for each pair of treatment arms (three F statistics in

total). We will make note of these imbalances, but these tests will not be used to select random assignments, as they will be conducted ex-post.
- Tables summarizing results from the statistical models
- To illustrate the results, graphs of treatment effects for our primary analyses (RQ1 & RQ2) will be generated from the models

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:

H1: In an intent to treat analysis, we will evaluate the following linear model using the Lin (2013) estimator:

$$ONLINE\_FILE_i = \beta_0 + \beta_1 TREAT\_TXT_i + \delta X_i + \varepsilon_i$$

where $ONLINE\_FILE_i$ represents the binary indicator for the outcome of interest for customer i, and the coefficient of interest, β_1, will be interpreted as the average effect of assignment to one of the text message conditions on online filing relative to customers who were assigned to the control condition. X_i represents a vector of the following covariates: gender, race, ethnicity, disability status, and age. The vector of covariates is included to increase the precision of the estimate for the coefficient of interest.

H2, H3, & H4: In an intent to treat analysis, we will evaluate the following linear model using the Lin (2013) estimator:

$$ONLINE\_FILE_i = \beta_0 + \beta_1 TREAT\_BENEFIT_i + \beta_2 TREAT\_GROUP_i^j + \delta X_i + \varepsilon_i$$

where $ONLINE\_FILE_i$ represents the binary indicator for the outcome of interest for customer i and where $TREAT\_GROUP_i$ represents the treatment group indicator for

$j \in \{TREAT\_SQ, TREAT\_CONTROL\}$. For H2 and H3, $TREAT\_GROUP_i^j$ will be $TREAT\_SQ_i$. The coefficients of interest, β_1 and β_2, will be interpreted as the average effect of assignment to the benefits condition and the status quo condition, respectively, on online filing, relative to those assigned to the control group. For H4, $TREAT\_GROUP_i^j$ will be $TREAT\_CONTROL_i$. The coefficient

of interest, β_1, will be interpreted as the average effect of assignment to the benefits condition relative to those assigned to the status quo condition. X_i represents a vector of following covariates: gender, race, ethnicity, disability status, and age.

Confirmatory Analyses:
The confirmatory analyses include the models and tests described for RQs 1-2 and the associated hypotheses, which focus on the effects of the text message treatments on filing modality.

Exploratory Analysis:
As an exploratory component of the evaluation, we will also evaluate the following research questions:
- **RQ 3:** What is the impact of informational outreach about the availability of online filing on overall case processing outcomes? Specifically, does outreach via text message affect:
    - (**3a**) the customer's time to file Form I-90?
    - (**3b**) whether the case has been resolved at the time of the outcome data snapshot?
    - (**3c**) time to case resolution?
    - We will conduct survival analyses to evaluate RQs 3a and 3c. We will evaluate RQ 3b using an OLS model of similar form to our main model for H1.
- **RQ 4:** What is the impact of informational outreach on Request(s) for Evidence (RFE)? Specifically, does outreach via text message affect:
    - (**4a**) whether a customer receives a Request(s) for Evidence?
    - (**4b**) the number of RFEs a customer receives?
    - (**4c**) the length of time to customer response to a RFE after filing for renewal and receiving a RFE?
        - If there are no treatment effects on whether a customer receives an RFE (4a), we will conduct the analysis for the length of time to respond to an RFE (4c) with the sample limited to those who received RFEs. If we find a significant treatment effect in 4a, we will determine whether to conduct an analysis for 4c based on the extent of the differential rate of selection into the sample.
    - We will evaluate RQs 4a and 4b using OLS models of a similar form to our main model for H1. We conduct a survival analysis to evaluate RQ 4c.
- **RQ 5:** What is the impact of online filing on time to file, case resolution, time to case resolution, receiving a RFE, the number of RFEs, and length of time to respond to a RFE (i.e., the outcomes listed in 3(a-c) and 4(a-c)), compared to filing by mail?
    - For this research question, we will conduct two-stage least squares analyses, using assignment to any text message treatment as an instrument for online filing.
    - Additionally, we will only conduct the two-stage least squares analyses for time to case resolution (3c) if there are no treatment effects on whether a case is resolved (3b). We will only conduct the two-stage least squares analyses for the length of time to respond to an RFE (4c) if there are no treatment effects on whether a

customer receives an RFE (4a) and the number of RFEs received (4b). Otherwise, the two-stage least squares estimates will reflect differential selection into the analysis sample.

- **RQ 6**: Are there any heterogeneous treatment effects by demographics?
    - o We expect to be underpowered to detect heterogeneous treatment effects, but given the agency's interest in understanding which groups may be more or less responsive to communication about online services, we will explore treatment effects for the following groups of interest:
        - ▪ Hispanic country of origin vs. non-Hispanic country of origin and/or Hispanic/Latino vs. non-Hispanic/Latino ethnicity
        - ▪ Older adult vs. not an older adult (exact age cut-off to be determined based on sample age characteristics)
        - ▪ Has a disability vs. no disability indicated
        - ▪ White vs. non-White
        - ▪ Black vs. non-Black
        - ▪ Used an attorney or preparer vs. did not
    - o Depending on the data received, we may expand or modify the groups of interest.
    - o We will analyze heterogeneous treatment effects by estimating a separate OLS model of the form used to test H1 for each group of interest, with additional independent variables: a binary indicator for the group of interest and an interaction term between the group indicator and the treatment indicator.

We do not have any *a priori* hypotheses regarding these exploratory research questions.

Inference Criteria, Including Any Adjustments for Multiple Comparisons:
For all OLS models, we will use HC2 standard errors for statistical inference. In all models, we will reject the null hypothesis if $p < 0.05$ for a two-tailed test on the coefficient of interest. To adjust for multiple comparisons, we will use the Holm-Bonferroni procedure to control the family-wise error rate (FWER) across our confirmatory hypotheses.

Limitations:
The primary analyses rest on the assumption that there are no differences among treatment conditions in likelihood of filing the I-90 form. As discussed above, we will test for this assumption and caveat our results accordingly as needed.

Due to case processing times, we may be unable to observe exploratory outcomes for some customers. We will test for differences among treatment conditions in outcome data availability and caveat any reported findings as needed.