

# Conducting Evaluation in an Era of Declining Telephone Survey Response Rates

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## ABSTRACT

Survey research is an important tool for energy efficiency program planning and evaluation. Despite the importance of surveys to the energy efficiency industry, few are paying attention to the increasing challenges of fielding quality surveys and the implications for many of the traditional methods we use to evaluate programs. The response rates of telephone surveys, the predominant mode of data collection for decades, have been declining for the past quarter century. In this paper, we explore the underlying causes of survey non-response and the extent to which telephone survey response rates are declining due to respondent refusals versus technological changes in the telecommunications industry. Low survey response rates are a concern because of potential non-response bias and increased survey fielding costs.

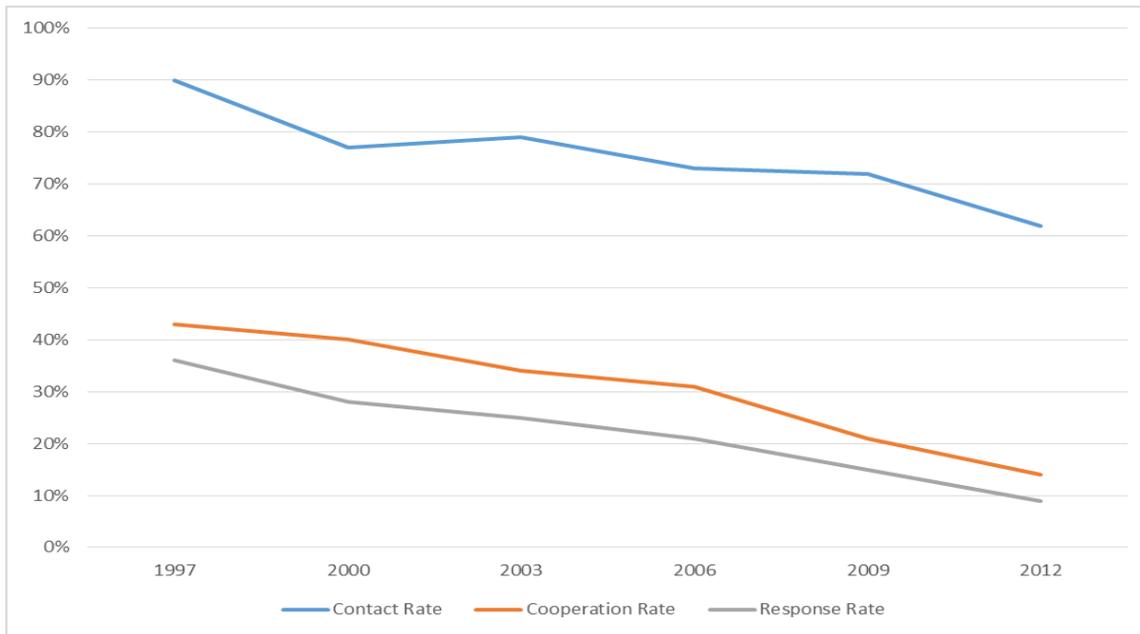
We suggest some solutions to the problem of declining telephone survey response rates based on a survey experiment. The objective of the experiment was to compare the response rates and results of a traditional telephone survey with one that made use of multiple survey modes. The mixed mode survey invited respondents to complete the survey online or via telephone. By using a mixed mode survey, we reduced our fielding costs and achieved a higher response rate than if we had completed all interviews using a telephone survey. Moreover, all survey modes reached different types of people in terms of demographics. No single mode was closer to the population across multiple characteristics. To reach the widest and most representative cross-section of the population, mixed mode surveys may result in the most representative sample. We also split the sample and provided different incentives to test the impact of the incentive level on survey response. While varying the incentive type had a differential effect on response rates, we did not see differences in respondent demographics or survey responses by incentive type.

## Introduction

Though it took some time for researchers to take notice, survey response rates have been declining since at least the 1950s (Steeh 1981). Survey non-response is comprised of two main components: (1) refusals to participate and (2) household non-contacts. The early response rate declines were largely due to an increase in the percentage of people who refused to complete a survey when contacted. With the advent of answering machines, call screening devices, and cell phones, the decline in response rates accelerated as it became increasingly difficult to even make contact with a household member. Many people simply will not answer their phone if the call is from an unknown number.

Until the 2000s, there was no agreed upon method to calculate survey response rates. As a result, it has been challenging for survey researchers to track the decline and underlying causes. The American Association of Public Opinion Research (AAPOR) issued its first standard definitions for survey outcomes in the late 1990s (see AAPOR 2015 for most recent edition). The survey industry, outside of energy efficiency program evaluation, gradually adopted these standards, though many still do not publicly report

their response rates.<sup>1</sup> An exception is the Pew Center for Research on the People and the Press, which recently revealed that their response rates had fallen from approximately 36% in 1997 to 9% in 2012 (Kohut et al. 2012). The Pew study was particularly informative as it provided trend information for the different components of the response rate. As Figure 1 makes clear, both decreasing refusal rates and contact rates are contributing to the overall decline in response rates.



**Figure 1.** Pew Center Survey Response Rates and Components

Low survey response rates are a concern because of the *potential* for non-response bias. Many assume that surveys with a low response rates are less representative of the target population than surveys with higher response rates. However, a low response rate does not necessarily mean a survey suffers from bias. The factors that are related to survey non-response must be correlated with the study variables of interest for the results to be biased (Tourangeau and Plewes 2013). The Pew study found that telephone surveys that include both landline and cell phone users and that are weighted to match population demographics, provide unbiased results of opinions on political and social issues (Kohut et al. 2012). Even if survey weighting can correct most biases, low response rates increase survey fielding costs, forcing many researchers to reduce sample sizes or make other compromises to manage project costs.

## Methods

Opinion Dynamics has been conducting a telephone tracking survey of residential households for Massachusetts’ Program Administrators (PAs) since 2012. The purpose of the surveys is to measure the effectiveness of a statewide marketing campaign promoting the Mass Save® brand. The PAs collectively promote the brand to encourage customer participation in energy efficiency programs and taking other energy saving actions and behaviors. The tracking survey includes questions on brand awareness and associations, campaign exposure, and understanding of energy efficiency programs.

<sup>1</sup> Evaluation firms still use a variety of practices to calculate and report survey response rates. Some regulators, such as those in New York State, are beginning to require that evaluators calculate and report AAPOR response rates.

Despite using industry best practices such as calling each number numerous times and at different times of the day, the response rates for the tracking surveys have consistently been under five percent. The survey production, which is the number of interviews completed per hour, was also low. It took two hours of calling to complete one interview. In our planning for the 2015 survey, we wanted to consider alternative fielding modes, but as a tracking survey, we needed to be able to compare the results to previous waves. We had conducted all previous waves by phone and did not feel comfortable changing to a different data collection mode for all survey completes. The solution was to conduct a survey experiment that used different survey fielding modes. The objective of the experiment was to compare the response rates and results of a telephone survey with one that made use of multiple survey modes.

The experiment made use of a split-sample design in which we conducted a telephone survey with a portion of the respondents using the same method we had used to conduct the earlier waves of the tracking survey. For the other part of the sample, we mailed customers an invitation to complete the survey online or via telephone (hereafter we refer to this survey as the “internet/telephone” survey). Each letter included a link to the web survey and a unique personal identification number that respondents were required to enter prior to starting the survey. In addition, the survey invitation letter gave potential respondents the option to contact our call center directly and complete the survey via telephone. We provided this option to ensure that each potential respondent in our web survey sample had an opportunity to complete the survey even if the respondent did not have access to the internet.

In addition to using a mixed-mode survey design, we wanted to explore the effects of different incentive structures on response rates. The method for delivering an incentive can also influence survey participation rates. Possible structures include providing a small cash incentive with the survey invitation, a slightly larger incentive to just those who complete the survey, or larger cash prizes to randomly selected winners. Past research has shown that providing an upfront small cash incentive with the survey invitation has the biggest impact on response rates but this structure can be expensive (Dillman, Smyth & Christian 2014). The least costly option is the sweepstakes depending on the prize amounts, but research shows it is least effective at increasing response rates. We chose to test the small upfront incentive versus the sweepstakes model.

For the telephone survey, we offered all respondents the chance to win one of five \$100 gift cards for completing the survey (i.e., the sweepstakes condition). For the internet/telephone survey, we randomly assigned one-half of the sample to the sweepstakes condition and the other half of the sample received a \$2 upfront cash incentive with their survey invitation letter. In total, the study design contained three unique combinations of survey mode and incentive levels (see Table 1).

**Table 1.** Survey Experiment Design

Survey Mode	Incentive Type	
	Internet/Telephone – Inbound	\$2 upfront
Telephone – Outbound	n/a	Sweepstakes

The sample came from the residential customer lists of Massachusetts PAs.<sup>2</sup> We drew a stratified random sample for each PA in proportion to the PA’s number of customers. Table 2 contains the survey fielding details and key dates.

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<sup>2</sup> Because the contact information came from a PA customer list, the phone numbers could be either landline or cell phone numbers. The telephone survey mode will therefore not suffer from coverage bias due to cell phone only customers.

**Table 2.** Survey Fielding Time Table

<b>Activity</b>	<b>Date</b>
Internet/telephone survey invitations sent	December 1
Outbound telephone interviewing begins	December 1
Outbound telephone interviewing holiday break	December 22 – January 4
Postcard reminder mailed	January 2
Survey complete	January 18

## Results

We completed a total of 515 interviews with Massachusetts households. We set a target of 200 completed interviews for the outbound telephone survey and completed 195. For the internet/telephone survey, our goal was to complete 300 interviews, and we completed 320, of which 223 completed the survey on-line, and 97 called our phone center and completed it via telephone.

**Table 3.** Residential Survey Completes by Survey Mode

<b>Survey Mode</b>	<b>Completed Interviews</b>
<b>Telephone Outbound</b>	<b>195</b>
<b>Internet/Telephone</b>	<b>320</b>
<i>Internet</i>	223
<i>Telephone Inbound</i>	97
<b>Total</b>	<b>515</b>

## Response Rates

Table 4 presents the dispositions for the outbound telephone survey and the internet/telephone survey. The outbound telephone dispositions show that no one answered the phone (i.e. answering machine, no answer, busy signal) for 42% of the numbers we dialed (3,224 out of 7,544) despite numerous call attempts. Of those that did, 18% refused (i.e. refusals and mid-interview terminates) to participate (1,324 out of 7,544). Another 17% of numbers we dialed (1,255 out of 7,544) were not eligible for a variety of reasons (e.g. non-working number, fax number, etc.).

The categories for the dispositions for the internet/telephone survey are somewhat different than the outbound telephone survey due to the different outreach mode. We cannot separate refusals to participate from non-contacts, which would include an unopened letter being thrown away or not reaching the addressee. No one responded to 79% of the letters we mailed (2,359 out of 3,000). We received 10% of the letters back due to an incorrect mailing address (287 out of 3,000). The letters were addressed to specific customers, and it is possible that some incorrect mailing addresses were thrown away rather than returned.

The greater efficiency of the internet/telephone survey is striking. It took less than half the number of sample pieces for the internet survey (3,000 compared to 7,544) to complete two-thirds more interviews (320 compared to 195). We dialed but never reached more telephone numbers (3,224) as part of the outbound telephone survey than the total number of mailings we sent as part of the internet/telephone survey. Because the sample source was a customer list, the telephone numbers were likely eligible households who use call screening devices and will not answer calls from unknown numbers. We could dial these numbers over ten times at different times of day and still never talk with a household member. It is difficult to increase telephone survey response rates in this environment.

**Table 4. AAPOR Sample Dispositions**

<b>Disposition – Outbound Telephone</b>	<b>N</b>
Completed Interviews (I)	195
Partial (P)	13
Eligible Non-Interviews	3,669
<i>Refusals (R)</i>	1,249
<i>Mid-Interview Terminate (R)</i>	75
<i>Telephone Answering Device (NC)</i>	1,687
<i>Respondent Never Available (NC)</i>	638
<i>Language Problem (NC)</i>	95
Not Eligible (e)	1,255
<i>Fax/Data Line</i>	44
<i>Non-Working</i>	911
<i>Wrong Number</i>	190
<i>Government/Other Organization</i>	95
<i>No Eligible Respondent</i>	10
<i>Duplicate Number</i>	6
Unknown Eligibility Non-Interview (U)	2,412
<i>No Answer</i>	1,500
<i>Busy</i>	37
<i>Call Blocking</i>	57
<b>Total Customers in Sample</b>	<b>7,544</b>

<b>Disposition – Internet/Telephone</b>	<b>N</b>
Completed Interviews (I)	320
<i>Internet</i>	223
<i>Telephone Inbound</i>	97
Eligible Non-Interviews	2,379
<i>Never replied to mailing (R)</i>	2,359
<i>Called to complete but later refused (R)</i>	5
<i>Called to complete but never reached (NC)</i>	15
Not Eligible (e)	303
<i>Returned to sender - incorrect mailing address</i>	287
<i>Survey determined not eligible</i>	16
<b>Total Customers in Sample</b>	<b>3,000</b>

We calculated the survey response rate using the AAPOR RR3 formula.<sup>3</sup> Table 5 shows the survey response rates by survey mode and incentive combination. The goal of adopting a mixed-mode approach and including monetary incentives was to increase survey response rates and reduce potential non-response bias. The difference in response rates indicates that this approach helped us meet the first objective. The response rates for the internet/telephone survey significantly outperformed the telephone survey. The overall response rate for the internet/telephone survey was 12% compared 3% for the outbound telephone survey.

We needed to make an additional comparison to see how much of this difference was due to different survey modes versus incentive type since the outbound telephone survey only made use of the sweepstakes incentive. We did find a difference in response rates by incentive type. The response rate of the internet/telephone sample that received the \$2 upfront incentive was higher--14% compared to 10% for those who were part of the \$100 sweepstakes incentive. This difference is not large enough to explain the different response rates by survey mode. The internet/telephone survey achieved a higher response rate controlling for incentive type (10% compared to 3%).

<sup>3</sup>  $RR3 = I / (I+P) + (R + NC) + e(U)$  . See

Table 4 for definitions of letters used in formula.

**Table 5. Survey Response Rates across Survey Mode and Incentive Type**

Survey Mode	Incentive Type		
	\$2 Upfront	Sweepstakes	Overall
Internet/Telephone – Inbound	14%	10%	12%
Telephone - Outbound	n/a	3%	3%

### **Demographic Differences**

The internet/telephone survey with a \$2 upfront incentive had the highest response rate of 14%. But as we discussed earlier, a survey with a lower response rate is not necessarily more or less biased than one with a higher response rate. Regardless of the response rate, we expected that survey modes may reach different types of people due to individual differences in communication preferences. Some people will not answer a call from an unknown number but they may be willing to complete a survey if we can just make contact with them. Providing an internet option may also appeal to people who are more comfortable answering questions privately rather than to an interviewer. Internet survey respondents can also complete the interview when it is most convenient for them.

We examined differences across a number of demographic variables for each of our residential samples to determine whether survey mode or incentive type encouraged different types of customers to participate in the study. To isolate the effect of the survey mode and incentive type, we conducted two sets of analysis:

1. Among the internet/telephone survey mode respondents, we compared sample demographics for the sweepstakes and upfront incentive condition. This allowed us to hold the survey mode constant and isolate the effect of incentive type on sample demographic composition.
2. Among participants in the sweepstakes incentive condition, we compared sample demographics by survey mode. These comparisons allowed us to see if different types of people are more likely to respond through different modes.

While varying the incentive type has differential effects on response rates, it does not appear to lead to differences in the type of customers that participate in the survey. The results from our analysis of incentive type (holding the survey mode constant) yielded no statistically significant differences across key demographic characteristics, including homeownership, age, education, sex, and income (see Table 6).

**Table 6. Sample Characteristics by Incentive Type: Internet/Telephone Survey**

	<b>Upfront \$2 Incentive (n=192)</b>	<b>Sweepstakes (n=128)</b>
<b>Home Ownership</b>		
Own	84%	81%
Rent	16%	19%
<b>Age</b>		
18 to 34	7%	11%
35 to 44	15%	13%
45 to 64	44%	48%
65 and over	35%	28%
<b>Education</b>		
High school or less*	23%	15%
Some college*	18%	27%
Bachelor's degree	27%	24%
Advanced degree	32%	34%
<b>Gender</b>		
Male	51%	47%
Female	49%	54%
<b>Household Income</b>		
Under \$30,000	16%	14%
\$30,000 to under \$60,000	25%	28%
\$60,000 to under \$100,000	23%	27%
\$100,000 or more	36%	31%

Note: The asterisk (\*) indicates that incentive structures are statistically different from one another at 90% confidence level.

Conversely, our comparison of survey mode (while holding the incentive type constant) does show statistically significant differences for several demographic variables. For a true comparison of the different survey modes, we divided our sample into three categories. The outbound telephone survey is the traditional survey mode that we used in previous waves, which involves our call center contacting customers directly. For the internet/telephone survey, we divided this sample into two distinct groups. We mailed both groups an invitation to complete the survey. One group chose to complete the survey online while the other group chose to complete the survey by calling our telephone call center directly. We summarize the results from our analysis of these three survey modes in Table 7.

The different survey modes reached different subsets of the population. No single mode provides a close match to the target population across all demographics. Our results show that, relative to the traditional phone survey mode, the internet survey tends to attract more-educated and higher-income respondents.<sup>4</sup> Conversely, by providing an option for respondents to call our telephone call center directly, we see that this survey mode attracted older, lower-income, and less-educated respondents.

That we find statistically significant differences in the demographic composition of our samples

<sup>4</sup> Note that the difference in the percent of homeowners for the web survey compared to the telephone survey may be due to our sample source, which was a customer database from 2013. The web survey relied on mailing invitation letters. Since homeowners are less likely to have changed residences in the past year compared to renters, the likelihood that an invitation letter went to an incorrect address is far higher for renters, thus biasing downward their representation in the web survey sample.

for each of the different survey modes is not surprising, since one of the objectives of a mixed-mode survey approach is to bolster sample representativeness by using multiple tactics to reach diverse segments of the population.

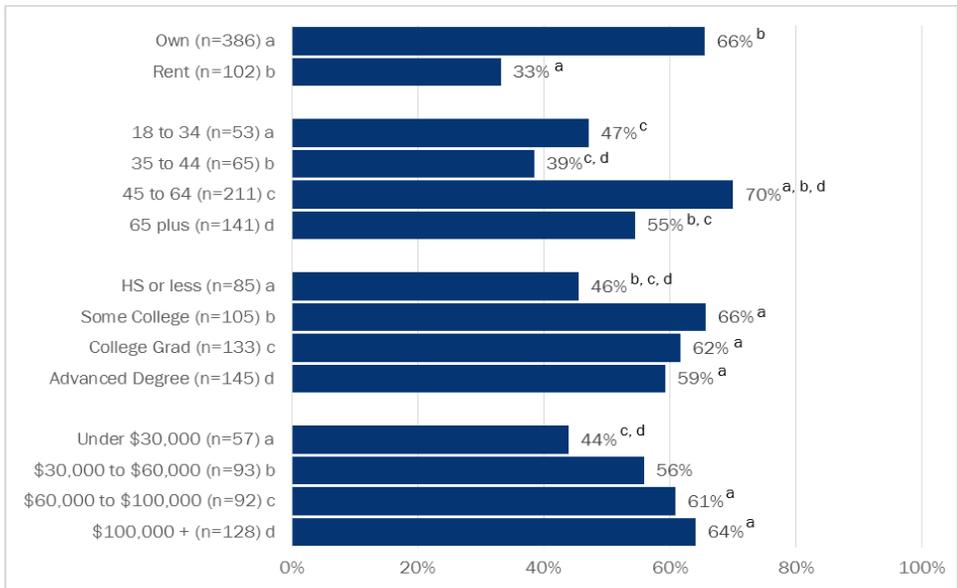
**Table 7. Sample Characteristics across Survey Mode**

	Massachusetts Population*	Telephone Outbound (n=195) a	Mailed Invitation (n=320)	
			Telephone Inbound (n=97) b	Internet (n=223) c
<b>Home Ownership</b>				
Own	63%	73% *c	76% *c	85% *ab
Rent	37%	27% *c	24% *c	15% *ab
<b>Age</b>				
18 to 34	29%	17% *c	1% *	11% *a
35 to 44	17%	14% *b	7% *ac	17% b
45 to 64	35%	44% *b	31% ac	52% *b
65 and over	18%	26% *b	62% *ac	20% b
<b>Education</b>				
High school or less	11%	19% *b	30% *ac	16% *b
Some college	27%	23%	31% c	18% *b
Bachelor's degree	19%	33% *b	20% a	28% *
Advanced degree	7%	26% *c	19% *c	39% *ab
<b>Household Income</b>				
Under \$30,000	24%	16% *bc	28% ac	10% *ab
\$30,000 to under \$60,000	22%	22% b	46% *ac	18% b
\$60,000 to under \$100,000	23%	25% b	15% *ac	29% *b
\$100,000 or more	31%	36% b	12% *ac	43% *b

Note: Letters indicate statistically significant differences between survey modes at the 90% confidence level. The asterisk (\*) indicates a significant difference between a survey mode and the Massachusetts population.

### Brand Awareness and Understanding

The comparison of demographic characteristics showed that we reached different types of people through the different survey modes. Moreover, no single mode was representative of the Massachusetts population across all characteristics without any post-stratification weights to adjust for survey non-response. However, demographic differences alone do not necessarily mean that the various survey modes suffered from non-response bias. As we noted earlier, the factors that are related to survey non-response must be correlated with the study variables of interest for the results to be biased. In the case of this survey, a key study variable was customer awareness of the Mass Save brand. We compared awareness of Mass Save by different demographics and found some sizable differences in awareness. In particular, owners and higher income customers were more aware of Mass Save than renters and lower income customers (see Figure 2). We also found differences in awareness by age and education. Customers with only high school educations were less aware of Mass Save than those with more education. Customers in the 45 to 64 age range were more aware than all other age groups.

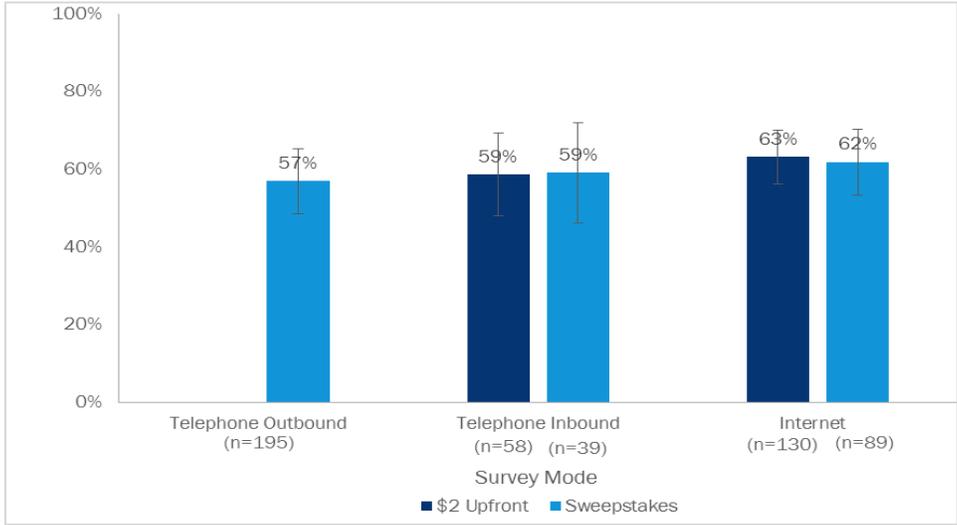


Note: Letters indicate statistically significant differences between designated categories at the 90% confidence level.

**Figure 2. Mass Save Brand Awareness by Demographic Characteristics**

Based on the demographic differences in awareness and the demographic differences we saw by survey mode, it is possible that we would find differences in Mass Save awareness across our survey modes.

Figure 3 displays Mass Save awareness by mode as well as incentive type. Awareness does not differ by incentive type, which is consistent with our demographic comparisons by incentive type. We see slight differences in awareness by survey mode but none of the differences are statistically significant.



**Figure 3 Mass Save Brand Awareness by Survey Mode and Incentive**

**Comparison to Previous Survey Waves**

The objective of the survey experiment was to determine if we could increase survey response rates and decrease survey costs by using a different survey fielding mode. We felt that a mixed mode approach in which we combined the results from multiple modes may reduce any non-response bias because we may reach people through one mode that we are unable to reach through another. At the same

time, we needed to be able to compare future survey waves to past tracking surveys that were conducted entirely by phone.

A challenge of using a mixed mode survey design is combining the results from different modes. There are no guidelines on the relative weight that we should give to each mode. Given the different number of completed interviews and demographic differences by mode, the most straightforward approach is to combine the three samples and apply a survey weight to the combined sample so that it matches the overall population on key demographic characteristics.

To be consistent with prior waves of the tracking survey, we weighted the survey on the same demographic characteristics we had used in the analysis of previous waves. For past waves, we applied a weight based on home ownership as we had interviewed too many home owners relative to renters. We had found that this single variable did a relatively good job of correcting other demographics at the same time. For the survey experiment, we combined the three samples and weighted on home ownership so that the sample matches the Massachusetts population.

**Table 8.** Demographics of Telephone Survey and Mixed mode Surveys Compared to Massachusetts Population

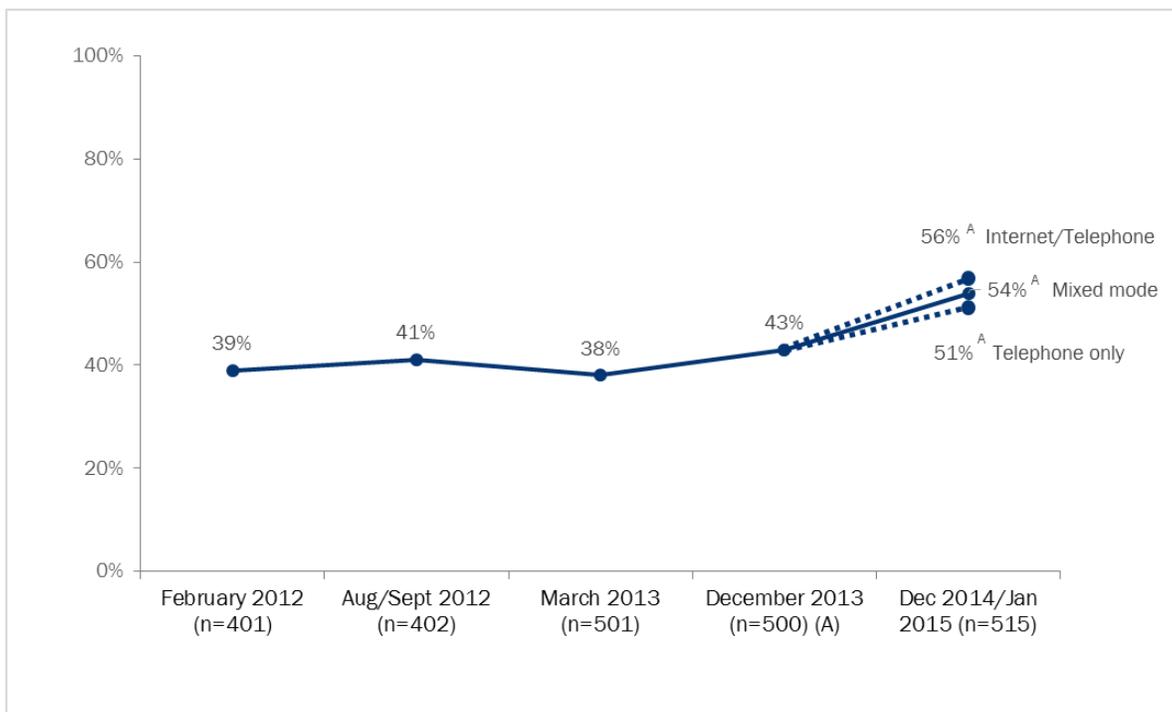
	Massachusetts Population *	Telephone Survey December 2013 (n=500) a	Mixed mode Survey Dec 2014/Jan 2015 (n=515) b
<b>Home Ownership</b>			
Own	63%	62%	63%
Rent	37%	38%	37%
<b>Age</b>			
18 to 34	29%	28% <sup>b</sup>	15% <sup>*a</sup>
35 to 44	17%	13% <sup>*</sup>	16%
45 to 64	35%	35% <sup>b</sup>	43% <sup>*a</sup>
65 and over	18%	23% <sup>*</sup>	26% <sup>*</sup>
<b>Education</b>			
High school or less	11%	21% <sup>*</sup>	21% <sup>*</sup>
Some college	27%	22% <sup>*</sup>	22% <sup>*</sup>
Bachelor's degree	19%	29% <sup>*</sup>	28% <sup>*</sup>
Advanced degree	7%	27% <sup>*</sup>	29% <sup>*</sup>
<b>Household Income</b>			
Under \$30,000	24%	24%	21%
\$30,000 to under \$60,000	22%	30% <sup>*</sup>	26% <sup>*</sup>
\$60,000 to under \$100,000	23%	23%	24%
\$100,000 or more	31%	23% <sup>*b</sup>	30% <sup>a</sup>

Note: The two surveys are weighted by home ownership. Letters indicate statistically significant differences between survey modes at the 90% confidence level. The asterisk (\*) indicates a significant difference between a survey mode and the Massachusetts population.

Even after applying the survey weight, our mixed mode survey is wealthier and older than the Massachusetts population (see Table 8). We compared these results to the most recent wave of the tracking survey we conducted using traditional outbound telephone methods. The telephone survey we conducted in 2013 matches the population better on age. The mixed mode survey underrepresents younger adults.

However, the mixed mode survey is a bit closer to the population in terms of household income. The telephone survey includes too many low to moderate income respondents relative to high income respondents.<sup>5</sup>

To determine if a mixed mode survey produced results that were significantly different from previous waves, we compared awareness of Mass Save as measured through the mixed mode survey with previous telephone tracking surveys. We applied the home ownership weight to all surveys. The most recent mixed mode survey shows a significant increase in Mass Save awareness (see Figure 4). It is the first significant increase in awareness that we have seen since we began conducting the surveys in 2012. The campaign may have been more effective; compared to previous years, the 2014 campaign ran the entire year instead of just part of the year. To ensure that the increase was due to an actual change in awareness among Massachusetts customers and not a change in survey design, we separated the weighted telephone outbound results from the internet/telephone results. Both modes show a significant increase in awareness, though the increase is greater for the internet/telephone mode than the telephone outbound survey. If we had continued with just a traditional outbound telephone survey, our conclusions would have been the same. Mass Save awareness was higher at the end of the 2014 marketing campaign.



**Figure 4.** Mass Save Awareness over Time

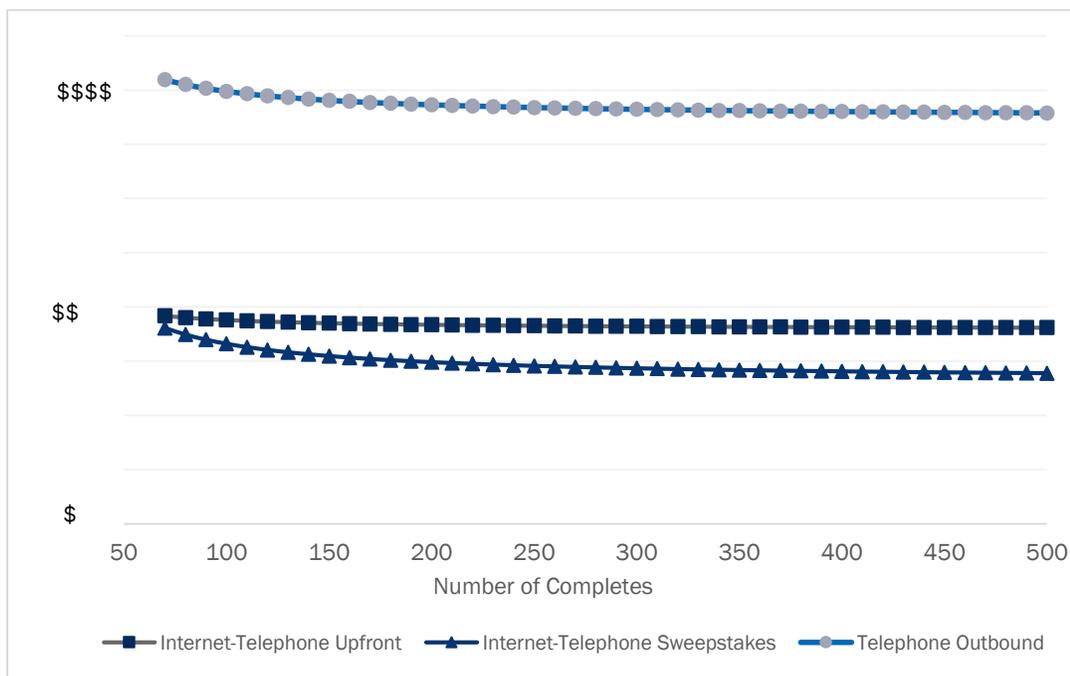
## Survey Costs

Telephone survey fielding costs have risen due to declining response rates. At the same time, the internet has become a viable survey mode. Our sample contained telephone numbers and mailing addresses but not email addresses, which is a common challenge for internet surveys. Our solution was to

<sup>5</sup> We could adjust for these remaining differences by using a survey weight that is comprised of multiple characteristics rather than just home ownership. Using multiple characteristics to construct a weight can result in some extreme weight values, which is undesirable as it can cause a handful of respondents to have a large amount of influence on the overall results. The previous weight using just home ownership was a good enough correction that we chose not to use a more complicated weight.

mail potential respondents an invitation to take the survey online or call our phone center to complete the survey. Even with the costs of mailing the invitation and a postcard reminder, the costs of the internet/telephone survey were much less than the outbound phone survey. We reduced the fielding costs of the project by approximately 50% by completing a portion of the interviews through the internet/telephone mode rather than all by the outbound phone mode.

Figure 5 displays the cost per survey complete for the different survey modes and incentive structures over a range of sample sizes.<sup>6</sup> The cost differences between survey modes are much greater than between incentive types, regardless of the number of completes. Costs per complete go down for all mode/incentive combinations as the number of completes goes up due to fixed costs being spread across more respondents. The different modes/incentive combinations have a different mix of variable costs (e.g. interviewing labor, mailed survey invitations, upfront incentives) and fixed costs (e.g. mailer setup costs, sweepstakes incentives), which explain why the costs per complete drop at unequal rates.



**Figure 5.** Cost per Complete by Survey Mode

## Conclusion

The energy efficiency industry relies on telephone surveys to conduct the majority of surveys with customers and program participants. While these surveys play a critical role in program evaluation, response rates have fallen so much that non-response bias is an increasing concern. Even if a telephone survey is unbiased, the costs keep increasing as it takes more interviewer hours to complete a single interview.

A mixed mode survey has several advantages. By using a mixed mode survey, we reduced our fielding costs and achieved a higher response rate than if we had completed all interviews using a telephone survey. Moreover, all three survey modes reached different types of people in terms of demographics. No single mode was closer to the population across multiple characteristics. To reach the

<sup>6</sup> Numeric costs per complete are proprietary, but the number of dollar signs in the figure are representative of the increase in costs along axis. Four dollar signs mean the costs were double that of two dollar signs.

widest and most representative cross-section of the population, mixed mode surveys may result in the most representative sample.

Our experiment also showed that incentives can boost response rates, but the impact varies depending on the design. An upfront incentive of \$2 outperformed a sweepstakes entry to win one of five \$100 prizes. The cost per survey complete is greater for the upfront incentive than the sweepstakes, but for small projects, the costs are much closer. With the increased response rate from the upfront incentives, fewer mailed invitations are needed, thus decreasing costs. For larger projects, the upfront incentive may be cost prohibitive. Our results showed that while the upfront incentive resulted in an increased response rate compared to the sweepstakes, respondents who received the different incentives were similar in terms of demographics and survey responses so that it may be difficult to justify the costs of the upfront incentive. Evaluators should consider their project budgets and the amount of available sample when deciding on their incentive approach.

The energy efficiency industry has been slow to recognize the changes and challenges confronting the survey industry. Mixed mode surveys are a potential solution. That we find statistically significant differences in the demographic composition of our samples for each of the different survey modes is not surprising, since one of the objectives of a mixed-mode survey approach is to bolster sample representativeness by using multiple tactics to reach diverse segments of the population. Additional research is needed to determine the impact of survey mode on response rates of different populations such as participants versus non-participants, and different incentive amounts and structures.

## References

- The American Association for Public Opinion Research. 2015. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*. 8<sup>th</sup> ed.
- Dillman, D.A., Smyth, J.D., & Christian, L.M. (2014). *Internet, Phone, Mail, and Mixed-Mode Surveys*. New Jersey: Wiley.
- Kohut, A., S. Keeter, C. Doherty, M. Dimock, and L. Christian. 2012. *Assessing the Representativeness of Public Opinion Surveys*. Washington, D.C.: The Pew Research Center for the People and the Press.
- Steeh, C.G. 1981. "Trends in Nonresponse Rates, 1952-1979." *Public Opinion Quarterly* 45:40-57.
- Tourangeau, R. & Plewes, T.J. (2013). *Nonresponse in Social Science Surveys: A Research Agenda*. Washington, D.C.: The National Academies Press.