Adaptive Design Experiments in a Longitudinal Survey: Plans for the Survey of Income and Program Participation

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<sup>1</sup> This work is released to inform interested parties of ongoing research and to encourage discussion of work in progress. Any views or opinions expressed in the paper are the authors' own and do not necessarily reflect the views or opinions of the U.S. Census Bureau.



## **Survey of Income and Program Participation**

- National panel survey Since 1984 with sample size between about 11,000 and 45,000 interviewed households
  - The duration of each panel varies from 2½ yrs to 4 yrs
  - The SIPP sample is a multistage-stratified sample of the U.S. civilian non-institutionalized population
  - Longitudinal following original sample household members (all 15 and over are followed)
- SIPP 2014
  - Annual survey with four month interviewing window recall to beginning of prior (reference) year
  - Event History Calendar (EHC) component to facilitate recall
  - Paradata and ancillary data include (contact history and reluctance, training certification, keystroke files, cost and case management, prior wave data for waves 2+)
- SIPP 'Classic' 1984-2008
  - Uses a 4-month recall period 3 interviews / year
  - The sample is divided into 4 rotation groups for monthly interviewing
  - Paper from 1984-1993 and DOS based CASES instrument from 1996-2008
- Interviews are conducted by personal visit and by decentralized telephone





## **Adaptive and Responsive Design**

Development of methodology to <u>tailor</u> survey designs to optimize response rates and to reduce nonresponse selectivity.

- <u>Adaptive Design</u> assumes
  - that different persons or households can receive different treatments
  - treatments may be defined before the survey starts, but may also depend on data that is observed during data collection
  - the availability of paradata
- <u>Responsive Design</u>, Groves and Heeringa (2006) defining "responsive design" with the following features:
  - preidentification of a set of design features potentially affecting costs and errors of survey estimates,
  - identification of a set of indicators of the cost and error properties of those features and <u>monitor</u> <u>those indicators in initial phases</u> of data collection,
  - <u>alter the features of the survey in subsequent phases</u> based on cost—error trade-off decision rules and
  - combine data from the separate design phases into a single estimator.

Shlomo, N., Schouten, B. & De Heij, V., (2013), Designing Adaptive Survey Designs with R-indicators. Paper presented at the NTTS Conference in Brussels, 2013. <u>http://www.risq-project.eu/papers/shlomo-schouten-heij-2013.pdf</u> Bethlehem, J., Cobben, F., and Schouten, B. (2011). <u>Handbook of Nonresponse in Household Surveys</u> (Chapter 13). New Jersey: John Wiley & Sons, Inc.

Groves, R. M. and Heeringa, S. G. (2006), Responsive design for household surveys: tools for actively controlling survey errors and costs. Journal of the Royal Statistical Society: Series A (Statistics in Society), 169: 439–457.

vent-History-Calenda

SNAP



## **Two Projects Underway in the 2014 SIPP Panel**

- Adaptive workload project
  - identify paradata indicators which can be used to readjust interviewer workloads on a weekly basis to promote
    - cost efficiency (miles, time, effort)
    - balanced progress and focus over 4-month interview period
    - reduce bias in non-response or for specific estimators
    - acknowledge appointments, cases in review, reluctant cases, prior effort, and other characteristics
  - Use frequent draws of paradata from wave 2 data collection to develop models and procedures for wave 3 and beyond
- Incentive experiment
  - to develop inter-wave responsive determination of incentive distribution
  - model based determination of incentive recipients to reduce nonresponse bias
  - reduce cost





## **Adaptive Workload Project**

- Follow daily workload experiment with Philadelphia enumerators with household personal visit survey adaptation
  - based on caseload and sample characteristics, enumerators were given reprioritized workloads on a daily basis
  - more consistent effort
  - stopping rules could be considered at the case level with daily review and action
- Motivation for a new project
  - SIPP Wave 1 asked interviewers to manage forty cases over four months.
  - SIPP interviews are very long (avg. 60min/adult all household members are interviewed)
  - transition from continuous interviewing to annual interviewing means lots of new hires
  - high and increasing non-response in surveys suggest considering a change to quality focus over response rate focus
- Project goals
  - build a monitoring and analysis plan that facilitates case prioritization
  - develop testable workload interventions to improve sample balance and reduce nonresponse bias
  - establish a plan for implementing an adaptive workload prioritization experiment during wave 3 of the 2014 SIPP panel





## **Adaptive Workload Project**

- Develop household survey protocols
  - adapt to longer interviews create efficiency by minimizing extraneous travel and targeting best times
  - acknowledge appointments and cases in supervisory review
  - consistently work cases that contribute to sample balance and reduced non-response bias
  - draw data from paradata systems to use for model input
- Monitoring and tailoring fieldwork treatments include:
  - designating when interviewers should most likely call sample units
  - which sample units are attempted on a given day/week
  - when cases should have work suspended
- Adaptive survey designs require metrics
  - to assess data quality
  - data collection progress
  - field procedures and reluctance
  - measurement of response and sample representativeness
- Tools to monitor metrics and retrieve data throughout data collection
  - frequently enough to provide dynamic inputs to adaptive models.





## **Data Inputs for Evaluating Adaptive Workload**

- Contact History Instrument
  - contact attempt dates and times
  - respondent reluctance
  - strategies attempted
  - neighborhood observations
- Regional Office Survey Control System
  - workload and interviewer information
  - supervisory review status
- Laptop Case Management
  - case appointment status
  - incentive group indicator
  - interviewer workload management
- Response and Frame Data
  - specific indicators
  - household characteristics (current interview period as well as prior interviews or frame data)
- Financial Systems
  - mileage and hours worked.





## Adaptive Workload Schedule and Plans

- Examine quality, timeliness and scope of data available as input (Fall 2014-Spring 2015)
- 2014 SIPP wave 2 data collection (February May 2015)
  - review and evaluate data streams during wave 2 data collection
  - set up any new data streams so monitoring (and implementation in wave 3) can take place
- Develop workload prioritization models (March 2015 June 2015)
- Develop experimental design for implementation (May 2015 July 2015)
- Share experimental design with regions (summer 2015 SIPP meetings)
- Test workload adjustment procedures (Fall 2015)
- Implement experiment in wave 3 data collection (February May 2016)





## **Incentive Experiment**

- Develop research results to guide incentive implementation and efficacy
- Implement procedures for centralized distribution and monitoring of incentives
- Develop procedures for responsive propensity based incentive model
  - could be based on likelihood of response
  - could be based on contribution to meeting expected sample distribution
- Results from Wave 1 and Wave 2 implementation will hopefully lead to the conclusion of the experiment and full implementation for Wave 3 and Wave 4
- Experimental results may differ from prior incentive experiments due to annual administration and centralized incentive group management





## **Incentive Experiment**

- Households randomly put into 1 of 4 equally sized groups.
  - approximately 13k sampled households in each group

Group	Sampled Households	Wave 1	
Total	53,070		
1	13,549	\$0	
2	13,471	\$0	
3	13,470	\$20	
4	12,580	\$40	

#### Incentives

- conditional on completion and transmission of full or sufficient partial interivew
- centralized distribution from our National Processing Center in Jeffersonville, IN
- distributed as debit cards for use in retail or ATM locations (\$20 and \$40 amounts)
- Develop inter-wave responsive model for incentive distribution
  - \$20 increased the response rate by 1.2%
  - \$40 increased the response rate by 3.5%





## **Wave 2 Incentive Plans**

### Treatments:

Group	Wave 1	Interviewed Wave 1 Sample Eligible for Incentive	Wave 2
Total		29,789	
1	\$0	7,452	\$0
2	\$0	7,434	\$40
3	\$20	7,511	\$0
4	\$40	7,392	(a) \$40 (b) \$0

### Testing:

- Continued non-receipt Control (Group 1)
- Adding receipt/propensity model (Group 2)
- Removal of receipt (Group 3, ½ of Group 4)
- Continued receipt/propensity model (½ of Group 4)





## **Wave 3 Incentive Plans**

- Probabilities of response are defined according to incentive treatment and control variables.
- Based on the probabilities, we will generate a response indicator.
- Using the response indicator as the dependent variable, we will fit a logistic regression model on the population using control and explanatory variables



## **Wave 3 Incentive Plans**

- Propensity Model:
  - logistic regression model that predicts the probability of response using household characteristics such as:
    - region
    - demographics
    - education
    - marital status
    - income
    - labor force status
    - health insurance coverage
    - contact history / reluctance
  - assign incentives to households with the lowest likelihood of responding or most contribution to R-Indicator





## **Incentive Experiment Schedule and Plans**

- 2014 SIPP wave 2 data collection (February May 2015)
  - review and evaluate treatment group response and characteristics following wave 2 data collection
- Develop incentive propensity models (March 2015 June 2015)
- Assign groups to wave 3 incentive assignments (May 2015 July 2015)

Group	Wave 1	Wave 2	Wave 3 Possible Treatments
1	\$0	\$0	\$0
			Model Based \$40
2	\$0	\$40	\$40
			Model Based \$40
3	\$20	\$0	\$0
			Model Based \$40
4 \$40	\$40	(a) \$40	(a) \$40
		(b) \$0	(b) \$0

- Share experimental design with regions (summer 2015 SIPP meetings)
- Implement model based incentive assignment experiment in wave 3 data collection (February May 2016)





Thank you.



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