

National Center for Education Statistics Adaptive Design Overview

FCSM Conference December 16, 2014

Introduction

- Conceptualization of adaptive design
- Short summary of NCES longitudinal studies testing adaptive design approaches
- Review of recent experiments of adaptive design options for the studies

Introduction

- Adaptive design is a relatively new concept
- “Alteration of sampling and collection approaches during the course of a data collection using real time process and survey data to improve survey cost efficiency and to achieve more precise and less biased estimates.”

Introduction

- Largely driven by declining response rates, costs for improving them, and concern about related data precision and biases
- Adaptive design experiments are numerous in the field
- Primarily focused on boosting overall response rates or cost reduction

Introduction

- Presentation highlights research NCES is doing with longitudinal studies that:
 - Focuses on improving response rates
 - Simultaneously considers bias reduction
 - Can reasonably be assumed to be adaptive to various nonresponse avoidance or conversion strategies

Studies

- Information presented here is drawn from work on NCES longitudinal studies
- Beginning Postsecondary Student Study (BPS)
 - First follow-up fielded this year
- High School Longitudinal Study of 2009 (HSL:09)
 - 2013 update

Studies

- BPS 12/14 follows students who participated in the National Postsecondary Student Aid Study (NPSAS) in 2011-12
 - NPSAS collects considerable information about students in postsecondary education
 - BPS sample drawn from freshmen in NPSAS
 - Approximately 37,000 students selected for BPS

Studies

- HSLs:09 follows representative sample of 9th graders sampled in the Fall of 2009
- 2013 Update gathered information when most of the sample was transitioning into postsecondary education or work
 - Over 23,000 students participating in HSLs:09

BPS 2014 Example – Use of Field Test

- Adaptive design process began with the field test for the 2014 BPS
- Field test results and NPSAS information used to model response propensities
- Identified 5 groups from lowest (under 40 percent) to highest (over 90 percent) likelihood of response without intervention

Phase 1 – BPS 2014

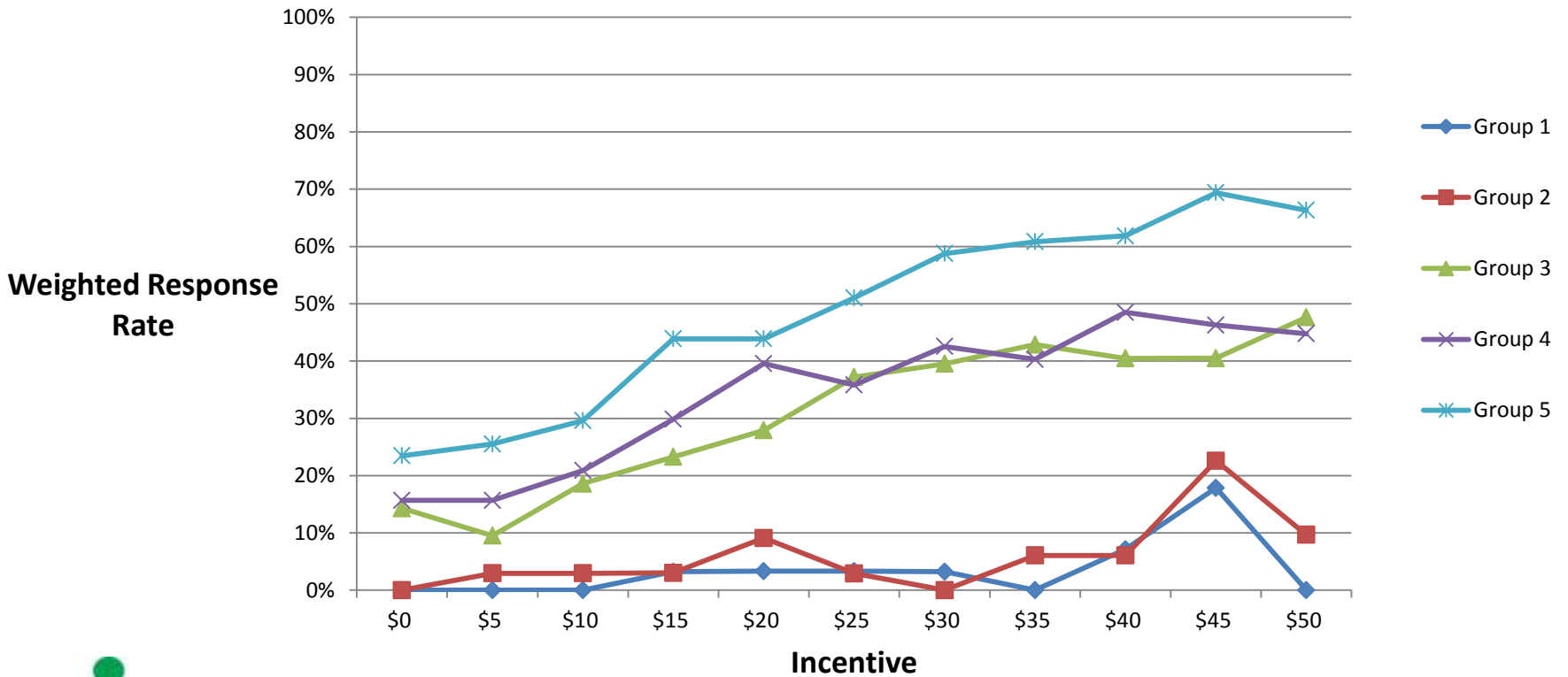
- Referred to as the calibration study
- Random subsample of 10 percent of the full 37,000 case national sample
- Grouped cases into 5 response propensity groups based on characteristics identified during the field test
- Fielded 7 weeks prior to main sample

Phase 1 – BPS 2014

- Assigned random subsamples of each response group to cash incentive groups defined by \$5 increments from \$0-50
- Purpose was to identify optimal initial incentive amount for undergraduate students
- Incentives are promised incentives for completing interviews

Calibration Study Response Rates

Response rate by incentive group through 6 weeks of data collection



Phase 2: Full Sample Collection Starts

- Offered \$30 the main national BPS sample
 - Response rate was highest for groups 1&2 at \$45, but based on small number of responding cases
 - For groups 3 – 5, response rate nominally highest at \$45, but not significantly different from amounts of \$30 and above

Phase 2

- Phase 2 encompassed the first four weeks of collection with the full sample
- Data available to identify nonrespondents who would contribute most to bias
 - Bias estimated using a set of variables from earlier stage BPS collection – NPSAS and frame information
 - New intervention approach tested with calibration sample

Phase 2

- Crossed information about estimated contribution to bias with response propensity estimate
- Importance score was assigned to nonresponding cases based on bias contribution and response propensity
 - Higher bias and response propensity resulted in higher scores

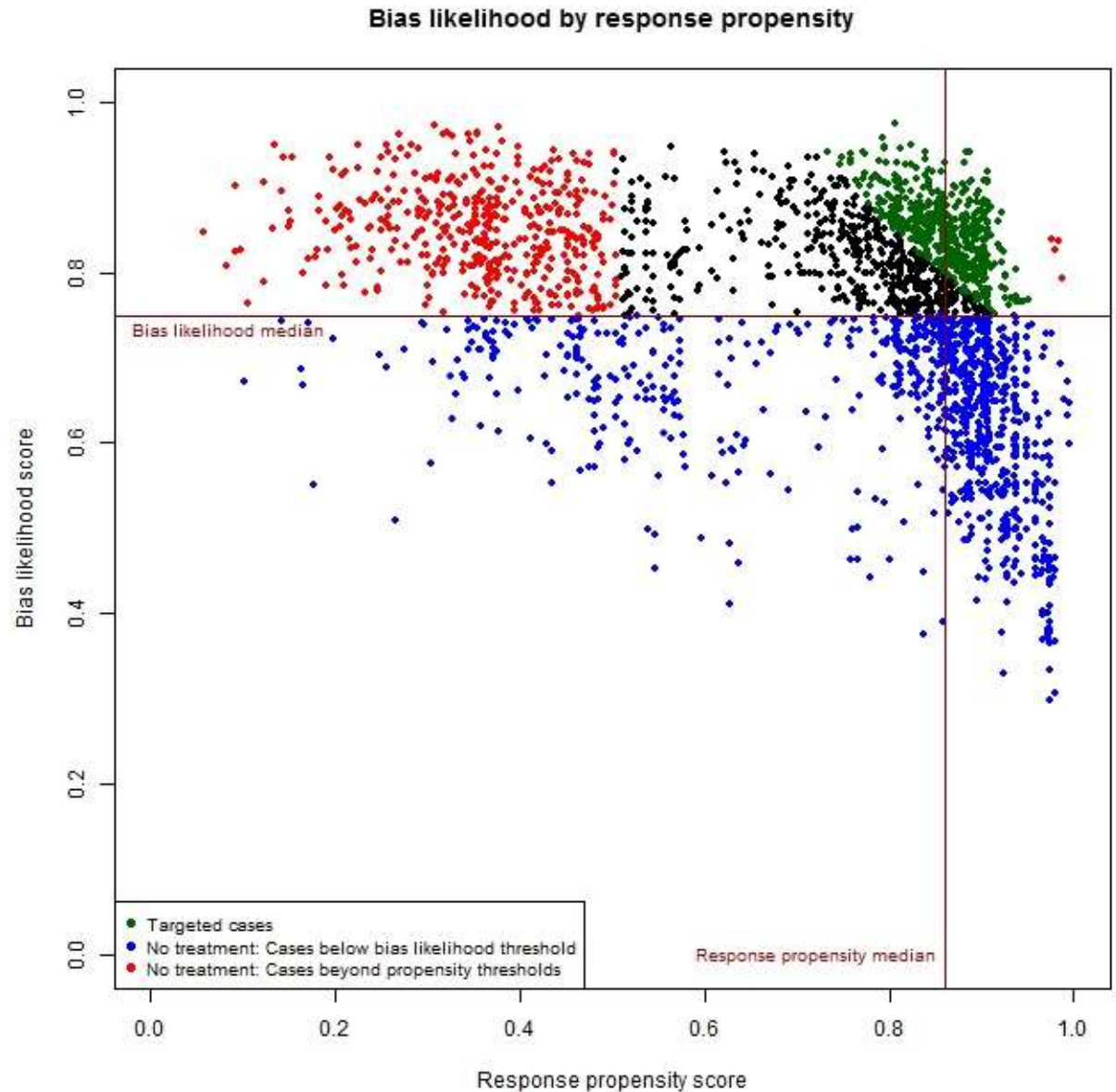
Conceptual Framework

high	Higher bias – lower response	Higher bias – higher response
low	Lower bias – lower response	Lower bias – higher response
	low	high

Likelihood to Respond

Plot of Bias Likelihood by Response Propensity Score

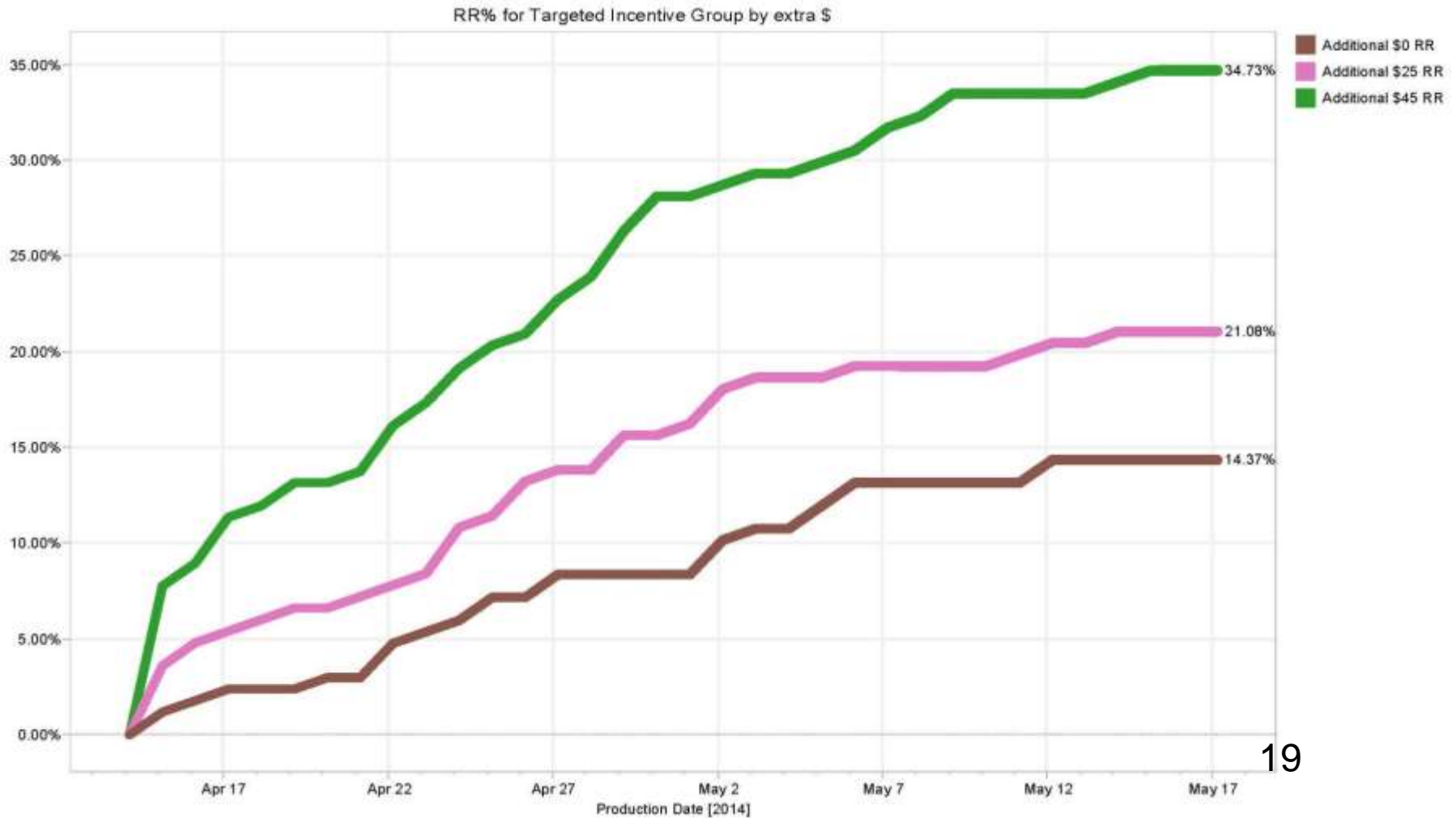
Select 500 cases with the highest importance score



Phase 3 Experiment

- Data from phase 2 used to identify 500 cases with highest importance scores
- 3 treatments were tested
 - \$0 additional incentive offer
 - \$25 additional incentive offer
 - \$45 additional incentive offer

Phase 3: Response Rates for 500



Targeting Study Results

- After a month of data collection during phase 3, analysis indicated
 - \$25 not significantly higher than \$0
 - \$45 significantly higher than \$25 and \$0
 - \$45 led to reduction in bias in the largest number of estimates

Phase 4: Main Sample

- At time of intervention, response rate for main sample about 36%
- Targeted 30% of nonrespondent cases with \$45 additional incentive - About 6,420 cases
- Same importance model as used in Calibration Study to select targeted cases
- Monitored response rates and bias in real time
- Data collection just ended so no results just yet
 - Planning a presentation at FEDCasic this spring

High School Longitudinal Study: 2009 – Fall 2013 Update

- Similar adaptive design approach pursued in the HSLS:09 2013 Update study
 - HSLS:09 suggests the results will be promising
- HSLS:09 approach did not control for response propensity, but used the same approach to predicting bias

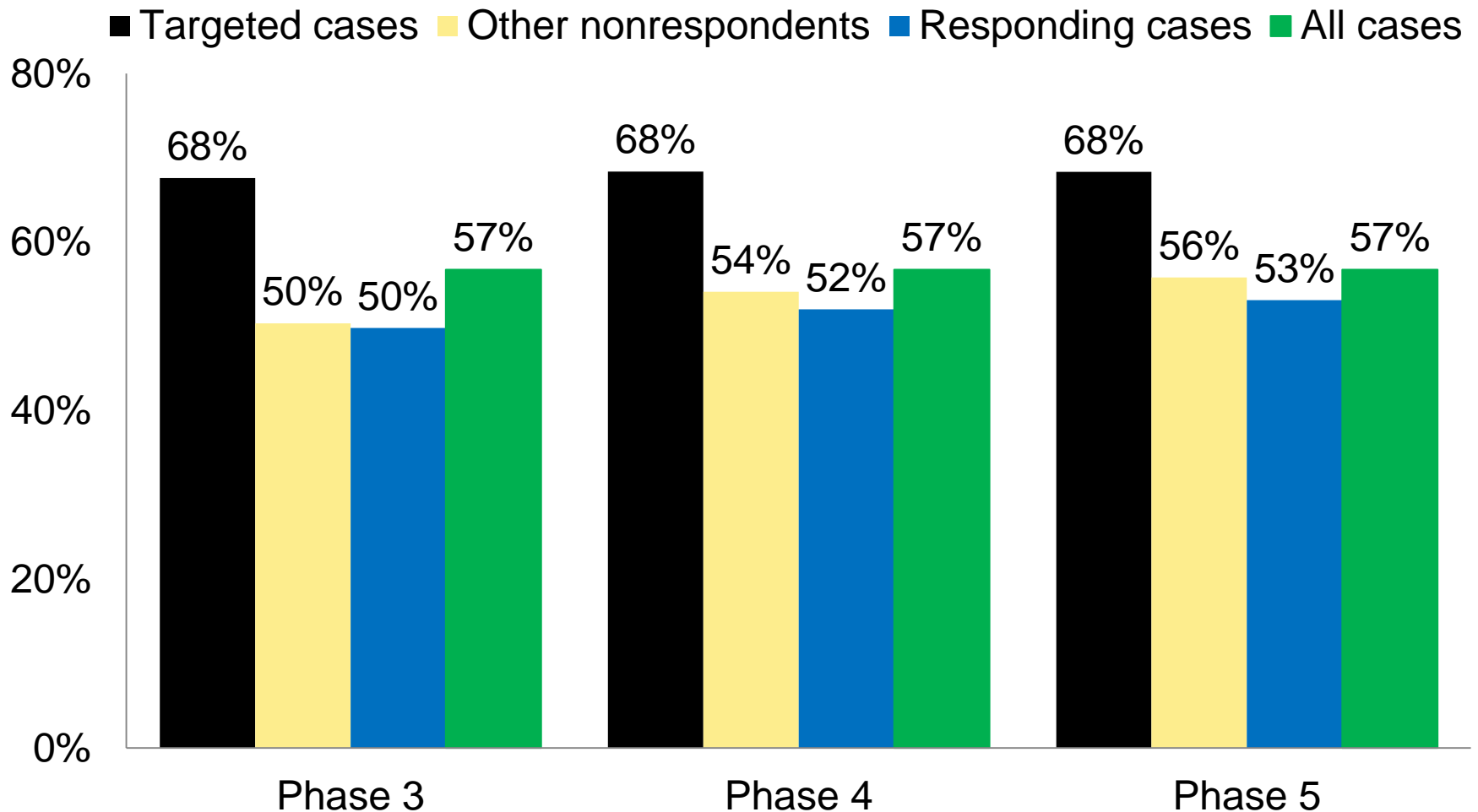
HSL:09

- Interventions began after the first 2 phases of the collection
 - Phase 1: self-directed web instrument
 - Phase 2: phone interview followup
- Phases 3-6 involved different monetary incentive interventions
- Last intervention was a reduced-length instrument

HSLs:09 – Phase overview

1. 3-week self-administered web period
2. 5-week computer-assisted telephone interview
3. \$5 prepay for targeted cases
4. \$15 offer for targeted cases
5. \$25 offer for targeted cases
6. Expand cases for \$5 prepay and/or \$25 offer
7. Short survey for remaining cases (last 3 weeks)

HSLs:09 – Percent of cases who took Algebra 1 by respondent group and phase



Interpretation

- The green bar represents the percentage who took algebra 1 as reported in 2009 (study year 1)
- The blue bar represents the percentage who took algebra 1 as reported in 2013
- As adaptive phases progress, the respondent algebra 1 rate more closely approximates known 2009 rate

Considerations

- Flexibility is critical – work closely with OMB to ensure public is able to understand plans
- Approaches here focused on studies with extensive a-priori information for sample
- If possible, study intervention options with subsamples then use for full sample

Followup

- For additional information about the specific studies discussed here, please contact
 - Sarah Crissey (BPS) – sarah.crissey@ed.gov
 - Elise Christopher (HSL:09) – elise.christopher@ed.gov
 - Chris Chapman (plans for NCEES sample surveys) – chris.chapman@ed.gov
- Studies discussed here were done in close cooperation with experts at RTI International

Questions?