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# Effect of Monetary Incentives on Mail Survey Response Rates for Midwestern Farmers

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ABSTRACT:
Response rates to mail-based surveys have declined in recent decades, and survey response rates for farmers tend to be low overall. Maintaining high response rates is necessary to prevent non-response bias. Historically, incentives have proven to be an effective tool to increase response rates with general populations; however, the effect of incentives on farmers has not been well tested. In this study, we experimentally manipulated the use of a small $2 incentive in two surveys targeted at and distributed to farmers. We tested both the use of the incentive overall and incentive distribution timing within the survey process. We found that the incentive significantly increased response rates with farmers but there was no significant effect based on when the incentive was distributed.

INTRODUCTION:
Response rates to mail-based surveys have been declining steadily in recent decades (Blecker and Ott 2007; Connelly, Brown, and Decker 2003; Larson and Poist 2004; Stern, Bilgen, and Dillman 2014). Additionally, farmers' response rates can be very low (Pennings, Irwin, and Good 2002; Prokopy 2011). Ensuring an acceptable response rate is important to prevent non-response bias in survey results (Schutt 2012). Evidence suggests that monetary incentives are effective at increasing the response rate of surveys for a variety of target populations due to the theory of reciprocity (Caporaso, Cantor, and Townsend 2015; Church 1993; Dillman, Smyth, and Christian 2014; Edwards 2002; Hopkins and Gullickson 1992; Linsky 1975; Singer and Ye 2013; Yu and Cooper 1983). However, few studies have evaluated the effectiveness of survey incentives with farmers, a group that is arguably unlike the general population in many ways, including the relatively high volume of surveys that they receive from the government, the private sector, and academia.

One study found that non-monetary incentives (chocolate) nominally increased response rates for dairy farmers, but had no effect on beef and sheep farmers in New Zealand (Fairweather 2010). Another study utilized a phone survey and asked farmers to predict what factors affected their willingness to take a survey, and the size of incentive that would be required to take such a survey (Pennings et al. 2002). These results suggested that farmers expected compensation of about $15USD (Mean=$15.31, std=13; $20.83 given inflation effects) to participate in a survey, and further suggested that the length of the survey would impact requisite incentive size. In that study, farmers indicated that they expected $35 ($47 after adjusting for inflation) to complete a 20-minute survey (Pennings et al. 2002). No experimental testing of the incentive was conducted. Added to this empirical evidence is anecdotal information from farmers themselves that they are frequently paid up to $100 by private companies to complete surveys.

To our knowledge, there has been no experimental testing of the effect of monetary incentives for farmers. This paper addresses this gap by offering an evaluation of the efficacy of a small ($2) monetary incentive, and the effect of when it was distributed in the survey mailing process. Given the mixed results discussed above, we hypothesized that neither the incentive nor its timing would improve response rates.

## METHODS

Two separate surveys were used to test the effectiveness of $2 incentives at increasing survey response rates for farmers. Both surveys were conducted in the Midwest region of the United States and were distributed by Purdue University. The first survey was conducted between February and April 2016 in the Saginaw Bay Watershed (SBW) of eastern Michigan. The purpose of this survey was to collect baseline social indicator data and to collect information about how farmers interact with crop advisors (Prokopy et al. 2009; Prokopy and Genskow 2016). Eanes et al. (2017) provides additional detail on the participant selection and project objectives. The second survey targeted landowners in 12 Midwestern states (IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI) as part of the Useful to Usable (U2U) project, and was distributed from May to August 2016 (Prokopy et al. 2017; Singh et al. 2017) The purpose of this survey was to evaluate a six-year project that developed decision support tools to help farmers adapt to climate change. The survey also included questions about climate change beliefs. Both surveys were 16 pages long and took an estimated 15-20 minutes to complete. Both surveys were designed following best practices outlined in Dillman et al. (2014). Address lists for both surveys were randomly selected from lists provided through a Freedom of Information Act (FOIA) request to the Farm Service Agency for people who had received some form of government payment for agricultural land in 2013-2014.

### Incentive and Survey Distribution

Survey distribution for both projects followed the 5-wave Dillman Tailored Design Method (Dillman et al. 2014). The 5 waves consisted of the 1) Advance Letter, 2) Survey 1, 3) Reminder Postcard, 4) Survey 2, and 5) Survey 3 with Postcard. All mailings included a link to complete the survey online via Qualtrics (Qualtrics, Provo, UT). The SBW distribution included a total of 3,000 participants of which half (n=1,500) were randomly assigned to receive the $2 incentive (in the form of a $2 bill). The $2 incentive was mailed in Wave 1. For the U2U survey distribution, a total of 6,840 surveys were mailed with approximately 2/3 (n=4,599) of the population randomly assigned to receive the $2 incentive ($2 bill). The incentive recipient population was further divided to receive the incentive either in Wave 1 (n=2,313) or Wave 2 (n=2,286).

### Response Rate

Response rates were calculated as the percentage of completed surveys per total number of eligible respondents (Beaman and Vaske 2008). Completed surveys were defined as any survey returned with at least one question answered with usable data. Eligible respondents were defined as all surveys mailed minus bad addresses, which included those automatically returned by the post-office, as well as recipients determined to be deceased. Response rates were calculated per incentive group by project (i.e. SBW with and without incentive, U2U incentive Wave 1, 2, and no incentive). Significant differences in response between the incentive groups were assessed with a chi-square test by project.

### Incentive Timing

To determine if the distribution timing of the incentive affected response rate or speed of response, each project was divided into five receipt categories. Survey receipt categories were defined as the range between the distribution of the previous wave and creation of the distribution list of the next wave (Table 1). If the distribution of the wave took multiple days (in the case of U2U) the last distribution date was used for that wave for the whole of the receipt category.

Cost

Undergraduate students completed mail distribution in-house. The total cost of the 5-wave distribution was determined by combining the estimated cost of toner, drums, maintenance, labor, envelopes, paper, envelope labels, and stamps for each wave and multiplying that cost by the number of surveys that were mailed (i.e. addresses that had not responded prior to the subsequent wave distribution). All bad addresses received from the post office and addresses associated with refusals were removed from additional mailings. Project management and data entry costs were not included in our analyses. Because both surveys were the same length, the unit cost was assumed to be the same for both projects.

We then compared the cost per returned survey with and without the incentive. This allowed us to assess whether the cost of the incentive ($2) was offset by an increase in response rate, or by earlier returns that saved costs on subsequent survey waves.

All analyses were completed in either Microsoft Excel (Microsoft Excel, Version 14.7.4, Redmond, WA USA) or R Statistical Software (Version 3.2.3).

RESULTS

The general effectiveness of the incentive was evaluated by assessing 1) the response rate, 2) the effect of when the incentive was distributed, and 3) overall cost per returned survey.

Response Rate

The overall response rates were 49.5% and 39.1% for SBW and U2U, respectively (Table 2). Individuals who received the incentive were significantly more likely to respond than individuals who did not. Response rates increased by 7.3% for SBW and by 8.3% and 10.3% for U2U Wave 1 and Wave 2, respectively (SBW: $2=53.1%, $0=45.8%, chi-square test p-value <0.05; U2U: Wave 1 - $2=41.1%, Wave 2 - $2 = 43.1%, $0=32.8%, chi-square test p-value <0.05). Receiving the incentive in Wave 2 of the U2U survey resulted in a slightly higher response rate (43.1%) than with Wave 1 (41.1%); however, this relationship was not significant (Wave 1: n=936; Wave 2: n=969, chi-square test; p-value >0.05).

Incentive Receipt Timing

In the SBW, more (+5.1%) completed surveys were returned earlier (i.e. pre-Category 3) in the group that received the incentives; however, the majority of the surveys were returned post-reminder postcard. Likewise in U2U Wave 1, more (+6.8%) surveys were returned earlier (i.e. pre-Category 3) relative to the non-incentive group (Table 3). Across all incentive groups, the

majority of returns occurred during receipt of Category 3, which was after the postcard reminder mailed (Wave 3) and before the Wave 4 distribution list was created.

### Cost

The unit cost of production and distribution across all waves in both surveys was $14.05/survey. For all groups that included the $2 incentive, the total mailing cost was reduced by 7.3%, 5.0%, and 5.7% for SBW, U2U Wave 1 and 2, respectively. However, when the cost of the incentive was included, the overall distribution cost was higher for the groups that included the incentive (Table 4). While the response rate of the incentive groups was higher, this increase was not sufficient to wholly offset the incentive cost. The reduction of mail costs due to the higher response rates for the incentive groups resulted in offsetting the cost of using an incentive for SBW by 39.7%, U2U Wave 1 by 28.1%, and U2U Wave 2 by 32.2%.

## DISCUSSION

Farmers tend to have low response rates to surveys (Pennings et al. 2002), thus, it was instructive to find that the use of a small incentive significantly increased response rates for this group. Likelihood of response was not affected by the wave in which the incentive was distributed (e.g. advance letter or Wave 2). The significant increase in response rate (from 32.8% to 39.1% and 45.8% to 49.5%) was surprising given Pennings et al. (2002) finding that farmers expected incentives of $15-$35 to complete a 20-minute survey such as the two discussed here.

Given the positive impact of the small incentive that we observed, a larger incentive may be even more effective at increasing response rates (James and Bolstein 1992; Jobber, Saunders, and Mitchell 2004; Pennings et al. 2002). Future research should experimentally manipulate incentive amount in surveys for farmers.

While the cost per returned survey was higher with the incentive, the cost of the incentive was offset by 28.1%-39.7%. To fully offset the cost of the incentive both higher response rates and earlier returns would have been necessary. While these did transpire, neither occurred at sufficient thresholds to mitigate the higher cost of the incentive. It should be noted that we did not include project management costs in our analysis, and labor costs are highly variable; due to these considerations, offset calculations will differ with other studies.

## CONCLUSIONS

Consistent with the general population, we found farmers responded to a small monetary incentive in two surveys in the Midwestern United States, presumably explained by the theory of reciprocity. Given recent declines in survey response rates, this is an important finding that can help ensure high-quality data from this critical population that manages a preponderance of the natural resources both in the United States and in other countries.

## Table 1. Survey receipt categories

| | | SBW[a] | U2U[b] | | |
|---|---|---|---|---|---|
| | | | Batch 1 | Batch 2 | Batch 3 |
| **Category** | **Description** | **DOY (Julian Calendar)** | | | |
| **1** | Post-Wave 1 - distribution list Wave 2[c] | ≤55 | ≤176 | ≤179 | ≤182 |
| **2** | Post-Wave 2 - distribution list Wave 3 | >55 - ≤67 | >176 - ≤189 | >179 - ≤193 | >182 - ≤195 |
| **3** | Post-Wave 3 - distribution list Wave 4 | >67 - ≤77 | >189 - ≤204 | >193 - ≤208 | >195 - ≤210 |
| **4** | Post-Wave 4 - distribution list Wave 5 | >77 - ≤92 | >204 - ≤225 | >208 - ≤229 | >210 - ≤231 |
| **5** | Post-Wave 5 | >92 | >225 | >229 | >231 |

DOY- Day of Year

[a] Two SBW surveys (both with incentive) were received without usable dates and were excluded from this analysis.

[b] 26 U2U surveys (3 no incentive, 12 incentive in Wave 1, 11 incentive in Wave 2) were received without usable dates and were excluded from this analysis. Due to the volume of the U2U survey, distribution was divided into three batches.

[c] Online only

**Table 2. Survey response rate**

| | SBW | | | U2U[a] | | | |
|---|---|---|---|---|---|---|---|
| | **Total** | **$2** | **$0** | **Total** | **Wave 1 - $2** | **Wave 2 - $2** | **$0** |
| Completed (n) | 1459 | 783 | 676 | 2633 | 936 | 969 | 726 |
| Mailed (n) | 3000 | 1500 | 1500 | 6840 | 2313 | 2286 | 2241 |
| Bad addresses (n) | 50 | 25 | 25 | 103 | 35 | 39 | 29 |
| Refusals (n)[b] | 11 | 4 | 7 | 93 | 23 | 35 | 35 |
| Response rate (%) | 49.5 | 53.1 | 45.8 | 39.1 | 41.1 | 43.1 | 32.8 |

[a] Two survey identifiers were obscured by respondent and could not be included in incentive analysis since group assignment was unknown.

[b] Refusals were not considered as completed when calculating the response rate; however, the associated addresses were removed from any further requests to complete the survey.

**Table 3. Receipt timing**

| | SBW | | | U2U | | | |
|---|---|---|---|---|---|---|---|
| | % (n) | | | | | | |
| Category[a] | Total | $2 | $0 | Total | Wave 1 - $2 | Wave 2 - $2 | $0 |
| 1 | 15.3 (223) | 18.6 (145) | 11.5 (78) | 12.8 (334) | 19.8 (184) | 6.1 (59) | 12.6 (91) |
| 2 | 16.1 (235) | 15.2 (119) | 17.2 (116) | 24.5 (641) | 22.0 (205) | 28.5 (274) | 22.4 (162) |
| 3 | 29.0 (422) | 29.7 (232) | 28.1 (190) | 30.8 (805) | 28.2 (262) | 37.2 (357) | 25.7 (186) |
| 4 | 21.7 (316) | 19.2 (150) | 24.6 (166) | 19.0 (497) | 19.0 (177) | 15.9 (153) | 23.1 (167) |
| 5 | 17.9 (261) | 17.3 (135) | 18.6 (126) | 12.9 (336) | 11.0 (102) | 12.2 (117) | 16.2 (117) |

[a] See Table 1 for category descriptions.

**Table 4. Survey mailing cost summary**

| | | SBW | | | | U2U | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $2 | | $0 | | Wave 1 - $2 | | Wave 2 - $2 | | $0 | |
| Wave | Cost ($/survey) | Mailed (n) | Mailing Cost ($) | Mailed (n) | Mailing Cost ($) | Mailed (n) | Mailing Cost ($) | Mailed (n) | Mailing Cost ($) | Mailed (n) | Mailing Cost ($) |
| 1 | 0.72 | 1500 | 1,082.25 | 1500 | 1,082.25 | 2313 | 1,668.82 | 2286 | 1,649.34 | 2241 | 1,616.88 |
| 2 | 4.38 | 1330 | 5,819.42 | 1397 | 6,112.57 | 2091 | 9,149.17 | 2185 | 9,560.47 | 2115 | 9,254.18 |
| 3 | 0.51 | 1211 | 623.06 | 1281 | 659.07 | 1881 | 967.77 | 1905 | 980.12 | 1949 | 1,002.76 |
| 4 | 4.03 | 979 | 3,948.80 | 1091 | 4,400.55 | 1613 | 6,506.04 | 1532 | 6,179.32 | 1757 | 7,086.86 |
| 5 | 4.40 | 829 | 3,651.50 | 922 | 4,061.13 | 1432 | 6,307.53 | 1375 | 6,056.46 | 1575 | 6,937.40 |
| | Total Mailing Cost ($) | | 15,125.01 | | | | 24,599.34 | | 24,425.72 | | |
| | Incentive Cost ($) | | 3,000.00 | | | | 4,626.00 | | 4,572.00 | | |
| | **Total Distribution Cost ($)** | | **18,125.01** | | **16,315.58** | | **29,225.34** | | **28,997.72** | | **25,898.08** |

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