

# Redesign Options for the Consumer Expenditure Survey

Presented at the  
Consumer Expenditure Survey  
Redesign Options Workshop

Washington, D.C.

October 26, 2011

### Authors

David Cantor, Sid Schneider, Brad Edwards  
Westat

### Acknowledgements

Pat Cunningham, Bob Fay, David Judkins,  
Bob Patchen, Abie Reifer, Lou Rizzo and Pat Ward  
Westat

Carol House,  
Committee on National Statistics (CNSTAT)

Anonymous reviewers from the expert panel

# Outline of presentation

---

Review of major issues

Proposed redesign

Diary

Quarterly Interview

Summary and discussion of proposed design

Evaluation

# Outline of presentation

---

**Review of major issues**

Proposed redesign

Diary

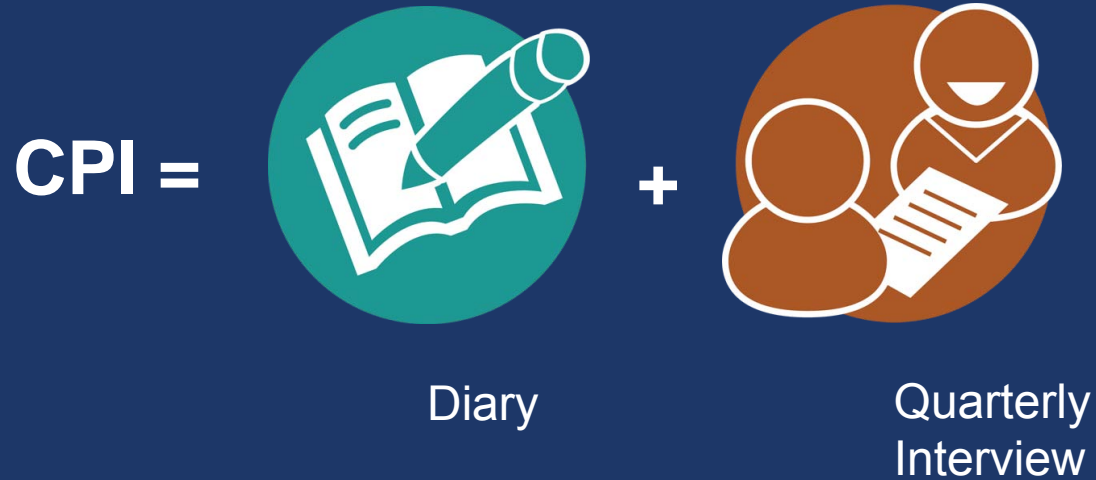
Quarterly Interview

Summary and discussion of proposed design

Evaluation

# CE Basic Design

---



# Parameters from the CNSTAT for recommendations

---

- Reduce measurement error
- Adapt to changing retail and technological landscape
- Provide respondents with more flexibility
- Think 'out of the box,' but ground recommendations in as much survey experience as possible
- Do not let budget constrain ideas too much

# Causes of measurement error

---

- CE is very burdensome
  - > Quarterly Interview averages 1 hour
  - > Recall is difficult
  - > Proxy reporting for other consumer unit (CU) members.
  - > High burden leads to errors (e.g., “satisficing,” nonresponse; interviewer shortcuts)
- Retrospective recall is subject to error
  - > Omissions, telescoping, estimation
  - > Failure to encode (expense amounts)

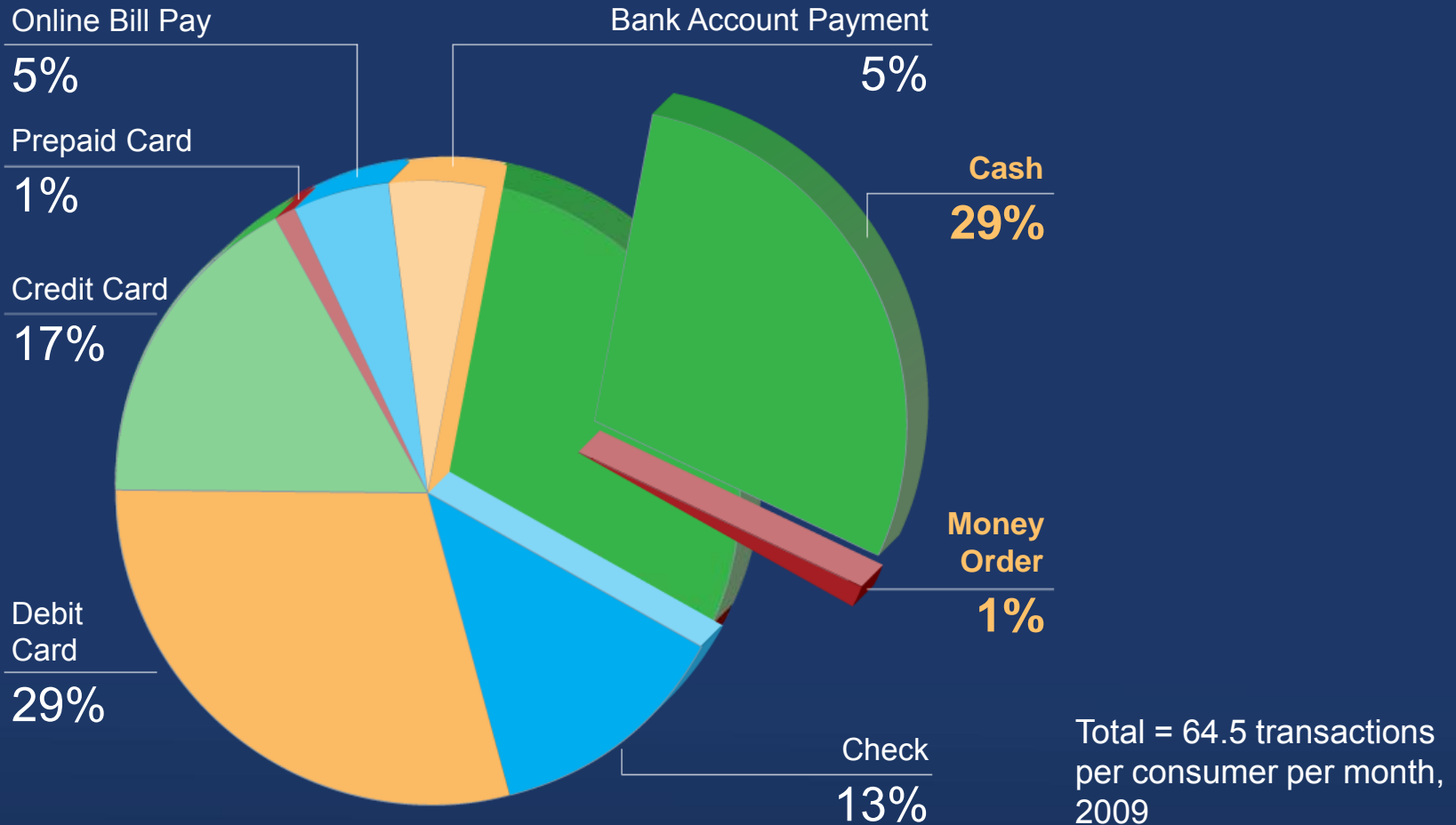
# Changing retail environment

---

- Transactions occur through multiple modes
  - > Brick and mortar stores
  - > Online expenditures
    - Bill payment
    - Online shopping
- Electronic records for most purchases



# Which transactions leave an electronic record that could be used for CE data collection?



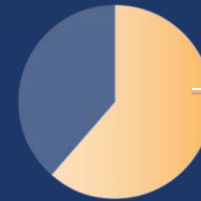
# Transactions with e-records/month/consumer, 2009

---

	% with e-records
Bill payments	87.0%
Online payments	98.0%
Retail, service, person-to-person transactions	59.3%
<hr/>	
All transactions	71.0%

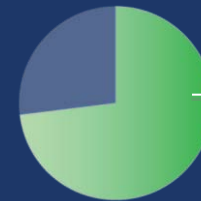
# With consolidation in retail industry, relatively few retail chains

- 20 largest grocery chains



Total Sales  
**61.6%**

- Walgreens, CVS, Rite Aid



Total  
Pharmacy  
Sales  
**73.2%**

- Sam's Club, Costco



Warehouse  
Club Sales  
**89.5%**

Cooperation from several chains =  
Data for a high proportion of CU expenditures

# Outline of presentation

---

Review of major issues

**Proposed redesign**



Diary

Quarterly Interview

Summary and discussion

Evaluation

# Summary of key features of proposed design

---



## **Both Diary & Interview Surveys**

Scan receipts or mail paper records;  
Download financial files

Increase monitoring

Enhance recall interview

Monetary & nonmonetary incentives

Vendor Survey

# Summary of key features of proposed design

---



## **Both Diary & Interview Surveys**

- Scan receipts or mail paper records;
- Download financial files
- Increase monitoring
- Enhance recall interview
- Monetary & nonmonetary incentives
- Vendor Survey



## **Diary Survey**

- Two 7-day collection periods
- Estimates for food, alcohol & other frequent purchases

# Summary of key features of proposed design



## **Both Diary & Interview Surveys**

- Scan receipts or mail paper records;
- Download financial files
- Increase monitoring
- Enhance recall interview
- Monetary & nonmonetary incentives
- Vendor Survey



## **Diary Survey**

- Two 7-day collection periods
- Estimates for food, alcohol & other frequent purchases



## **Quarterly Interview Survey**

- Two 3-month collection periods, 12 months apart
- Estimates for all other purchases

# Proposed design: use of personal records



- Ask respondents to download electronic information from
  - > Credit card
  - > Bank
  - > Mortgage
  - > Any other online source
- Emphasis on collecting receipts
- Create records using other methods





### EXPORT OPTIONS

Please Select One

Please Select One

Quicken (.QFX)

Quickbooks (.QBO)

Microsoft Money (.OFX)

Microsoft Excel (.CSV)

### Online Banking

Account Activity    Checking XXXX-XXXX-XXXX-3456

Date	Description	Withdrawals	Deposits	Balance
10/21/2011	Check 245	\$125.00		\$5463.24
10/20/2011	ACH Credit		\$350.45	\$5588.24
10/20/2011	ATM Withdrawal	\$200.00		\$5237.79
10/09/2011	ACH Payment	\$24.55		\$5437.79
10/08/2011	Deposit		\$45.00	\$5462.34

# Proposed design: use of personal records



- Ask respondents to download electronic information from
  - > Credit card
  - > Bank
  - > Mortgage
  - > Any other online source
- Emphasis on collecting receipts
- Create records using other methods





# Proposed design: use of personal records



- Ask respondents to download electronic information from
  - > Credit card
  - > Bank
  - > Mortgage
  - > Any other online source
- Emphasis on collecting receipts
- Create records using other methods

# Potential problems with increased record use



- Reduced response rate
  - > Countermeasure: accept self-reports too.  
Avoid extremes.
  - > Empirical question on effect on total survey error.  
Measurement error vs. non-response bias
- How many respondents will comply?

# Proposed design: survey of vendors



- Ask vendors to provide purchases made by respondents
- Use information to substitute directly for data
- Use information to improve data quality
  - > Fill in data missing from respondents' reports
  - > Obtain a measure of accuracy, completeness of respondents' reports

# Potential problems with vendor surveys



- Timing of collection may not coincide with publication schedule
- Increased cost (assuming sample size is fixed)
  - > Possible offset by efficiency gains
  - > Empirical question on interaction between costs and TSE



# Proposed design: develop enhanced recall interview



- Recall interview for all respondents
  - > Respondent burden mitigated with record use
- Cues to store data about expenditures (e.g., type; amount of expenditure; retail outlet).
  - > Consider use of Event History Calendar
  - > Refer to any records or receipts.
- CARI for monitoring question performance and interviewer behavior

# Enhanced recall interview: Pros and Cons



- PRO
  - > Reduce error due to omission and telescoping
  - > Data for those with no records or receipts
- CON
  - > Potentially increased interview length

# Proposed design: monetary & nonmonetary incentives



- \$50 – \$70 for main respondent  
\$10 – \$20 secondary
- Reports of expenditures
- Charts showing how household expenditures compare with others

# Bundle.com compares spending of users and others with similar demographic characteristics



# Outline of presentation

---

Review of major issues

**Proposed redesign**



Diary

Quarterly Interview

Summary and discussion

Evaluation

# Proposed design: multiple diary keepers

---



- All individuals 14+ fill out a diary
- Main diary keeper instructs others in CU
- Edgar et al (2006) show increases in mean expenditures with multiple diaries/CU

# Multiple diary keepers: pros and cons



- PRO
  - > Improved measurement
  - > Reduced burden on main CU respondent
- CON
  - > Increase in cost
  - > Reduction in response rate
    - How do cost and error balance?

# Redesigned Diary survey schedule



- Start: Initial in-person interview
- 2-3 days: Telephone call
- 7 days: Telephone or in-person interview
- 10 days: Telephone call
- 14 days: Telephone or in-person interview



# Respondent data reporting alternatives



- Electronic
  - > Download financial data files
  - > Scan receipts, paper forms
  - > Use respondents' smartphones
- Paper
  - > Mail-in receipts, monthly statements
  - > Keep diary, as now

# Respondents download financial data from Web sites of financial institutions



- Credit card accounts
- Checking accounts
- Bank accounts for debit card or electronic payments
- Software for downloading
  - > Financial software packages like Mint
  - > New software using Yodlee Software Development Kit

# Creating a Record



- Types of records
  - > Receipts from vendor
  - > On-line receipts
  - > Information entered into smartphone
  - > Short paper form describing purchase
- Transmitting receipts
  - > Scan
  - > Mail





# Repository system



- Software automatically transfers to central repository
  - > Scanned receipts
  - > Downloaded financial data files
- Converts to text using optical character recognition (OCR) software
- Extracts individual purchases from text
  - > Expert system reads text
  - > Finds description, cost of purchase (shirt, \$20)
  - > Ignores irrelevant text

# Acme Clothing

## PURCHASE

GLOVES 20.00  
0088377056874 614/61

SHIRT 25.00  
0088377048965 822/41

\*MANAGER'S SPECIAL -5.00

YOUR PRICE 20.00

SHOES 125.00  
0088377036952 7752/61

\*BONUS CARD SAVINGS -20%

YOUR PRICE 100.00

Sub Total 120.00  
5.000 RGLR Tax 8.00  
Total 128.00

Credit Card  
08830Z XXX  
xxxxxxxxxxxx1234

CUSTOMER COPY

# Acme Clothing

## PURCHASE

GLOVES 20.00  
0088377056874 614/61

SHIRT 25.00  
0088377048965 822/41

\*MANAGER'S SPECIAL -5.00

YOUR PRICE 20.00

SHOES 125.00  
0088377036952 7752/61

\*BONUS CARD SAVINGS -20%

YOUR PRICE 100.00

Sub Total 120.00  
5.000 RGLR Tax 8.00  
Total 128.00

Credit Card  
08830Z XXX  
xxxxxxxxxxxx1234

CUSTOMER COPY



# Repository matches purchases, generates Web survey



- Compares
  - > Purchases documented in receipts
  - > Purchases documented in financial data files
- Matches by total cost, date
- Generates Web survey
  - > CE-relevant questions for each purchase

## Consumer Expenditure Survey

---



**On October 26, 2011, you bought a shirt for \$20.00. Was this for a male or a female?**

- Male
- Female

# Example #1



- Repository finds
  - > Expenditure for \$20.25 in credit card data file
  - > Receipt for \$20.25 which lists
    - Hammer \$15.00
    - Nails \$3.00
    - Tax \$2.25
  - > Match data file with receipt

# Example #1



- Repository finds
  - > Expenditure for \$20.25 in credit card data file
  - > Receipt for \$20.25 which lists
    - Hammer \$15.00
    - Nails \$3.00
    - Tax \$2.25
  - > Match data file with receipt

**On July 25, you purchased a HAMMER for \$15.  
Was this purchase for someone in your household list?**

Yes  No

Joe's Hardware	
One Main Street Newark, NJ	
PURCHASE	
HAMMER	15.00
NAILS	3.00
Sub Total	18.00
tax inc.	2.25
Total	20.25
CREDIT CARD 000000 XXX XXXXXXXXXXXX1234	
CUSTOMER COPY	

# Example #2



- Repository finds
  - > Expenditure for \$34 in checking account data file
    - Check cashed July 30, 2011
  - > No corresponding receipt for \$34.00 near July 30, 2011
  - > No receipt was scanned

# Example #2



- Repository finds
  - > Expenditure for \$34 in checking account data file
    - Check cashed July 30, 2011
  - > No corresponding receipt for \$34.00 near July 30, 2011
  - > No receipt was scanned

**You made a purchase by check for \$34.  
The check was cashed on July 30, 2011.  
Do you remember what you purchased?**

# Example #3



- Repository finds
  - > Receipt for \$5 from dry cleaner dated July 15, 2011
  - > No corresponding check or credit card charge for \$5 near July 15, 2011
  - > Paid in cash

# Example #3



- Repository finds
  - > Receipt for \$5 from dry cleaner dated July 15, 2011
  - > No corresponding check or credit card charge for \$5 near July 15, 2011
  - > Paid in cash

**On July 15, 2011, you purchased DRY CLEANING for \$5.  
Was this purchase for someone in your household list?**

Yes  No

Metro Dry Cleaners	
	5.00
Total	5.00
Thank you!	



# Will many respondents cooperate and actually save receipts? Maybe yes.



- SIPP encouraged use of administrative records of income
  - > Interviewers encouraged, instructed respondents
  - > Telephoned respondents to remind them
  - > Asked respondents to get missing records, including return visits
  - > Achieved “astonishingly high” levels of compliance
    - Record use increased from 25 to 87 percent

# Will many respondents cooperate and actually save receipts? Maybe no.



- MEPS respondents asked to keep receipts, calendar
  - > 13.7 % used receipts to report data
  - > 22.5 % used calendar

# Administrative record survey for Diary



- Approach major retail chains
- Ask for purchasing histories
- Identify respondent households by loyalty card number

# Uses of personal records and recall interviews for Diary

---



- Use receipts, financial data files as memory aids in recall interview
- Enter transaction dates on Event History Calendar

# Diary survey data collection timeline



- Start: in-person interview
  - > Sign consent for electronic information
  - > Select paper or electronic data collection method
  - > Provide envelopes/box for receipts
  - > Provide scanner if electronic method used
  - > Provide paper diary if that method used
- Interviewer monitors respondents' recordkeeping
  - > Scans of receipts, mailed-in paper receipts

# Initial followup



- 2-3 days: telephone call
  - > Identify barriers, problems
  - > Motivate
- 7 days: telephone/in-person
  - > If respondent has been sending adequate records, by telephone
  - > Otherwise, in-person recall interview
- 10 days: telephone call
  - > Identify barriers, problems
  - > Motivate

# 14 days: telephone/in-person

---



- If respondent meets criteria for recordkeeping, conduct interview by telephone; then close out
- Otherwise, in-person recall interview

# Estimates of cost



- Costs estimated using:
  - > CE Diary costs provided by CNSTAT
    - For proposed design, anchored on total cost from current design
    - Computed a “per complete” cost by dividing total cost by number of completes
  - > Costs from Medical Provider Component of the MEPS, Energy Supplier Survey for RECS
- Many assumptions required



# Table of Diary costs



	Current design	Proposed design
CE Units	7,449	7,449
Interview cost	\$5.1M	\$7.5 M
Administrative records cost	NA	\$0.8 M
Total Diary Cost	\$5.1M	\$8.3 M

# Impact of the redesigned Diary survey on precision of estimates



- Sample design unchanged, changes in precision are a function of cost
- If only one respondent is interviewed, Diary cost would not increase
- For fixed budget, new design with  $>1$  respondent could collect approximately 60% as much data
  - > This would increase standard errors by about 29%
  - > If no administrative data are collected, the increase would be about 21%

# Outline of presentation

---

Review of major issues

**Proposed redesign**

Diary

**Quarterly Interview**

Summary and discussion

Evaluation





# New interviewing schedule for CE quarterly interview survey



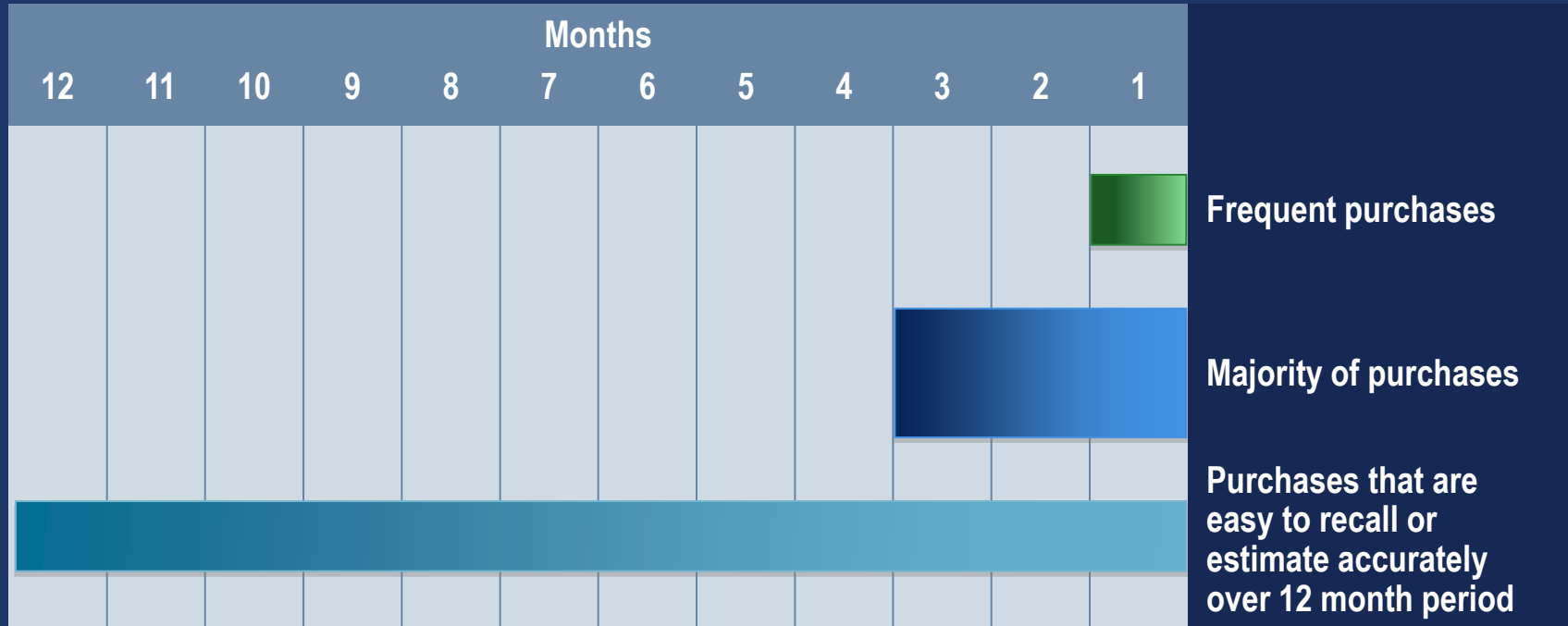
- Two recall interviews, spaced 12 months apart
- Collect details on purchases other than food and alcoholic beverages
- Vary the reference periods across expenditures

# The interviewing structure

-  Set up interview
-  3 month collection period



# Quarterly interview reference periods for recall



# Proposed structure: Pros and Cons



- PRO
  - > Reduces number of CE interviews
  - > Reduces design effects for annual estimates
  - > Can ask reference periods >3months
- CON
  - > Increased cost due to more interviews
  - > No longitudinal data on quarterly change
  - > No annual data for individual CUs

# Redesigned Quarterly Interview schedule



- Wave 1
  - > Start: initial in-person interview
  - > 2 weeks, 1 month, and 2 months: telephone call
  - > 3 months: In-person interview
- Wave 2, 12 months later
  - > Start: telephone or in-person interview
  - > 2 weeks, 1 month, and 2 months: telephone call
  - > 3 months: in-person interview



# Respondent data reporting alternatives



- Electronic
  - > Download financial data files
  - > Scan receipts, paper forms
  - > Enter information using smartphone
- Paper
  - > Mail-in receipts, monthly statements
  - > Keep receipts and other records

# Other survey design parameters



- One main person interviewed in the CU
  - > Consider experimentation with using more than 1 person
  - > Encourage main respondent to consult others in CU
- Incentive provided for each recall interview

# Wave 1, initial in-person interview



- Sign consent for electronic information
- Select paper or electronic data collection method
- Provide envelopes/box for receipts
- Provide scanner if electronic method used
- Conduct bounding interview

# Followup



- Telephone contacts at 2 weeks, 1 month, and 2 months
  - > Interviewer monitors respondents' recordkeeping
    - Scans of receipts
    - Mailed-in paper receipts
  - > Identify barriers, problems
  - > Motivate
- In-person interview at 3 months
  - > Review records provided
  - > Recall interview

# Wave 2



- 12 months after initial contact
  - > Mail instruction packet to CU
  - > Followup telephone call to orient respondent and conduct bounding interview
  - > If household has changed, use initial contact protocol
- Followup
  - > Repeat wave 1 procedures

# Administrative record survey



- Approach major retail chains, utility, mortgage companies
- Ask for purchasing histories and collect expenditures as they occur

# Quarterly Interview survey cost caveats



- Same as for the Diary
- Plus: difficult to partition current costs by mode

# Table of quarterly interview costs



	Current design	Proposed design
CE Units	28,000	28,000
Interviews/ CE Unit/quarter	1	2
Quarters	4	4
Interview cost	\$17.0 M	\$24.7 M
Administrative Records cost	NA	\$10.2 M
Total Interview Cost	\$17.0 M	\$34.9 M



# Estimates of precision for proposed design



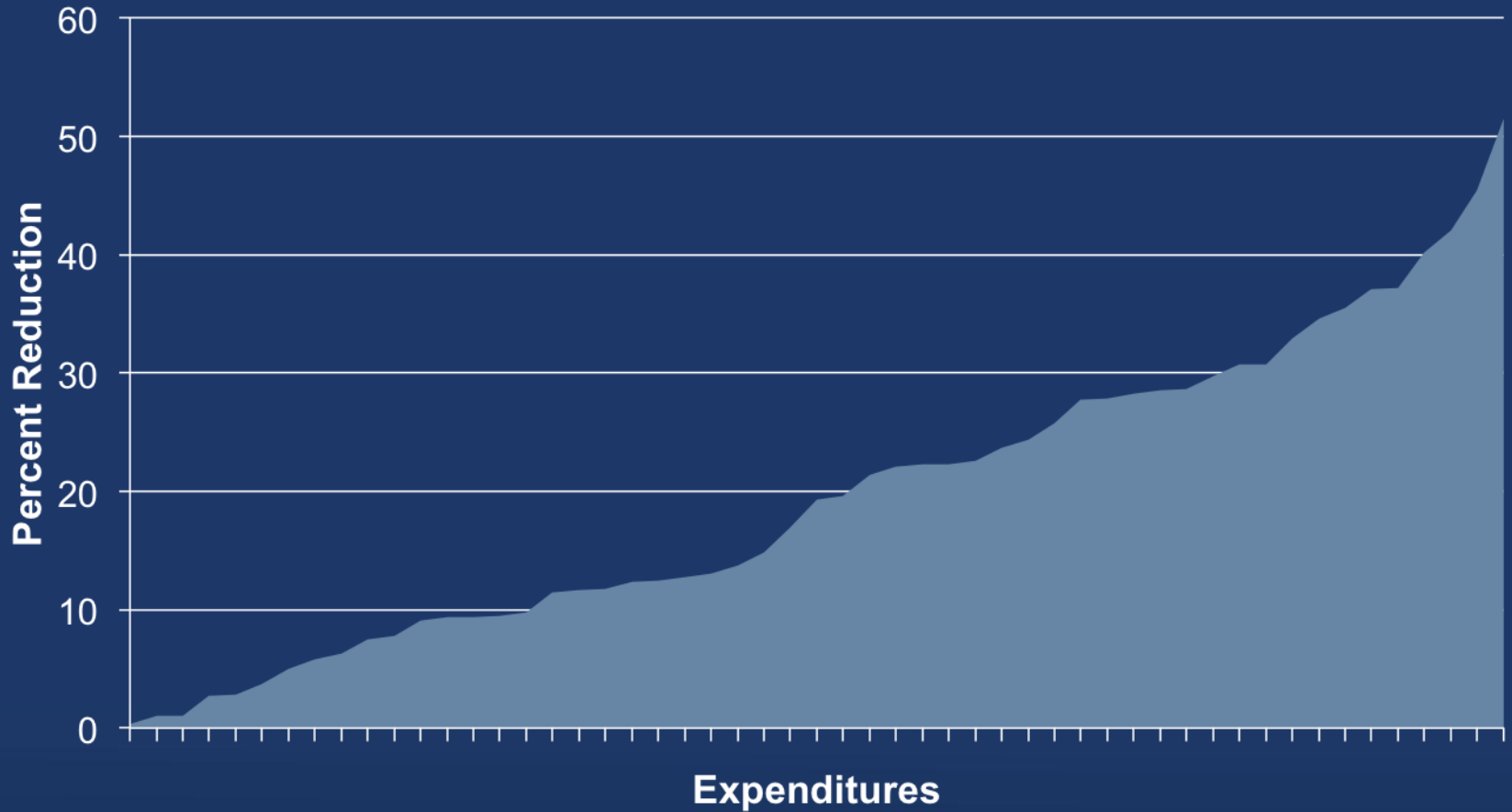
- Estimates for expenditures that are currently based on the Quarterly Interview Survey
- Estimates of precision simulated using the 2009 public use file

# Methodology for estimating precision

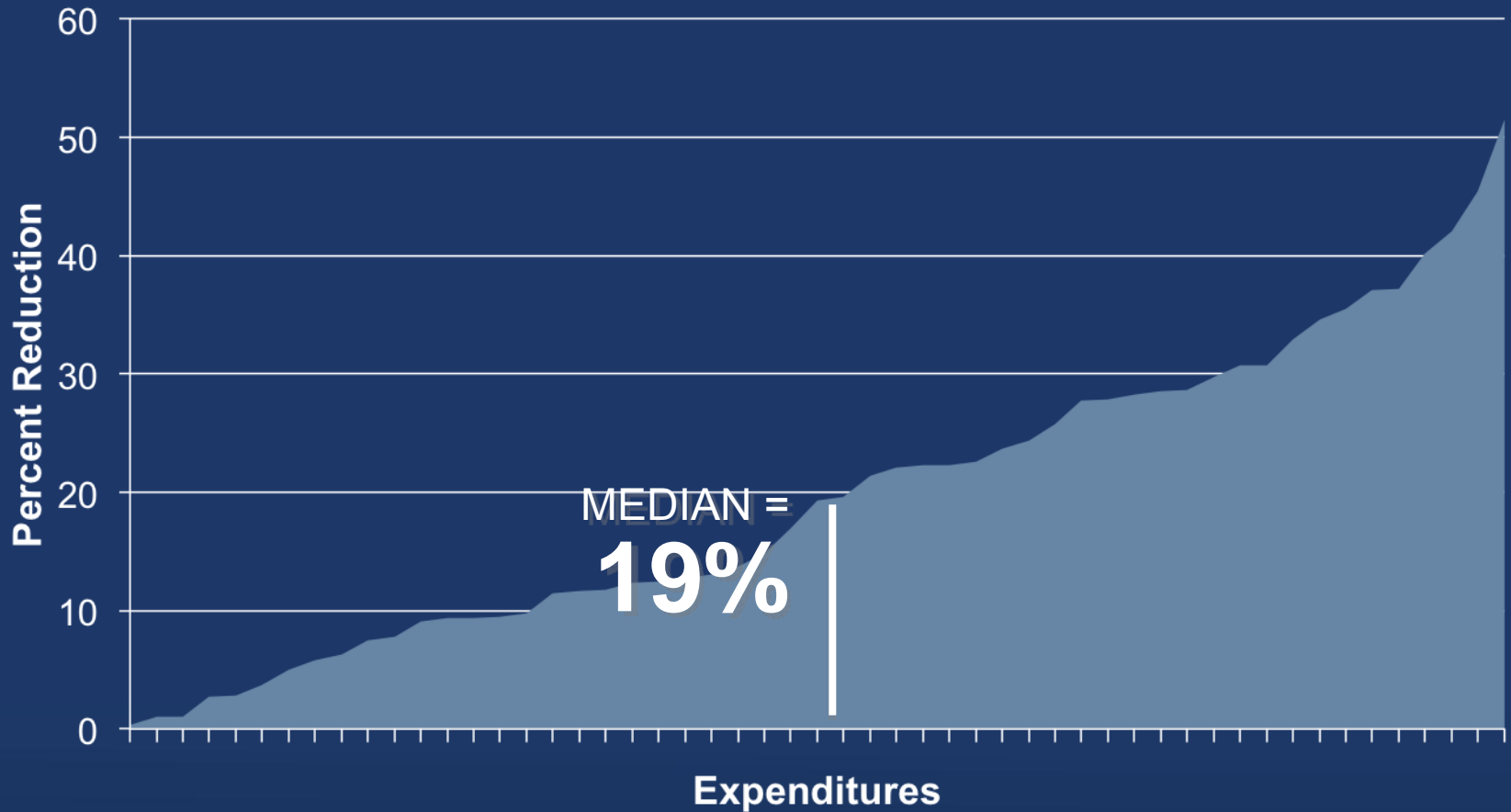


- Simulated effects on within-PSU sampling variance for 1-, 3-, and 12-month reference periods
- Assumed each 3-month interview was uncorrelated and computed variances
- For 12-month period used constant reduction based on length of reference period
- For 1-month period used most recent month of 3-month reference period

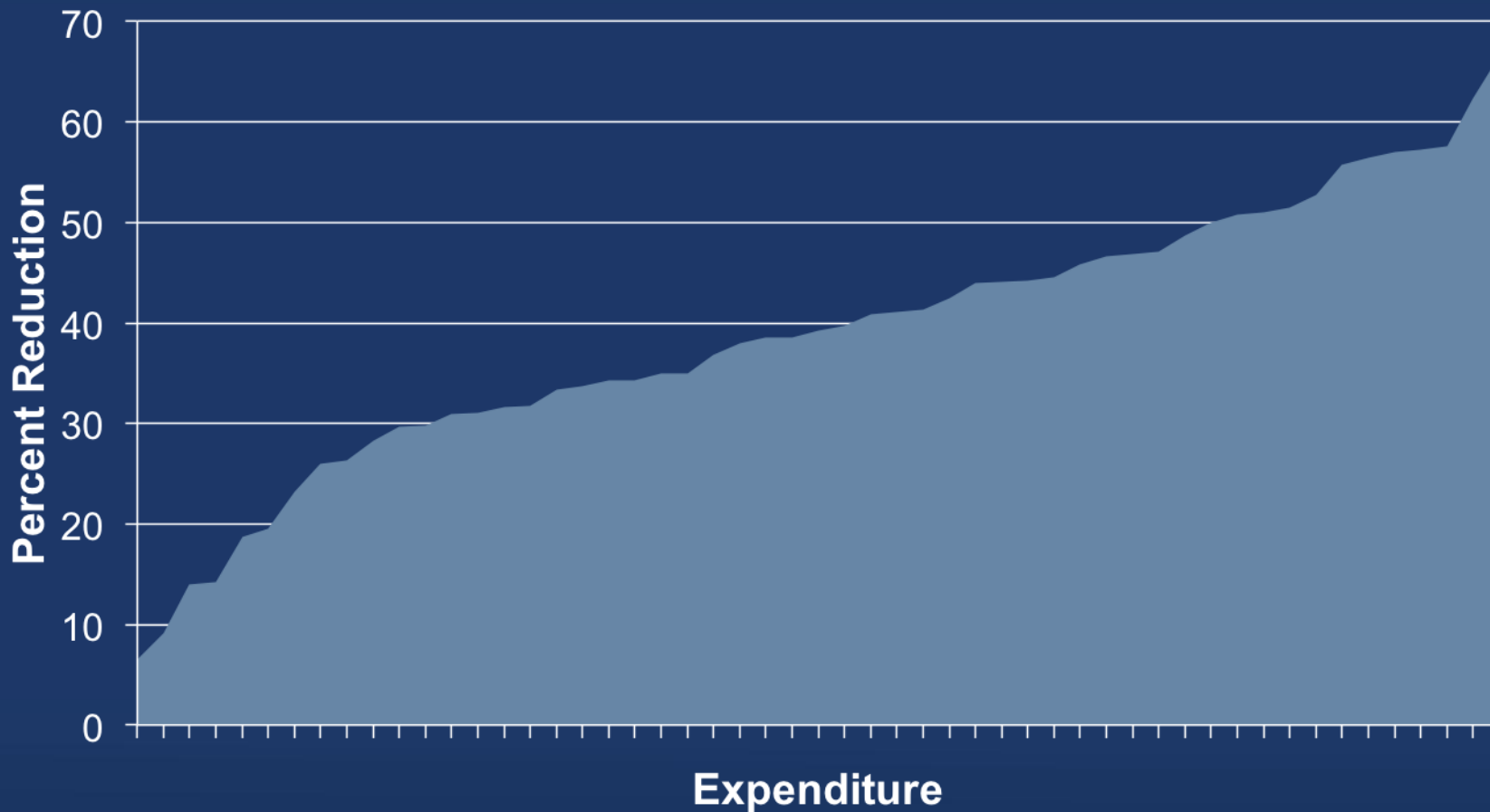
# Percent reduction in sampling variance for a 3 month reference period



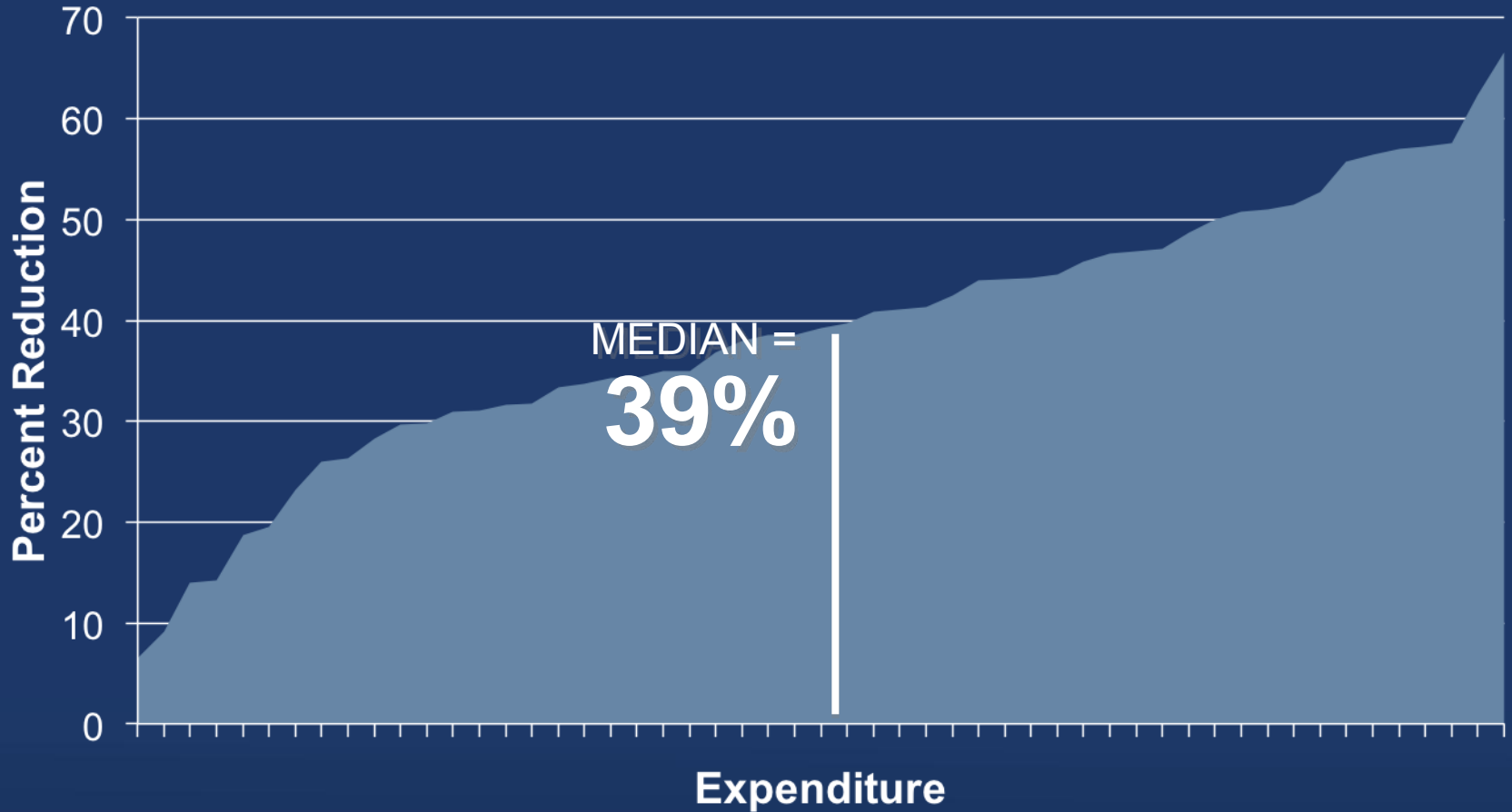
# Percent reduction in sampling variance for a 3 month reference period



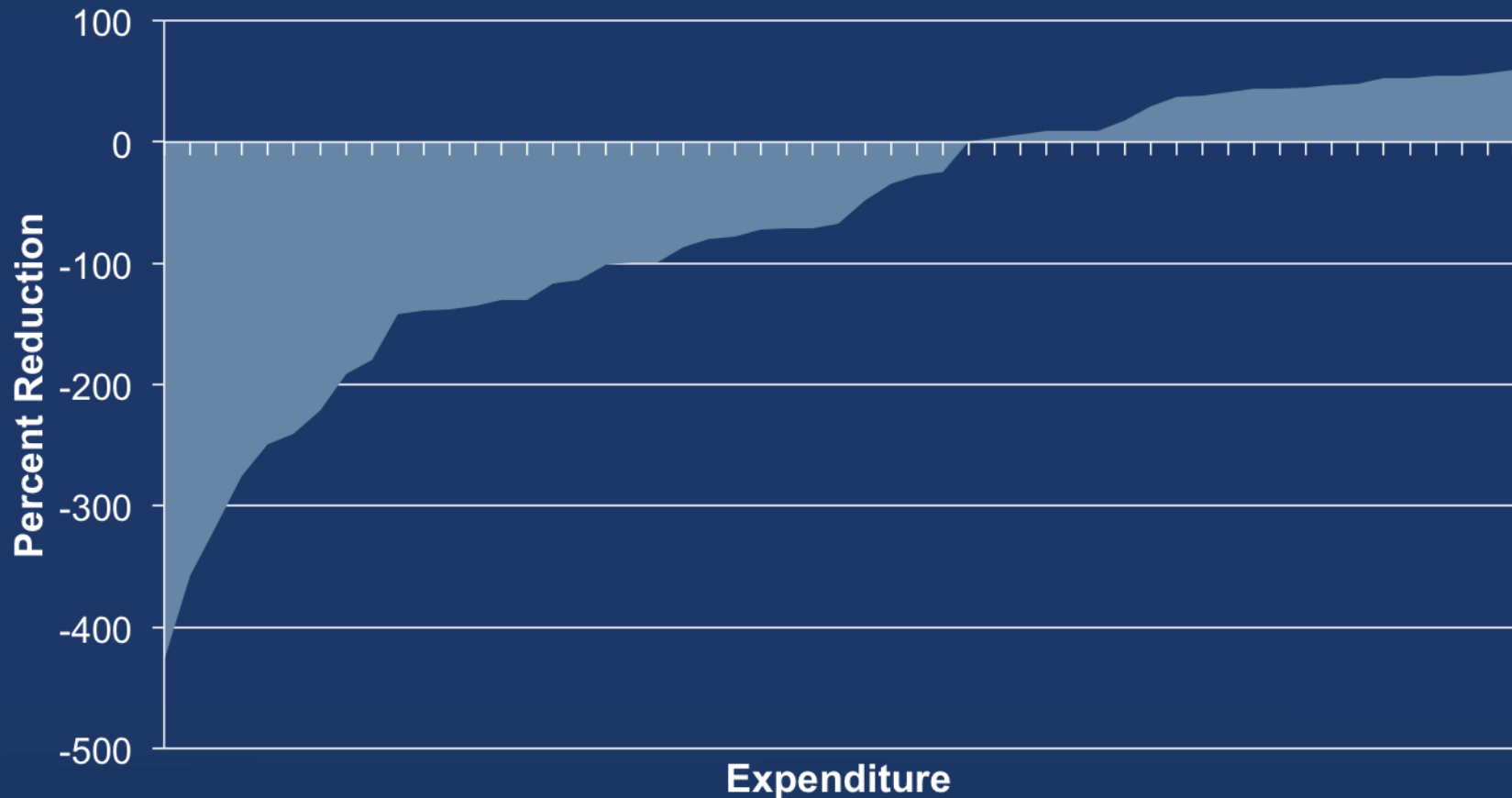
# Percent reduction in sampling variance for a 12 month reference period



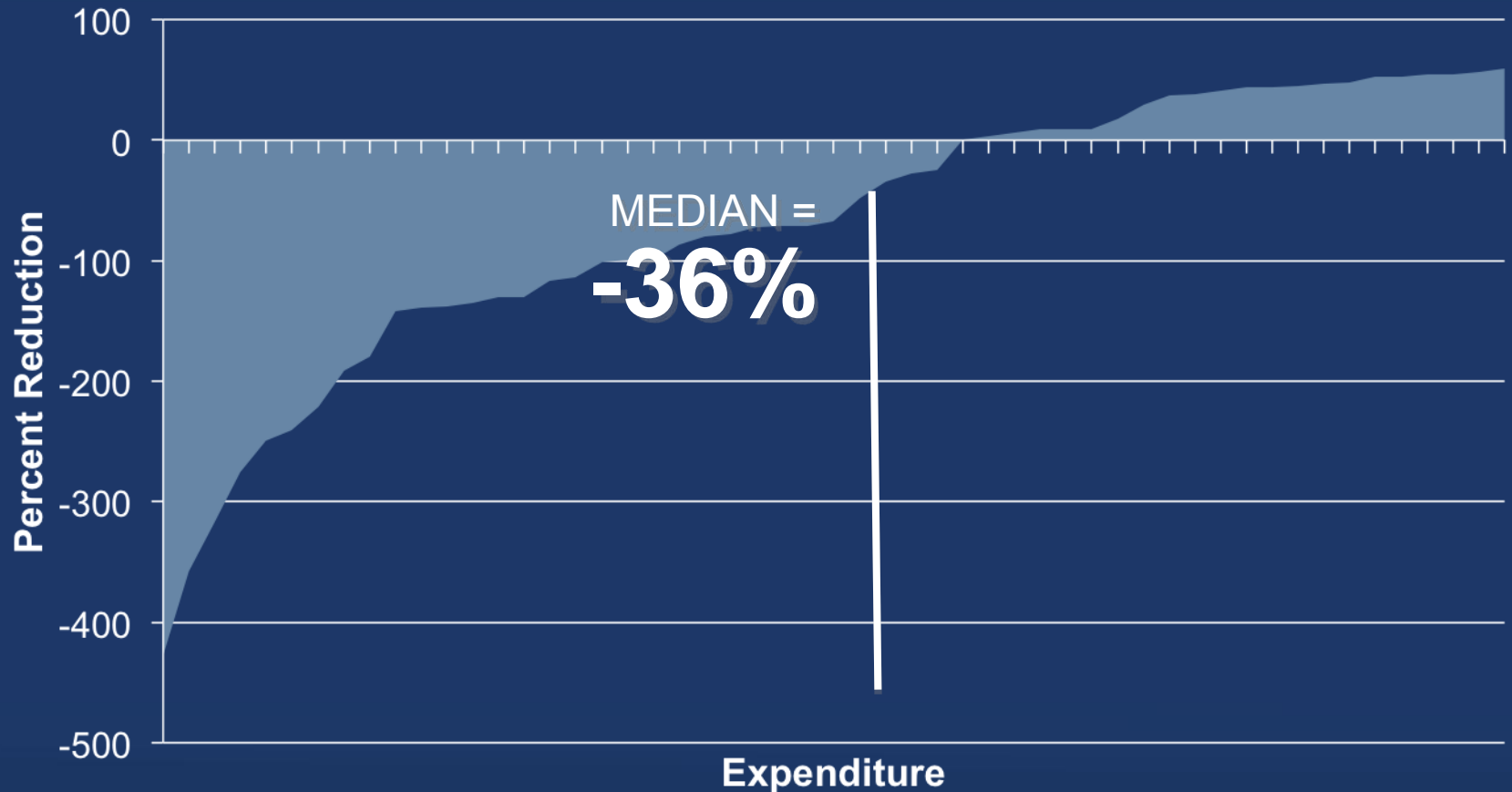
# Percent reduction in sampling variance for a 12 month reference period



# Percent reduction in sampling variance for a 1 month reference period



# Percent reduction in sampling variance for a 1 month reference period



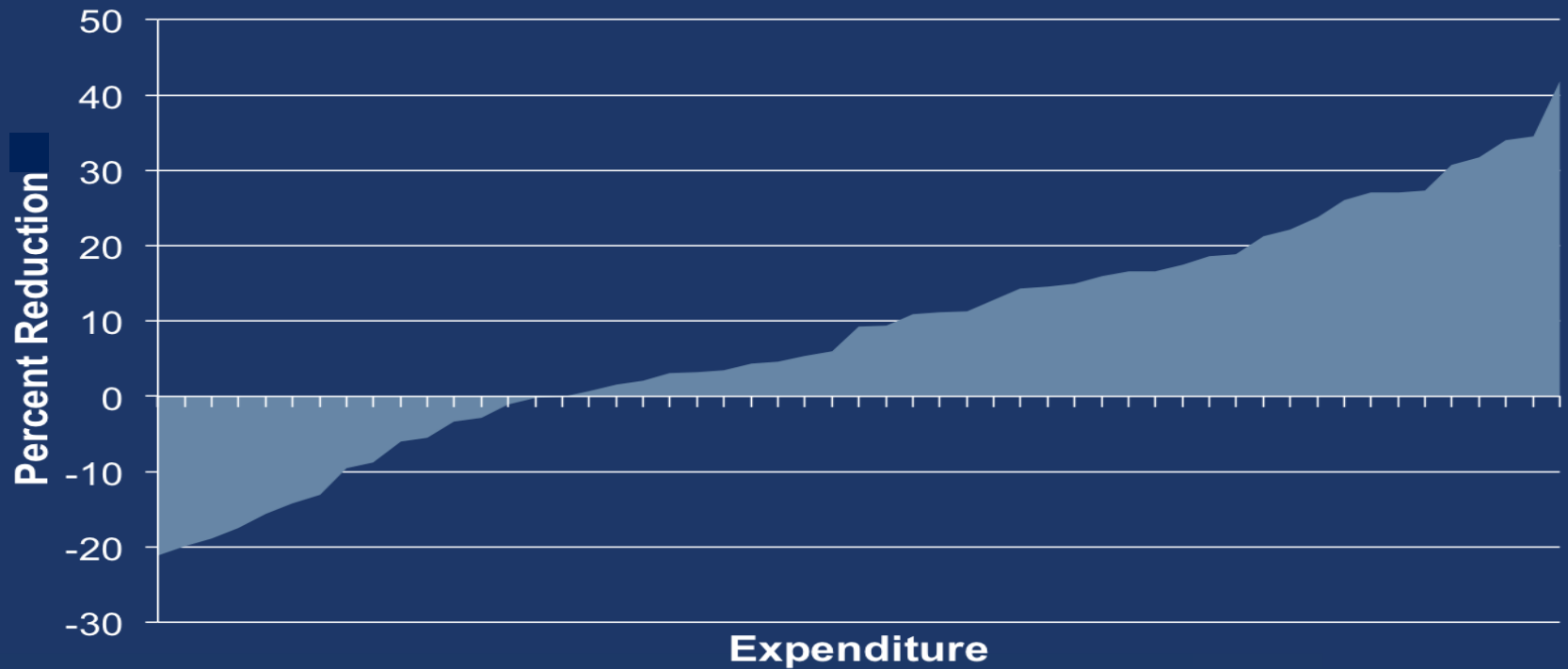


# Combining costs and precision



- The additional costs of the new design are partially offset by reductions in variance
- Cutting 4 waves to 2 waves increases costs by 40%
  - > A 20% reduction in sample achieves equal or better precision on the annual estimates for most expenditures
  - > Shifting to a 12-month reference period for some items would reduce variances further.
- The administrative record component adds to the cost

# Percent reduction in sampling variance with a 20% sample cut and a 3 month reference period



# Outline of presentation

---

Review of major issues

**Proposed redesign**

Diary

Quarterly Interview

Summary and discussion

Evaluation



# Methods to improve measurement & reduce burden



- Increase use of records
  - > Personal
  - > Administrative
- Reduce number of quarterly interviews
- Use of multiple diary keepers
- Enhanced recall interview
- Use of incentives

# Design is flexible



- Provides respondents with several different ways to report
  - > Need to make this a positive feature of the survey
  - > Avoid making it more complicated to respond
- Is adaptable as new technologies and consumption methods evolve
- If records become principal mode, permits two surveys to merge

Oh No! The cost is twice as much!!

# Additional costs of proposed design relative to current design



## Method to Reduce Burden and Measurement Error

	Diary	Interview	Total
Use of personal records	N	N	N
Administrative records	.8 M	10.2 M	11.0 M
Reduction in CE interviews	NA	7.6 M	7.6 M
Multiple diary keepers	2.4 M	NA	2.4 M
Enhanced recall interview	N	N	N
<b>Total</b>	<b>3.2 M</b>	<b>17.8 M</b>	<b>21.0 M</b>

N= not a significant cost factor

NA = not applicable

# But...



- New design can cut sample by at least 20% and maintain or exceed current precision
  - > Efficiencies with selective use of a 12 month reference period
- Modifications to administrative data collection are possible, e.g.
  - > Restrict to utility companies. This would reduce the cost from \$10 million to \$3 million
  - > Subsample retailers to fit resources



# Design priorities in managing costs



- First priority
  - > Personal records and technology
  - > Multiple diary keepers
  - > Incentive
- Second priority
  - > Administrative data collection
- Third priority
  - > New panel design

# Outline of presentation

---

Review of major issues

Proposed redesign

Diary

Quarterly Interview

Summary and discussion

**Evaluation**



# Administrative data



- Will retail, utility, mortgage companies provide data?
- What are the barriers?
- What procedures elicit cooperation?

# Outcome measures for evaluation



- Level of expenditures
- Match reported expenditures = administrative data
- Proportion of expenditures reported with records
- Cost of data collection
- Nonresponse
- Perceived level of burden, satisfaction
- Proportion of respondents requiring recall interview

# Diary survey field test



- Single respondent vs. multiple respondents
- Low incentive vs. high incentive
- Respondent chooses data collection method vs. interviewer chooses

# Quarterly Interview field test



- Single respondent vs. multiple respondents
- Low incentive vs. high incentive
- All 3-month reference period vs. 1, 3, or 12-month reference periods

*Thank you!*



David Cantor

DavidCantor@westat.com

Sid Schneider

SidSchneider@westat.com

Brad Edwards

BradEdwards@westat.com