

INDIRECT MONETARY INCENTIVES WITH A COMPLEX AGRICULTURAL ESTABLISHMENT SURVEY

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Key Words: Incentives; nonresponse; response rate; refusal conversion; mail surveys

1. INTRODUCTION

The Agricultural Resource Management Survey (ARMS) is an annual survey conducted by the United States Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS) and co-sponsored by USDA's Economic Research Service (ERS). The ARMS consists of three phases. Phase I is used for screening potential operations for Phases II and III; Phase II collects data on cropping practices and agricultural chemical usage; and Phase III collects detailed economic information about the agricultural operation as well as the operator's household. This paper deals only with Phase III.

ARMS Phase III has been problematic because, compared with other NASS surveys, its response rates are low, and its data collection costs are high. The ARMS Phase III survey design is complex, using several questionnaire versions and data collection modes. One component of the data collection is a mail-out/mail-back methodology using a 16-page self administered "Core" questionnaire. This questionnaire is the shortest of the ARMS Phase III questionnaires, but asks all of the most critical elements. The development of this questionnaire made it possible to collect data through the mail. Face-to-face nonresponse follow-up interviews are conducted for all mail non-respondents.

An incentive experiment was implemented with the 2004 ARMS Phase III Core to test whether monetary incentives would be effective at increasing response rates for this survey while being cost effective. Offering potential respondents incentives is a proven technique to increase response rates on a variety of surveys conducted by several agencies and companies (Church, 1993; James and Bolstein, 1992; James and Bolstein, 1990; Singer, 2002).

2. METHODS

The 2004 ARMS Phase III Core sample size was 15,900 farm/ranch operations across 15 states. The 15 states were those with the highest agricultural value of sales and included Arkansas, California, Florida,

Georgia, Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Carolina, Texas, Washington, and Wisconsin. The total sample was stratified by state, ARMS farm value of sales (as maintained on the sampling frame), and type of operation (also as maintained on the sampling frame). Then, five sub-samples, each of size 2,000, were systematically selected. The sub-samples were drawn such that each was equally represented by the strata. Once the sub-samples were drawn, NASS Field Offices had the opportunity to remove operations from the Core sample that had previous data reporting arrangements with the office. This resulted in each sub-sample being slightly less than 2,000.

The standard mail-out/mail-back data collection methodology for the 2004 ARMS Phase III Core sample consisted of: (1) a cover letter and questionnaire mailed on December 28, 2004, (2) a post-card reminder and "thank you" sent to the entire sample on January 13, 2005, (3) a cover letter and second questionnaire mailed to all non-respondents on January 31, 2005, and, finally, (4) starting February 21, 2005, face-to-face interviews attempted for all remaining mail non-respondents.

In addition to the standard data collection methodology, prepaid and promised indirect cash incentives – in the form of \$20 automated teller machine (ATM) cards – and priority mail were used as stimuli in the incentive experiment. Combinations of these stimuli were administered to four of the five sub-samples mentioned above; a fifth sub-sample received no stimuli and served as the control for this project. Collectively, these five sub-samples formed the five treatment groups used for this project. Table 1 contains descriptions of the treatment groups.

All treatment groups received cover letters. However, the letters for those in the treatment groups that received prepaid incentives differed in that they: (1) explained the incentive was a "thank you", (2) described the uniqueness of the ARMS, and (3) justified the use of the incentive by its overall cost savings to the government.

The actual ATM card incentive was delivered to recipients in the same packet as the first questionnaire and was affixed to a standard 8½ inch x 11 inch sheet of paper that reiterated a "thank you" and included

instructions on how to use the card.

The \$20 ATM cards were supplied by JPMorgan Chase bank and were usable in nationwide ATM machines that displayed the NYCE[®], Pulse[®], Maestro[®], or Cirrus[®] logos. The cards were also usable at point-of-sale (POS) (i.e., retail) establishments that allow the use of debit cards as payment; however, this fact was not revealed to card recipients. In addition to the \$20 incentive, the ATM cards were loaded with an extra \$4 to cover any transaction charges. If a card recipient lost or could not use the card, a replacement could be requested by calling the toll free phone number listed on the instruction sheet. For the few cases where this occurred, only the replacement card was used in our analysis.

Table 1: Treatment Groups

Treatment Group	First Questionnaire Mailing ^{1/}
1 (Control)	First Class Mail Cover letter No incentive
2	First Class Mail Cover letter Prepaid \$20 ATM card
3	Priority Mail Cover letter No incentive
4	Priority Mail Cover letter Prepaid \$20 ATM Card
5	First Class Mail Cover letter Promised \$20 ATM Card

^{1/} All treatment groups also received a postcard reminder/thank-you and face-to-face non-response follow-up. No incentives were sent in the second questionnaire mailing.

The cards were pre-activated and were immediately usable when the recipients received them. The personal identification number (PIN) needed to use the card was embossed on the front of each card after the words “THANK YOU”. The front of each card also included the embossed message, “FOR HELP 1-888-424-7828”; this toll-free telephone number was answered by NASS staff. All ATM cards expired on June 30, 2005 (there was no provision for extending this date). The decision to use \$20 ATM cards as incentives was essentially made by default. Actual cash was preferred by the authors; however, NASS and USDA senior management were concerned with accountability when using cash. Checks were also considered, but the U.S. Treasury Department (the would-be issuer of the checks) was concerned with logistical issues related to

check usage. There were no such concerns from NASS, USDA, or the Treasury Department for the ATM cards. The decision to offer \$20 as the incentive amount was made because many, if not most, ATMs only dispense cash in \$20 increments.

Priority mail was also used as a stimulus because evidence from survey literature has shown the use of priority mail increases overall response rates, especially when used in combination with monetary incentives (Moore and An, 2001).

3. RESULTS

3.1 Response Rates

Similar to previous incentive research conducted on various populations, the results of this project showed that incentives for the farm and ranch operator population increased response rates, most notably, the mail response rates. Table 2 shows the response rates by treatment group (treatment group descriptions are given in Table 1). Response rates are also broken out by the different mailing and contacts employed as part of the data collection methodology.

As shown in Table 2, all treatment groups that received an incentive had higher response rates than the control group (Treatment Group 1). The prepaid \$20 ATM incentive sent by priority mail (Treatment Group 4) had the highest mail and overall response rates, at 43.9 percent and 72.4 percent, respectively. The second highest mail and overall response rates were achieved with the prepaid incentive sent by first class mail (Treatment Group 2) with a mail response rate of 40.8 percent and an overall response rate of 70.4 percent. The promised \$20 ATM incentive response rates, at 37.2 percent for mail and 68.4 percent overall, surpassed the treatment groups that received no incentives, but lagged those that provided prepaid incentives. Priority mail alone was ineffective at increasing response rates.

The mail and overall response rates were compared for statistical significance using *t*-tests across all treatment group combinations. All tests were done at an overall $\alpha=0.05$ level of significance (with a Bonferroni adjustment for the ten comparisons). Details of all comparisons are given in Tables 3 and 4. All three treatment groups that received ATM card incentives had significantly higher mail and overall response rates than the control group, with the two prepaid treatment groups outperforming the promised incentive. In terms of *mail* response, all three treatment groups that received ATM card incentives had significantly

higher response than the control group. Specifically:

- Treatment Group 2 had a significantly greater mail response rate than Treatment Groups 1 and 3.
- Treatment Group 4 had a significantly greater mail response rate than Treatment Groups 1, 3, and 5.
- Treatment Group 5 had a significantly greater mail response rate than Treatment Groups 1 and 3.

In terms of *overall* response, all three treatment groups that received ATM card incentives had significantly higher response than the control group. Specifically:

- Treatment Group 2 had a significantly greater overall response rate than Treatment Groups 1 and 3.
- Treatment Group 4 had a significantly greater overall response rate than Treatment Groups 1 and 3.
- Treatment Group 5 had a significantly greater overall response rate than Treatment Group 1.

3.2. ATM Card Use

Prior to survey year 2004, indirect monetary incentives were not used at NASS. Therefore, it was unclear what to expect when mailing ATM cards to potential survey respondents. Other government agencies have used ATM cards on a large scale and found that a sizable percentage of card recipients do not cash their cards (Kay, et al., 2001).

3.2.1. ATM Card Use: How many recipients cash them?

Using a \$20 ATM card incentive to attempt to boost response could be costly if everyone were to cash his/her card. The cover letter emphasized that the ATM card was provided with the purpose of passing on some of the cost savings of mail data collection over a face-to-face interview data collection. For the ARMS Core, most recipients of ATM cards did not use them. Table 5 shows the percentages of recipients who used their ATM cards for monetary withdrawal by treatment group.

Just over a third (38.6 percent) of all card recipients cashed their ATM cards. This rate differed greatly by

incentive treatment group and response. The most striking difference is that between respondents and non-respondents. Respondents cashed their cards at an average rate of 47.6 percent, while non-respondents cashed them less than five percent of the time. It could be that non-respondents never saw the card because they threw the packet in the trash without opening it. Also, non-respondents may have felt that they did not deserve the money because they did not complete the questionnaire.

Also noteworthy is that mail respondents cashed their cards at a higher rate than face-to-face interviewed respondents (this can be concluded from Table 5). The cover letter emphasized that the ATM card was provided with the purpose of passing on some of the savings of mail data collection, instead of requiring a face-to-face interview. Assuming they read (and remembered) the cover letter, those respondents who completed the survey with a face-to-face interview may have felt that they were not entitled to the money or that the card was not valid unless the questionnaire was mailed back.

Respondents in the two prepaid incentive treatment groups (Treatment Groups 2 and 4) cashed their cards at a rate of about 41 percent while respondents in the promised treatment group (Treatment Group 5) cashed their cards at a rate of over 60 percent. This could be because the respondents who were promised the incentive felt as if they deserved the card because they fulfilled their side of an economic agreement. By making receipt of the card contingent on filling out the questionnaire, NASS may have made these respondents more likely to feel that they had earned the money. The prepaid respondents, on the other hand, may have seen the ATM card as a gesture of goodwill, and not felt as if they necessarily deserved it.

Table 2: Response Rates by Treatment Group

Treatment Group	N ^{1/}	1 st Mailing Returns		Postcard		2 nd Mailing Returns		Overall Mail Returns ^{2/}		Face-to-Face Follow-Up Completes		Overall Returns & Completes	
		Count	Response Rate	Count	Resp. Rate Increase	Count	Resp. Rate Increase	Count	Response Rate	Count	Response Rate	Count	Response Rate
1 (Control)	1,948	137	7.0%	117	6.0%	225	11.6%	586	30.1%	649	33.3%	1,235	63.4%
2	1,941	223	11.5%	214	11.0%	240	12.4%	791	40.8%	575	29.6%	1,366	70.4%
3	1,935	146	7.6%	135	7.0%	241	12.5%	635	32.9%	616	31.8%	1,251	64.7%
4	1,952	197	10.1%	226	11.6%	307	15.7%	856	43.9%	557	28.5%	1,413	72.4%
5	1,946	193	9.9%	156	8.0%	276	14.2%	724	37.2%	608	31.2%	1,332	68.4%

^{1/} Initially, all treatment groups contained 2,000 records, but field offices removed operations with whom they had previous data collection agreements.
^{2/} Overall Mail Returns includes all returns from the 1st and 2nd mailings and postcard reminder in addition to all mail returns received after face-to-face follow-up started.

Table 3: Comparisons of Overall *Mail* Response Rates

Comparison	Response Rate Difference ^{1/}	<i>t</i> -test Statistic ^{2/}	<i>p</i> -value ^{3/}
Treatment Group 2 versus Treatment Group 1	10.67	6.9997	0.0000*
Treatment Group 3 versus Treatment Group 1	2.73	1.8356	0.3333
Treatment Group 4 versus Treatment Group 1	13.77	8.9999	0.0000*
Treatment Group 5 versus Treatment Group 1	7.12	4.7166	0.0000*
Treatment Group 3 versus Treatment Group 2	-7.94	-5.1403	0.0000*
Treatment Group 4 versus Treatment Group 2	3.10	1.9587	0.5032
Treatment Group 5 versus Treatment Group 2	-3.55	-2.2691	0.2340
Treatment Group 4 versus Treatment Group 3	11.04	7.1225	0.0000*
Treatment Group 5 versus Treatment Group 3	4.39	2.8686	0.0419*
Treatment Group 5 versus Treatment Group 4	-6.65	-4.2369	0.0002*

1/ In percentage points.

2/ Comparisons involving Treatment Group 1 (the control) are based on a one-sided *t*-test with a Bonferroni adjustment for the 10 comparisons; comparisons not involving Treatment Group 1 (the control) are based on a two-sided *t*-test with a Bonferroni adjustment for the 10 comparisons.

3/ *P*-values incorporate a Bonferroni adjustment for 10 comparisons.

* = Statistically significant at the $\alpha = 0.05$ level.

Table 4: Comparisons of Overall Response Rates

Comparison	Response Rate Difference ^{1/}	<i>t</i> -test Statistic ^{2/}	<i>p</i> -value ^{3/}
Treatment Group 2 versus Treatment Group 1	6.98	4.6361	0.0000*
Treatment Group 3 versus Treatment Group 1	1.25	0.8134	1.0000
Treatment Group 4 versus Treatment Group 1	8.99	6.0395	0.0000*
Treatment Group 5 versus Treatment Group 1	5.05	3.3290	0.0044*
Treatment Group 3 versus Treatment Group 2	-5.72	-3.8123	0.0014*
Treatment Group 4 versus Treatment Group 2	2.01	1.3885	1.0000
Treatment Group 5 versus Treatment Group 2	-1.93	-1.3046	1.0000
Treatment Group 4 versus Treatment Group 3	7.74	5.2097	0.0000*
Treatment Group 5 versus Treatment Group 3	3.80	2.5086	0.1218
Treatment Group 5 versus Treatment Group 4	-3.94	-2.6967	0.0705

1/ In percentage points.

2/ Comparisons involving Treatment Group 1 (the control) are based on a one-sided *t*-test with a Bonferroni adjustment for the 10 comparisons; comparisons not involving Treatment Group 1 (the control) are based on a two-sided *t*-test with a Bonferroni adjustment for the 10 comparisons.

3/ *P*-values incorporate a Bonferroni adjustment for 10 comparisons.

* = Statistically significant at the $\alpha = 0.05$ level.

3.2.3. ATM Cards: How much do they cost?

An important issue with offering ATM card incentives is the various costs associated with using them. Table 6 breaks down overall ATM card-related costs for the treatment groups. Card use for all operators in each treatment group (respondents or nonrespondents) is included. Overall costs, including printing, mailing, and interviewing costs for the incentive experiment are presented later in Section 3.3.

There are several transaction fees associated with ATM card use besides the actual withdrawal amount. This is why each card was loaded with \$24, instead of just the \$20 incentive amount. These fees include withdrawal and purchase fees, balance inquiries fees, and failure fees. In addition, since the ATM cards could be used at point-of-sale (POS) debit card machines, users could withdraw money at a variety of locations (this fact was not explicitly stated to card recipients; hence the low numbers of such fees). These fees are presented separately in Table 6.

3.3. Overall Costs

Overall cost must be considered when deciding whether or not to use incentives. Data collection costs for mail and face-to-face interviewing need to be combined with incentive costs to create an overall picture of the dollar value of using incentives.

Table 7 displays the total cost for the approximately 2,000 records associated with each treatment group. As shown in Table 7, overall costs and the average costs per sample and completed record are lowest for the two prepaid incentive groups (Treatment Groups 2 and 4). This is due to two important factors in the data collection methodology and incentive use. First, only a little over one-third of card recipients (considering all treatment groups that received cards) cashed their ATM card. This saved NASS several thousand dollars in ATM card withdrawals and fees. Second, face-to-face interviews are much more costly than mail self-administered questionnaires, even when combined with the incentive. Because the prepaid incentive treatment groups achieved such large increases in mail response over the other treatment groups, overall data collection costs for those two groups were lower.

3.5. Data Quality

The greatest benefit NASS derived from using incentives was the economical increase in response rates for the ARMS Phase III Core. One natural concern that goes along with this is that while these incentives may buy NASS higher *response*, they will not necessarily buy NASS better *data*. An incentive may get more data for a particular survey (in the form of more responses), but what if those data are also more likely to be inaccurate?

Although not provided in this paper, we performed three different analyses to attempt to determine if there were differences in data quality among the treatment groups. These tests included: comparing data *quantity*, comparing the amount of data editing required, and comparing survey data with data maintained on the sampling frame. Taking note of the limitations in our analysis, the data quality results show that incentives likely did not bring us “worse” data quality. In fact, operators in Treatment Group 4 (\$20 prepaid ATM card incentive delivered in priority mail), on average answered significantly more questions and there was no significant difference in “accuracy” as measured by comparing the sampling frame value for total land to the reported value. However, we did see a slight increase in the amount of editing required for the prepaid incentive groups over the other treatment

groups. In general, incentives helped provide NASS with more data, as well as possibly better data (or at least no worse).

4. CONCLUSION

Indirect monetary incentives in the form of \$20 ATM cards proved to be effective at increasing survey response rates for the ARMS Phase III Core. Mail response rates for the prepaid incentive groups were significantly higher than the control group, saving a large amount of money on costly face-to-face follow-up interviews. Overall response rates were higher as well, providing NASS and ERS with more completed records for analysis.

In addition, data collection costs were lowest for the prepaid incentive treatment groups because of the low card cashing rate and the lower number of costly face-to-face follow-up interviews required.

The data provided by respondents in the incentive groups were comparable to those collected in the control group. There was slightly less item nonresponse for the incentive groups, but slightly more editing required. There were no differences in the control data for total land compared to the survey data collected for total land.

It is not known what effects the continued use of indirect monetary incentives may have on the response rates for ARMS or for NASS’ entire survey program (NASS conducts hundreds of agricultural surveys each year targeting the same population as the ARMS Phase III). If the use of indirect monetary incentives is implemented into operational programs, NASS should conduct research to determine if there are any negative wide-ranging effects of their use.

Table 5: ATM Card Usage by Treatment Group^{1/}

Treatment Group	Card Use Among Mail Respondents			Card Use Among Overall Respondents ^{2/}			Card Use By Overall Non-Respondents			Card Use By All Card Recipients ^{3/}		
	Number of Mail Respondents	Cards Used For \$ Withdrawal	Percent of Cards Cashed	Number of Overall Respondents	Cards Used For \$ Withdrawal	Percent of Cards Cashed	Number of Non-Respondents	Cards Used For \$ Withdrawal	Percent of Cards Cashed	Number of Card Recipients	Cards Used For \$ Withdrawal	Percent of Cards Cashed
2	791	478	60.4	1,366	561	41.1	575	27	4.7	1,941	588	30.3
4	856	504	58.9	1,413	576	40.8	539	29	5.4	1,952	605	31.0
5	724	517	71.4	1,332	818	61.4	614	19 ^{4/}	3.1 ^{4/}	1,365	837	61.3
Total (Trts. 2,4,5)	2,371	1,499	63.2	4,111	1,955	47.6	1,728	75	4.3	5,258	2,030	38.6

1/ Numbers include distinct operators who withdrew money using ATM cards.

2/ Includes mail and face-to-face respondents.

3/ Includes respondents and non-respondents.

4/ Operators in Treatment Group 5 should not have received an ATM card unless they responded to the survey. However, some returned partially completed forms that were determined to be inadequately completed after the card had been mailed out.

Table 6: ATM Card Charges by Treatment Group^{1/}

Treatment Group	ATM Withdrawal ^{2/}		ATM Withdrawal Fee ^{3/}		POS Purchase ^{2/}		POS Purchase Fee ^{3/}		Balance Inquiry Fee		Transaction Failure Fee		Total Cost
	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	
2	578	\$12,386.85	574	\$579.00	11	\$201.62	11	\$3.85	23	\$10.35	38	\$13.10	\$13,194.77
4	600	\$12,953.50	595	\$599.00	5	\$105.50	5	\$1.75	24	\$11.70	34	\$11.90	\$13,683.35
5	822	\$17,695.81	814	\$818.00	16	\$277.60	16	\$6.30	31	\$16.20	44	\$17.80	\$18,831.71

1/ Numbers include distinct operators who withdrew (or tried to withdraw) money using ATM/Debit cards.

2/ Includes amount of withdrawal/purchase as well as any transaction fees imposed by the ATM owner/retailer.

3/ JPMorgan Chase transaction fee. JPMorgan Chase was the issuer of the ATM cards.

Table 7: Overall Costs by Treatment Group

Treatment Group	N	Costs (In Dollars)									Average Per Sample	Average Per Complete
		Postage	NPC Printing	NPC Extra Admin	ATM Card Charges	ATM Card Admin	Face-to-Face Follow-up Costs	Total				
1 (Control)	1,948	4,882	6,638	--NA--	--NA--	--NA--	176,291	187,811	96.41	152.07		
2	1,941	4,833	6,295	2,000	13,195	1,650	154,154	182,127	93.83	133.33		
3	1,935	15,207	6,515	--NA--	--NA--	--NA--	170,951	192,673	99.57	154.02		
4	1,952	14,953	6,297	2,000	13,683	1,659	148,356	186,948	95.77	132.31		
5	1,946	5,284	6,655	2,000	18,832	1,654	160,475	194,900	100.15	146.32		

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