Designing a Multipurpose Longitudinal Incentives Experiment for the Survey of Income and Program Participation

Ashley Westra, Mahdi Sundukchi, and Tracy Mattingly

U.S. Census Bureau[1]
4600 Silver Hill Rd
Washington, DC 20233

Proceedings of the 2015 Federal Committee on Statistical Methodology (FCSM) Research Conference

Abstract

The U.S. Census Bureau has experimented with the use of monetary incentives in the Survey of Income and Program Participation (SIPP), a demographic longitudinal survey, since the 1996 Panel. As with most surveys, the main goal of using incentives is to increase response rates, especially when facing a steady increase in nonresponse over the course of a panel. For the most recent SIPP panel, the 2014 Panel, the survey has been extensively redesigned, with households being interviewed only once a year instead of every four months. Since this redesign could have an impact on the effect of incentives, a new incentives experiment is introduced for Waves 1 and 2 of the SIPP 2014 Panel. In addition to investigating the effect of incentives on response rate, we design a way of assigning incentives using a response propensity model with the purpose of reducing nonresponse bias. This new methodology is made possible due to the longitudinal design of the SIPP. We will outline the design of the multipurpose incentives experiment for Waves 1 and 2 of the SIPP 2014 Panel and provide preliminary results.

I. Introduction

The Survey of Income and Program Participation (SIPP) is a demographic longitudinal survey conducted by the U.S. Census Bureau.[2] The main goal of the SIPP is to provide accurate and comprehensive information about the income and program participation of individuals and households in the United States. SIPP data provide the most extensive information available on how the nation's economic well-being changes over time, a defining characteristic of the survey since its inception in 1983. To achieve this goal, the SIPP provides both cross-sectional and longitudinal estimates for households, families, and persons in the civilian noninstitutionalized population living in the United States.[3]

The SIPP is administered in panels, with each panel typically running from 3 to 5 years. Prior to the 2014 SIPP Panel, the sample was divided into four equally sized rotation groups, with one rotation being interviewed each month. One round of interviewing the entire sample, a four-month interval, is called a wave. The purpose of the rotation groups was to distribute the interviewing workload and reduce bias in transition estimates. However, in order to reduce both the burden on respondents and program costs, the SIPP was re-engineered beginning with the 2014 Panel. The sample is no longer divided into rotation groups, and a household is only interviewed once a year instead of three times. Rather than year round, interviewing runs for 4 months of each year, February through May, and respondents are asked about each month of the previous calendar year.

Since 1996, the U.S. Census Bureau has conducted numerous experiments on using incentives in the SIPP. These experiments were designed to test the effect of monetary incentives on overall response rates and conversion rates. Both unconditional and conditional incentives were tested, where conditional incentives are only given if a response is received. Also, we tried both random assignment as well as discretionary incentives, where Field staff were given

---

[1] Any views expressed are those of the authors and not necessarily those of the U.S. Census Bureau.
[2] For more information about the SIPP visit its webpage at < http://www.census.gov/sipp/>.
[3] Statistics from surveys are subject to sampling and nonsampling error. For further information on the source of the data and accuracy of the SIPP estimates, including standard errors and confidence intervals, see
<http://www.census.gov/programs-surveys/sipp/tech-documentation/source-accuracy-statements.html >.

the decision to determine which households needed an incentive to get a response. We furthermore experimented with the monetary amount of the incentive, with $10, $20, and $40 being the typical choices.

After all of these previous experiments, there was no conclusive result as to the best way to implement incentives as a standard practice for the SIPP. In addition, the 2014 Panel marks extensive changes in the design of the survey. Therefore, we felt it was worthwhile and the Office of Management and Budget (OMB) required that we conduct another incentive study for the SIPP 2014 Panel before any recommendations could be made on a standard practice for implementing incentives.

This paper discusses the design of a longitudinal incentives experiment for the 2014 SIPP Panel. First we look at the design of the experiment and provide preliminary results for Wave 1. We then go on to describe the Wave 2 experiment, which we have designed in an innovative way that will hopefully give us a different perspective on assigning incentives, one that has not been looked at by many researchers and certainly not for the SIPP. While previous SIPP experiments focused mainly on the goal of improving response rate, this new 2014 Panel experiment also looks into using incentives assigned by a propensity model to improve the characteristics, or distribution, of the final sample and potentially decrease nonresponse bias.

II. Background

There are a number of reports and analyses done on the different uses of incentives in past SIPP panels, with varying conclusions on their effectiveness.

In the 1996 SIPP Wave 1, we compared a control group to groups receiving $10 and $20 unconditional incentives, both paid in advance to households at their door. The finding was that the $20 incentive increased response rates for key SIPP respondents (i.e. those tending towards poverty) by 3.4% to 6.0% (James, 1997; Mack et al., 2008; Flanagan, 2007). On the other hand, the $10 incentive did not significantly reduce nonresponse (Mack, et al., 1998). In addition, the $20 incentive reduced overall household, person, and item nonresponse rates. Also, the $20 incentive was determined to have a strong effect in helping with attrition of households in the high poverty stratum by reducing the nonresponse rate from 9.32% to 5.94% (James, 1997).

In the SIPP 2001 Panel, we evaluated the effectiveness of two types of $40 incentives, conditional discretionary incentives in Waves 1-9 and unconditional incentives mailed to prior wave nonrespondents in Waves 4-9. Due to inconsistent Field practices, in the early waves few discretionary incentives were given out (for example, 1.94% in the first wave), which resulted in an increase of only 0.9% to 1.9% in response rates in six of the first eight waves and no significant differences in the other two waves, Waves 1 and 4 (Killion, 2008; Lewis, et al., 2005). The later wave unconditional incentives had no significant impact on conversion rates.

In the SIPP 2004 Panel, $40 discretionary incentives were used in the production of the survey rather than as an experiment. The Field staff had enough $40 debit cards to cover approximately 20% of their workload (Creighton, 2003). There are no results as to the effectiveness of the incentives themselves for this panel. We did find that households that are chosen by the Field staff to receive the $40 discretionary incentives in an earlier wave are more likely to be chosen again to receive an incentive in later waves. In Wave 6, an experiment to improve conversion rates was conducted. Nonrespondents in both Waves 4 and 5 were mailed a letter that promised a $40 incentive upon completion of the Wave 6 interview. The finding was that there was no evidence of an improvement of the Wave 6 conversion rates with the use of this conditional incentive (Flanagan, 2007).

Finally, in the SIPP 2008 Panel, an incentive experiment was conducted to test two types of incentives, a $20 unconditional incentive with advance letter in Wave 1 and $40 discretionary conditional incentives in every wave of the panel. The $20 unconditional incentive was effective at improving response rates in all waves but one (Wave 5), with small improvements of 1.0% to 1.8% compared to the control. The $40 discretionary incentive began to have a significant effect in Waves 4 to 7, with an increase in response rates from 1.6% to 3.1% compared to the control (Mattingly, 2011). There was some inconsistency among the regional offices in the distribution and effectiveness of the $40 discretionary incentive.

III. Design of the SIPP 2014 Experiment – Wave 1

Since the 2014 SIPP Panel marks the start of a new survey design, the Office of Management and Budget (OMB) requires an analysis of the effectiveness of incentives in the new panel design before a full implementation can occur. Our experiment plans to distribute conditional incentives in at least the first two waves of the 2014 Panel. To avoid the inconsistency in the distribution of the incentives by the regional offices that we had in the last panel, debit card incentives and separate PIN numbers are mailed out by the National Processing Center (NPC).

To facilitate both of our goals for Wave 1 and Wave 2 incentive experiments, we divided the 53,070 sampled housing units randomly into four approximately equal sized incentive groups, which we call Groups 1 through 4. Group 1 is designed to be a control group for all waves, so the households in it will never receive an incentive in any wave. Group 2 will become part of the experiment treatment in Wave 2, but for Wave 1 receives no incentive. Meanwhile, in Wave 1, Group 3 households will receive $20 conditional incentives and Group 4 households will receive $40 conditional incentives. Table 1 summarizes the Wave 1 treatment groups and the number of housing units and eligible households in each of those groups.

Table 1. Number of Housing Units and Eligible Households for each Incentive Group in the SIPP 2014 Panel Wave 1 of Interviewing

Group	Incentive Amount	Number of Housing Units	Number of Eligible Households
1	$0	13,549	10,798
2	$0	13,471	10,766
3	$20	13,470	10,697
4	$40	12,580	10,197

SOURCE: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 2014 Panel Wave 1

In Wave 1, the main goal was to determine whether the use of conditional incentives, and at what amount ($20 or $40), significantly improves response rates relative to the control group (Groups 1 and 2 combine to form the control group that receives no incentive in Wave 1). The results of the Wave 1 experiment are summarized in Section IV. In the 2014 SIPP Panel experiment, we are also interested in exploring the effect of incentives on nonresponse bias and whether we can use incentives to improve the distribution of the final sample in terms of overall coverage. These goals will be explored further in the Wave 2 experiment, the design of which is explained in Section V.

IV. Wave 1 Results for the 2014 SIPP Incentive Study[4]

In this section, we present our findings from the incentive experiment for Wave 1 of the SIPP 2014 Panel. Note that in Wave 1, we combine Groups 1 and 2 to form the $0 incentive group. We compare response rates across incentive groups overall, by regional office (RO), and for subgroups of the population. Next, we compare the Type A noninterview distributions, specifically the household refusals, across incentive groups. Among the interviewed households, we compare distributions of key variables across incentive groups.

In addition to looking at the effectiveness of incentives, we also want to evaluate a few operational issues associated with incentives. First, we want to compare the average number of contacts per respondent household across incentive groups. We want to know if using incentives actually reduced Field costs by reducing the number of times a field representative (FR) had to travel to a household to complete the interview. Also, we want to look at how many of the households that received an incentive actually cashed them.

Response Rates by Incentive Group

Table 2 presents the weighted response rates across incentive group for Wave 1 of the 2014 SIPP Panel. Table 2 shows that both the $20 and $40 conditional incentives significantly increase the Wave 1 response rate compared to the control group by 1% and 3%, respectively. Also, the $40 incentive significantly improves the response rate by 2% compared to the $20 incentive.

---

[4] All comparative statements in this report have undergone statistical testing, and, unless otherwise noted, all comparisons are statistically significant at the 10 percent significance level.

Table 2. Weighted Wave 1 Response Rates by Incentive Amount

Incentive Amount	Response Rate	Difference from $0	Difference from $20
$0	67.9% (0.38%)	--	--
$20	69.0% (0.51%)	1.1%*	--
$40	70.9% (0.48%)	3.0%*	1.9%*

SOURCE: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 2014 Panel Wave 1
*Significant at the 10% level of significance
Response rates are weighted using the base weights. Standard errors are shown in parentheses.

Response Rates by Incentive Group and Regional Office

In the 2008 Panel incentive experiment, it was found that the implementation of incentives differed by regional office and so did the incentives' effectiveness (Mattingly, 2011). We already believe that there are fundamental differences between the respondents in Census regions, as evidenced by the fact that we use region as a variable in the weighting nonresponse adjustment. Therefore, in this experiment, although we controlled the distribution of the incentives through the National Processing Center, we want to see if the same differences in incentive effectiveness are still present across regional offices as they were in the 2008 Panel. Table 3 shows the weighted response rates for each incentive group in each regional office for Wave 1 of the SIPP 2014 Panel.

Table 3. Weighted Wave 1 Response Rates by Regional Office and Incentive Amount

Regional Office	$0	$20	$40	Significant Differences
New York (22)	59.4%	59.8%	58.6%	
Philadelphia (23)	71.0%	70.4%	74.2%	†, ‡
Chicago (25)	72.3%	74.1%	75.2%	†
Atlanta (29)	66.2%	68.6%	70.6%	*, †
Denver (31)	68.5%	69.6%	72.8%	†, ‡
Los Angeles (32)	68.0%	69.6%	71.6%	†

SOURCE: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 2014 Panel Wave 1
*Significant difference between $0 and $20 at the 10% level of significance
†Significant difference between $0 and $40 at the 10% level of significance
‡Significant difference between $20 and $40 at the 10% level of significance
Response rates are weighted using the base weights.

We can see from Table 3 that the effectiveness of incentives differs by regional office. In New York, we saw no significant difference in response rate between the three incentive groups. While we saw that the overall effect of a $20 conditional incentive on response rate was significant at the national level, when looking by regional office, Atlanta was the only regional office where a $20 incentive showed a significant increase in response rate over the control group. This is in part due to a smaller sample size, but also gives some credence to the idea that different regions of the country respond differently to incentives.

Response Rates by Incentive Group for Subgroups

In the Wave 1 incentive assignment, incentives were randomly distributed to households regardless of their characteristics. Assuming incentives do not equally affect all households, we want to examine subgroups of the households to see if we can determine the effectiveness of incentives based on the characteristics of the household. Table 4 shows the response rates by incentive group for various subgroups of the population. Examined characteristics were poverty stratum, urban or rural status, Census region, Metropolitan Statistical Area (MSA) status, household size, tenure, race and gender of the household reference person. These variables are chosen because we have their values for both respondents and nonrespondents from either the frame or as reported by interviewer observation.

Table 4. Weighted Wave 1 Response Rates by Incentive Amount for Subgroup Characteristics

Variable	Level	$0	$20	$40	Significant Differences
Poverty Stratum	Low Income	70.7%	72.8%	75.6%	*, †, ‡
	Non-Low Income	66.2%	66.8%	68.2%	†
Urban / Rural	Urban	67.1%	68.5%	70.1%	*, †, ‡
	Rural	71.2%	72.0%	74.1%	†
Census Region	Northeast	62.5%	63.2%	63.3%	
	Midwest	70.7%	72.7%	73.7%	*, †
	South	68.5%	69.3%	72.2%	†, ‡
	West	68.2%	69.4%	72.0%	†, ‡
MSA Status / Place	Central City of MSA	66.0%	68.2%	70.0%	*, †
	Balance of MSA	66.9%	68.1%	69.6%	†
	Place	75.1%	74.4%	76.4%	
	Other	75.0%	73.3%	77.9%	‡
Household Size	1	74.3%	74.7%	73.7%	
	2	65.7%	67.4%	71.2%	†, ‡
	3	72.4%	74.2%	74.8%	†
	4+	75.1%	76.8%	77.4%	†
Race	White	70.4%	71.1%	72.4%	†
	Black	72.2%	76.4%	78.8%	*, †
	Other	70.3%	72.1%	69.8%	
Gender	Male	68.4%	70.1%	71.2%	*, †
	Female	71.5%	72.1%	73.8%	†, ‡
Tenure	Owned	70.3%	70.8%	72.3%	†, ‡
	Rented	71.9%	74.8%	75.8%	*, †
	Occupied	88.4%	92.8%	90.7%	*

SOURCE: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 2014 Panel Wave 1
*Significant difference between $0 and $20 at the 10% level of significance
†Significant difference between $0 and $40 at the 10% level of significance
‡Significant difference between $20 and $40 at the 10% level of significance
Response rates are weighted using the base weights.

Table 4 shows that the effect of the incentive amount on response rate changes based on household characteristic. For example, a $20 incentive increases response rate compared to no incentive for low income and urban households. However, a $20 incentive does not significantly increase the response rate in non-low income and rural households. This implies that we may be able to use household characteristics to determine which households are more likely to respond with incentives.

Distribution of Type A Cases by Incentive Group

We found that giving an incentive tends to decrease the overall nonresponse rate, so now we want to take a look at the distribution of the Type As by incentive group to see if that decrease occurs in a specific nonresponse status, such as household refusal. Table 5 shows the Wave 1 percent of Type As by nonresponse status for each incentive group.

Table 5. Wave 1 Percent of Type As by Nonresponse Status and Incentive Group

Incentive Amount	Language Problem	Unable to Locate	No One Home	Temporarily Absent	Household Refused	Other
$0	0.76%	0.40%	10.83%	1.44%	79.07%	7.49%
$20	0.97%	0.28%	11.27%	1.04%	79.25%	7.19%
$40	0.46%	0.43%	11.17%	1.11%	79.38%	7.46%

SOURCE: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 2014 Panel Wave 1

A Chi-square test shows that there is no evidence of a significant difference between the distributions of the Type As by incentive group. In particular, the percent of households refused does not significantly decrease due to an offered incentive.

Distribution of Interviewed Households by Incentive Group

In addition to increasing response rates, it is believed that incentives can improve the characteristics of the final sample. If the coverage of the final sample is higher due to incentives this can reduce the size of the nonresponse adjustments needed in weighting and ultimately decrease nonresponse bias. For this reason, we want to compare the distributions of the interviewed households by key characteristics that are used in SIPP nonresponse weighting adjustments. For Wave 1, these key variables are within PSU stratum code, race of the reference person, tenure, Census region, MSA Status / Place, and household size. In addition to these variables, we looked at other demographic characteristics such as age, gender, educational attainment, and marital status of the household reference person.

Table 6 shows the distributions of the interviewed households by incentive group for each of these key variables. Chi-square tests were used to test for a significant difference in the distributions across incentive groups. When we look at the distribution of interviewed cases, it is difficult to find any differences between the incentive groups. We did find difference in the distribution of householder race between incentive groups. However, for a majority of the variables, incentives did not significantly change the distribution.

This leads us to conclude that while incentives do appear to increase response rates they are not having an effect on reducing nonresponse bias, if it exists. This issue will be the focus of our Wave 2 incentive experiment, where we will analyze the use of a response propensity model to assign incentives.

Table 6. Wave 1 Distribution of Key Variables by Incentive Group for the Interviewed Sample

Variable	Level	$0	$20	$40
Poverty Stratum	Low Income	38.3	39.1	38.9
	Non-Low Income	61.7	60.9	61.1
Urban / Rural	Urban	19.6	19.5	19.9
	Rural	80.4	80.5	80.1
Census Region	Northeast	16.6	16.6	16.3
	Midwest	23.5	24.0	23.3
	South	37.3	37.1	37.9
	West	22.6	22.3	22.4
MSA Status / Place	Central City of MSA	32.5	33.4	33.2
	Balance of MSA	50.8	50.6	50.5
	Place	8.9	8.7	8.3
	Other	7.8	7.3	8.0
Household Size	1	30.1	29.3	28.0
	2	32.6	32.3	33.9
	3	15.0	15.2	15.2
	4+	22.3	23.1	23.0
Race*	White	80.5	80.4	80.4
	Black	11.9	12.8	12.8
	Other	7.6	6.7	6.8
Gender	Male	47.4	46.7	47.4
	Female	52.6	53.3	52.6
Tenure	Owned	63.5	62.5	63.7
	Rented	34.2	35.0	34.0
	Occupied	2.3	2.5	2.3
Age	Under 25	4.8	4.9	4.8
	25-34	14.4	14.7	14.0
	35-54	35.8	35.6	36.7
	55+	45.0	44.9	44.4
Educational Attainment	Less than High School	4.2	4.1	4.5
	High School, no diploma	7.5	6.8	6.9
	High School graduate	57.0	57.5	56.2
	College graduate	31.3	31.6	32.3
Marital Status	Married, spouse present	46.7	47.2	47.7
	Married, spouse absent	1.7	1.9	1.9
	Widowed	10.6	10.1	9.9
	Divorced	17.4	17.0	17.3
	Separated	2.7	2.7	3.2
	Never Married	21.0	21.2	20.1

SOURCE: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 2014 Panel Wave 1
*Significant difference in distribution between incentive groups at the 10% level of significance

Number of Contacts per Household by Incentive Group

We now switch our attention away from how incentives can help improve data quality towards how they can decrease total survey costs. One measure of survey cost is the number of contact attempts (in person or by telephone) per household that are needed to obtain an interview. The hope is that offering an incentive decreases the number of times a field representative needs to contact the household to complete the interview. Using collected Contact History Instrument (CHI) data, we can retrieve the number of attempts made for each household. The average number of contact attempts per interviewed household by incentive group is presented in Table 7 for Wave 1.

Table 7. Wave 1 Average Number of Contact Attempts per Interviewed Household

Incentive Amount	Avg # of Contact Attempts	Difference from $0	Difference from $20
$0	4.87	--	--
$20	4.72	-0.1467*	--
$40	4.67	-0.1924*	-0.0457

SOURCE: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 2014 Panel Wave 1
*Significant at the 10% level of significance

The results in Table 7 show that both the $20 and $40 incentives significantly decreased the average number of contact attempts needed to complete an interview compared to the control group. Across modes, it costs approximately $44.31 per contact attempt. Therefore, we estimate that a $20 incentive saves $6.50 and a $40 incentive saves $8.53 per interviewed household.

Analysis of the Distribution of the Debit Cards

For the first time, we have information about who received the debit cards and cashed them, allowing us to analyze how many of the incentives were cashed and the characteristics of those households that did not cash them.

First, we can look at how many households actually cashed the incentives they received. 69.4% of households that were sent $20 incentives cashed them, and 80.5% of households that were sent $40 incentive cards cashed them. The difference in cashed rates between the $20 incentives and $40 incentives is significant.

Table 8 compares the cashed rates for each incentive amount by RO. The same trend that held for the entire nation is also true for each RO. Interestingly, the New York RO has the lowest percentage of cashed incentives. New York was also the RO with the lowest response rate, and the only RO that had no significant differences between the response rates of the control group and the incentive groups.

Table 8. Percentage of Households that Cashed Received Incentives by Incentive Amount and RO

Regional Office	$20	$40	Difference
New York (22)	66.2%	75.0%	8.9%*
Philadelphia (23)	69.0%	83.9%	15.0%*
Chicago (25)	71.1%	81.4%	10.3%*
Atlanta (29)	72.4%	81.8%	9.4%*
Denver (31)	69.5%	78.9%	9.4%*
Los Angeles (32)	67.1%	80.8%	13.7%*

SOURCE: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 2014 Panel Wave 1
*Significant difference between $20 and $40 at the 10% level of significance

Finally, it is interesting to look at the characteristics of the households that do not cash the incentives. A logistic regression model predicting the probability of cashing a received incentive can provide insight into the types of households that are more likely to cash an incentive. Table 9 shows the estimated coefficients for such a logistic regression model. A significantly positive coefficient implies that the group is more likely to cash an incentive compared to the reference group; whereas, a significantly negative coefficient implies that the group is less likely to cash an incentive compared to the reference group.

Table 9. Estimated Logistic Regression Model for Predicting a Household's Probability of Cashing an Incentive

	Estimate	90% Confidence Limits	
Intercept	0.43*	0.31	0.56
Incentive Amount (ref=$20)			
$40	0.62*	0.54	0.69
Race (ref=White)			
Black	0.21*	0.07	0.35
Other	-0.05	-0.23	0.12
Gender of Reference Person (ref=Male)			
Female	0.21*	0.12	0.29
Age of Reference Person (ref= >55)			
<25	-0.23*	-0.41	-0.04
25-34	0.02	-0.09	0.14
35-54	0.03	-0.06	0.12
Education of Reference Person (ref=Bachelor's degree)			
No high school	-0.33*	-0.51	-0.15
High school, no diploma	0.28*	0.14	0.43
High school diploma	0.13*	0.05	0.21
Tenure (ref=Owned)			
Rented	0.22*	0.14	0.31
Occupied w/o Payment	0.05	-0.21	0.31
Region (ref=Northeast)			
Midwest	0.29*	0.18	0.40
South	0.22*	0.11	0.33
West	0.13	-0.01	0.28
Marital Status (ref=Married w/ spouse present)			
Married w/o spouse present	-0.35*	-0.62	-0.09
Widowed	-0.47*	-0.59	-0.34
Divorced	0.05	-0.07	0.17
Separated	0.38*	0.13	0.63
Never Married	-0.06	-0.18	0.05
Urban/Rural Status (ref=Urban)			
Rural	-0.16*	-0.25	-0.07

SOURCE: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 2014 Panel Wave 1
*Significant at the 10% level of significance

Based on this logistic regression model, we can see that the likelihood of cashing an incentive differs by household characteristic. Households with a black reference person are more likely to cash the incentive than those with a white reference person. Renters are more likely to cash than house owners. Urban households are more likely to cash than rural households. Female household reference persons are more likely to cash than male reference persons. When the reference person is under age 25 they are less likely to cash the incentive. Also, a $40 incentive is more likely to be cashed than a $20 incentive.

V. Design of the SIPP 2014 Experiment – Wave 2

Our Wave 2 experiment is aimed towards finding a way to use incentives to improve the overall representativeness of our interviewed sample. In Table 6, we saw that for many of the key variables typically used in the weighting nonresponse adjustment, a randomly assigned incentive does not change the distribution of the interviewed cases. Therefore, instead of randomly assigned incentives, we can assign incentives based on a household's characteristics.

We plan on developing a response propensity model to predict each household's probability of responding in Wave 2 given their Wave 1 characteristics. We hope to use characteristics typically associated with potential nonresponse bias as dependent variables in our model. By assigning incentives to households based on these characteristics, we hope to improve the coverage of our final sample.

In addition to improving coverage, another goal of the propensity model is to eliminate the offering of unnecessary incentives. By including the receipt of an incentive as a main effect and as an interaction with other variables in the propensity model, we can determine how an incentive will affect a household's propensity to respond. Then we can target incentives towards the households in which receiving an incentive increases the probability of responding by the most, i.e., those with the largest differences between the predicted probability of responding with the incentive and the predicted probability of responding without the incentive according to the model. In this way we hope that we can avoid giving incentives to the households that would have responded without them.

We have designed the SIPP 2014 Wave 2 experiment with these goals in mind. In Wave 2 we are only going to test the results of assigning incentives based on a propensity model, we are not ready to actually use the model to assign incentives. Therefore, we are still going to do a random assignment of conditional incentives. Since Wave 1 showed $40 incentives are more effective than $20 incentives, we are only going to study the effect of $40 incentives in Wave 2. We start with the four groups from the Wave 1 experiment, but decide to divide Group 4 randomly in half into Groups 4a and 4b to create more options for our propensity model testing. Group 1 is again the control group and is assigned no incentive. Groups 2 and 4a are assigned $40 conditional incentives. Groups 3 and 4b are also assigned no incentive. Table 10 summarizes the Wave 2 treatment groups and the number of eligible households in each.

Table 10. Number of Housing Units and Eligible Households for each Incentive Group in the SIPP 2014 Panel Wave 1 of Interviewing

Group	Wave 1 Incentive Amount	Wave 2 Incentive Amount	Number of Eligible Households
1	$0	$0	7726
2	$0	$40	7773
3	$20	$0	7781
4a	$40	$40	3932
4b	$40	$0	3856

SOURCE: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 2014 Panel Wave 2

Since we are doing a random assignment of incentives, in addition to testing a propensity-model based incentive, we can also look at the effect of Wave 2 randomly assigned incentives. With this in mind, we can answer the following questions:

- Does the Wave 1 incentive effect carry-over to Wave 2? We can compare the Wave 2 response rates of Groups 4b and 1 and Groups 3 and 1.
- What is the effect of duplicate incentives? We can compare the Wave 2 response rates of Groups 4a and 1.
- What is the effect of a later incentive in Wave 2? We can compare the Wave 2 response rates of Groups 2 and 1.

In order to test propensity-based incentives, the same model will be applied to both the control and treatment groups, conditional on the Wave 1 incentive. Groups 1 and 4b are the control groups, with $0 and $40 Wave 1 incentives, respectively. Groups 2 and 4a are the treatment groups that receive a $40 Wave 2 incentive, with $0 and $40 Wave 1 incentives, respectively. We can then look at what would have happened if we assigned only a portion of the treatment group incentives based on the household response propensity instead of assigning incentives to the entire group.

For example, suppose we want to assign 50% of the sampled households incentives, so we pick out the 50% of households for which giving an incentive increases the probability of responding the greatest extent according to the model. We select this 50% for both the control group (1 and 4b) and the incentive group (2 and 4a). We can observe

if there is a difference in the response rate or distribution of the interviewed households between the control and incentive groups (Note: we are only using the 50% of these groups chosen by the model for this comparison) to see the effect of the model-based incentive. We can do this for any percentage, not only 50%, to see which works best, both in terms of resulting distribution, response rate, and cost.

VI. Conclusions

Overall, the Wave 1 incentive study for the SIPP 2014 Panel shows the following results:

- Both the $20 and $40 conditional incentives significantly increase overall response rate compared to the control, with the $40 incentive significantly increasing response rate compared to the $20 incentive.
- The effectiveness of the incentive differed by regional office. For New York, neither incentive amount was effective in increasing response rate. For Atlanta, both the $20 and $40 were effective.
- Among interviewed households, the distribution of many key variables did not significantly differ among incentive groups. The distribution of the householder reference person's race was significantly different across incentive groups.

We conclude that the conditional incentive approach is effective in improving response rate but does not change the characteristics of the final interviewed sample. Therefore, if there is nonresponse bias, a randomly assigned incentive will not affect the bias of our estimates.

Our Wave 2 experiment is aimed towards finding a way to use incentives to improve the overall representativeness of our interviewed sample. We plan on developing a response propensity model to predict each household's probability of responding in Wave 2 given their Wave 1 characteristics. By assigning incentives to households based on their response propensity instead of randomly, we hope to improve the coverage of our final interviewed sample. In addition, we hope that we can get similar improvements in the response rate with fewer incentives by targeting households that are affected by incentives the most.

References

Bates, Nancy (2001). Evaluation of 1996 SIPP Incentive Experiment Waves 8-12. *Memorandum from Bates to King.* Census Bureau, June 22, 2001.

Creighton, Kathleen P. (2003). *Letter from Creighton to Schechter (regarding use of monetary incentives in 2004 SIPP Panel).* Census Bureau, April 8, 2003.

Creighton, Kathleen P., King, Karen E., and Martin, Elizabeth A. (2001). The Use of Monetary Incentives in Census Bureau Longitudinal Surveys. *Statistical Policy Working Paper 32: 2000 Seminar on Integrating Federal Statistical Information and Processes.* Washington DC: Federal Committee on Statistical Methodology, Office of Management and Budget, April 2001, pp. 289-310.

Flanagan, Patrick (2007). SIPP 2004: Incentive Analysis (ALYS-3). *Internal Memorandum from Flanagan to Creighton.* Census Bureau, March 27, 2007.

Gelman, Andrew, Stevens, Matt, and Chan, Valerie (2003). Regression Modeling and Meta-Analysis for Decision Making: A Cost-Benefit Analysis of Incentives in Telephone Surveys. *Journal of Business & Economic Statistics,* Vol. 21.

James, Tracy L. (1997). Results of the Wave 1 Incentive Experiment in the 1996 Survey of Income and Program Participation. *ASA Proceedings of the Section on Survey Research Methods,* 834-839.

Lewis, Denise (2004). SIPP 2001 Panel: Final Results of the Incentive Experiments. *Memorandum from Lewis to Creighton*. Census Bureau, July 14, 2004.

Lewis, Denise, and Creighton, Kathleen (2005). The Use of Monetary Incentives in the Survey of Income and Program Participation. Paper presented at the annual meeting of the *American Association for Public Opinion Research,* Fontainebleau Resort, Miami Beach, FL.

Mack, Stephen, Huggins, Vicki, Keathley, Donald, and Sundukchi, Mahdi (1998). Do Monetary Incentives Improve Response Rates in the Survey of Income and Program Participation?. *ASA Proceedings of the Section on Survey Research Methods,* 529-534.

Mattingly, Tracy L. (2011). 2008 Survey of Income and Program Participation Incentive Study Report (ALYS-7). *Internal Memorandum from Killion*. U.S. Census Bureau, August 29, 2011.

Shettle, Carolyn (1996). Evaluation of Using Monetary Incentives in a Government Survey. *American Statistical Association,* Aug. 1996.

Singer, Eleanor (2001). The Use of Incentives to Reduce Nonresponse in Household Surveys. *Survey Nonresponse,* eds. R. M. Groves, D. A. Dillman, J. L. Eltinge, and R. J. A. Little, New York: Wiley, pp. 163-177.