

# Using Response Rates and Other Quality Metrics to Assess the Effects of the Multi-Mode Collection for Business Surveys: A Case Study

Katherine (Jenny) Thompson

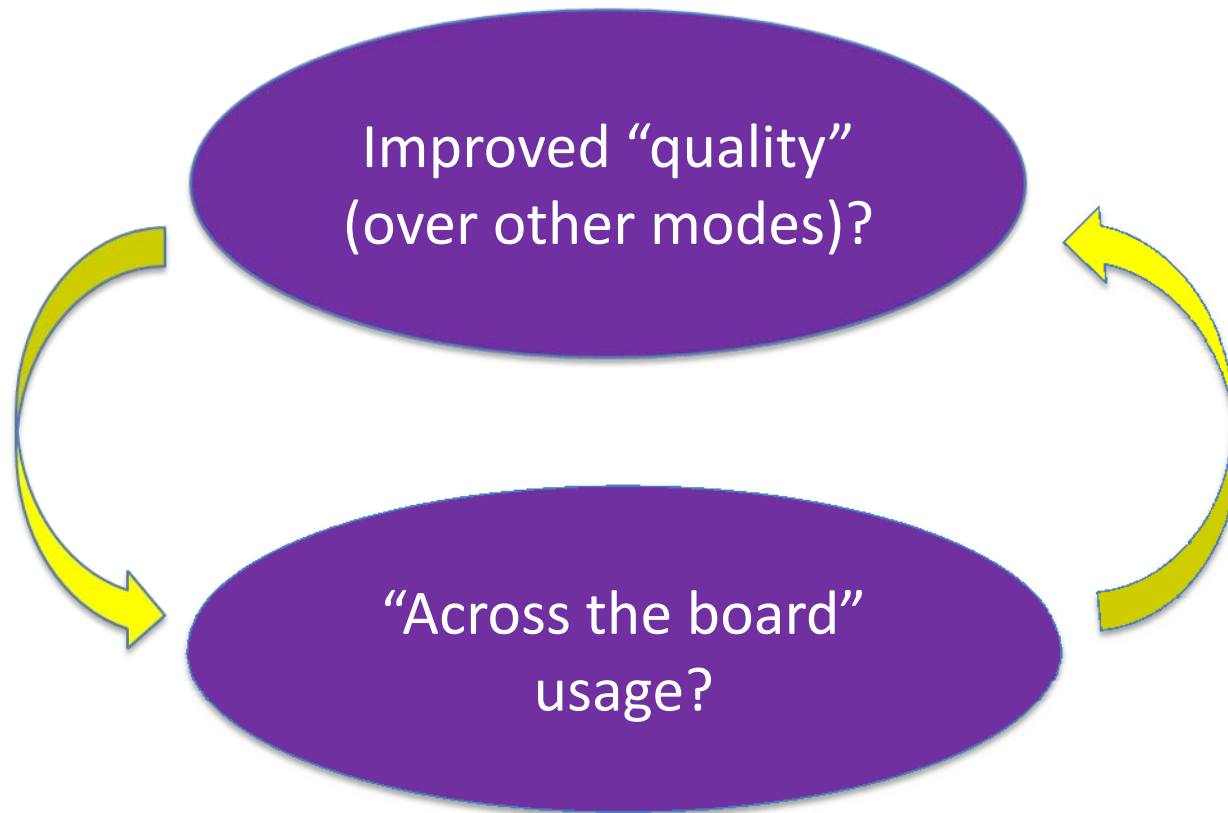
Broderick Oliver

Jennifer Beck

# Context

- Business Surveys conducted by the U.S. Census Bureau
- Multi-mode collection
  - Internet (Web), Mail, Fax, Telephone
  - Selection of mode made by respondent
- Increase Web collection (Strategic Plan)
  - Contact strategies “push” towards Web
  - Availability of paper form decreasing

# Web Collection Questions



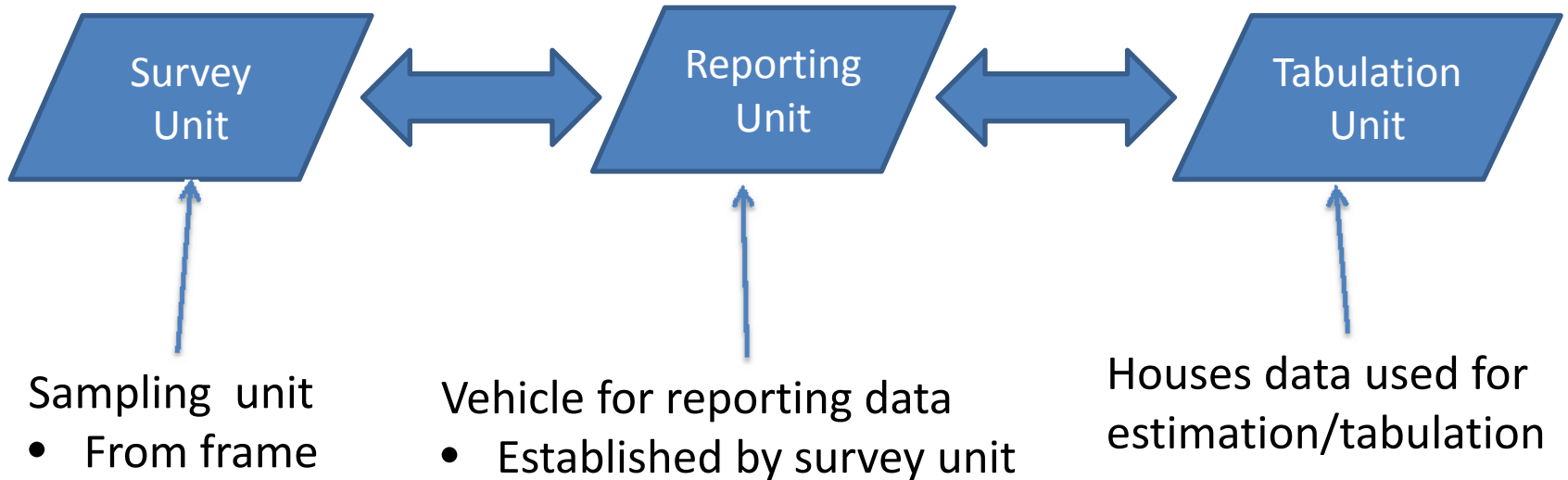
# Web Collection Questions

Improved “quality”  
(over other modes)?

Quality = Reporting Accuracy

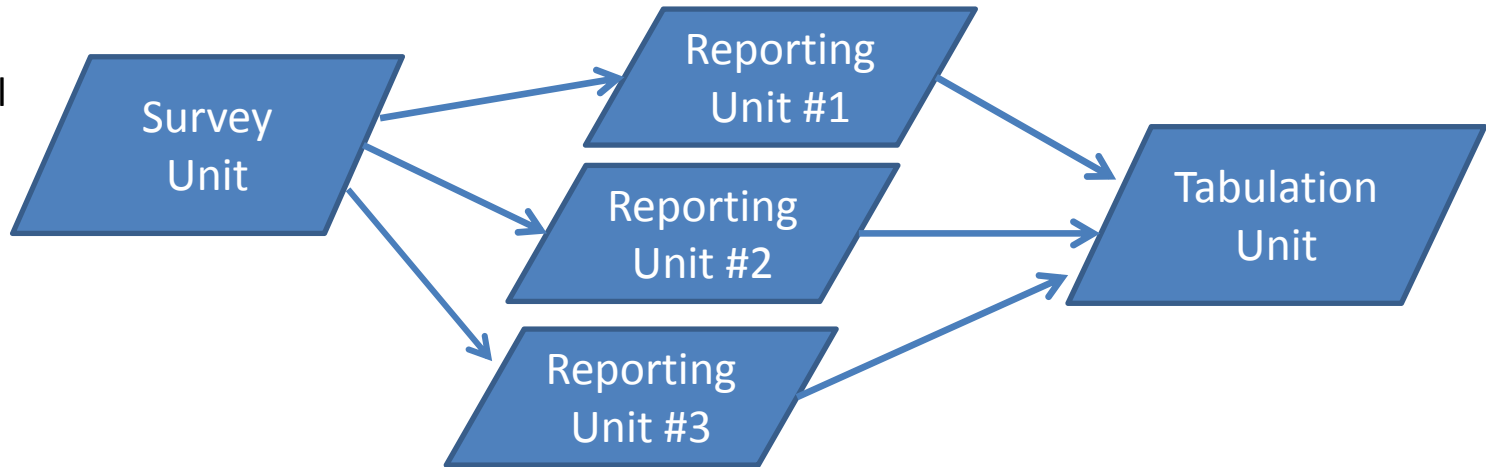
- Is collection mode eliciting accurate data?
- Measure “retained” reported data
  - After analyst review and machine editing
- Considerations
  - Auxiliary data availability (impact on analyst review)
  - Unit type

# Unit Type

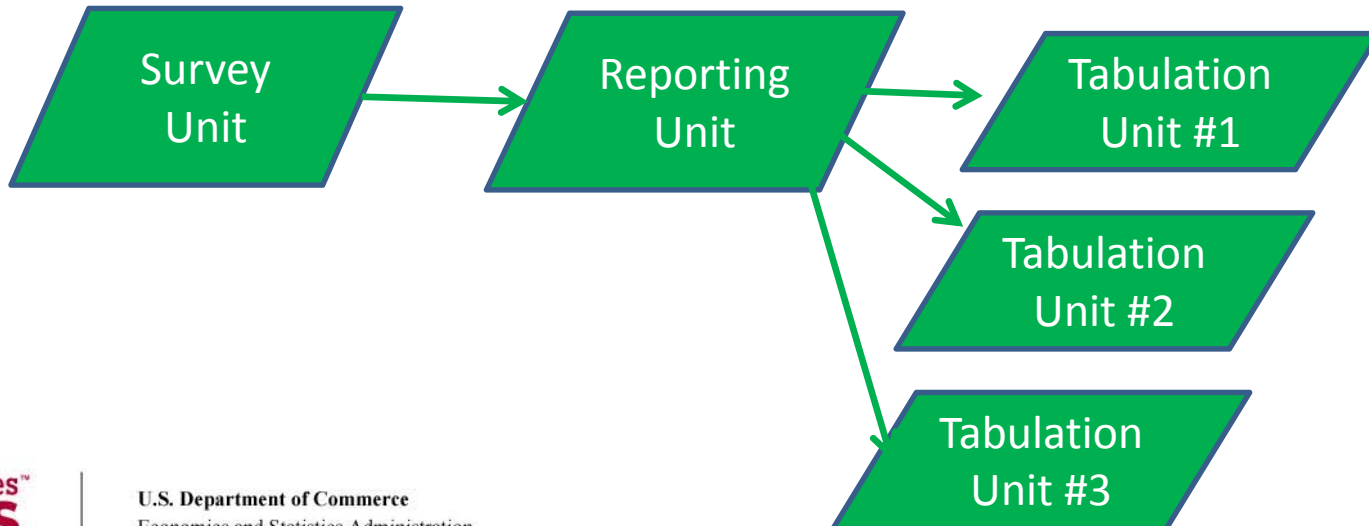


# Unit Type

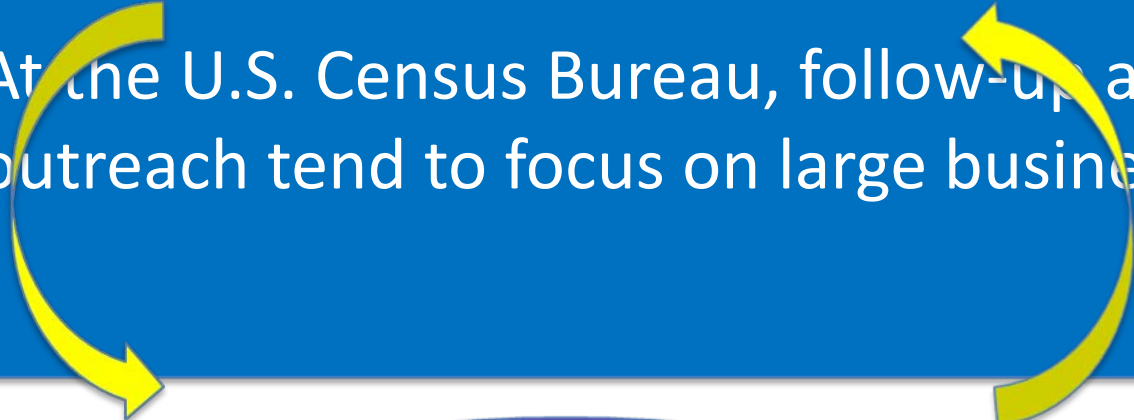
At statistical period  $t$



At statistical period  $t$



# Web Collection Questions

- Unit Size = “importance”
    - Skewed populations
    - Totals as key statistics
  - At the U.S. Census Bureau, follow-up and outreach tend to focus on large businesses
- 

“Across the board”  
usage?

# Multi-mode Collection

## Advantages

- “Provide access to different types of businesses”\*
- “Attract different types of respondents”
- “Elicit different responses”

\*Jäckle, Roberts, and Lynn 2010

## Disadvantages

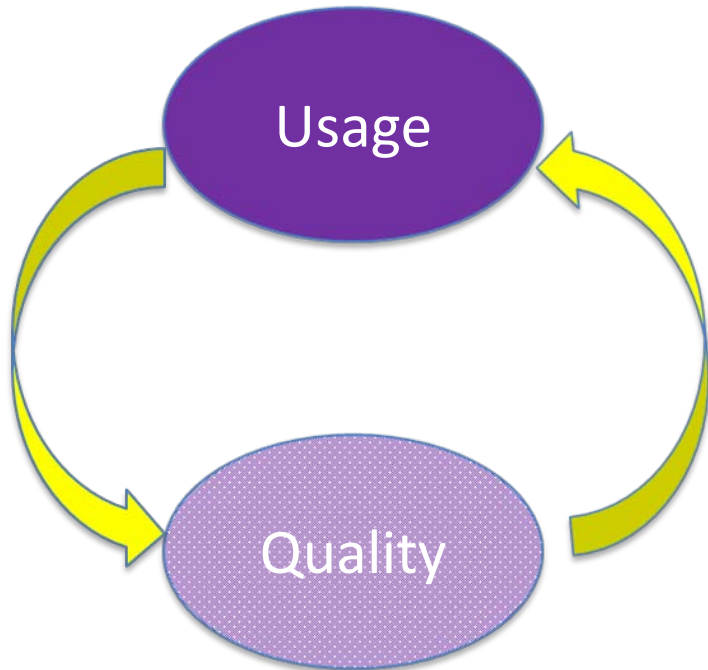
- Mode effects
- Differential review procedures
  - Web allows for self-validation
  - Other modes require post-collection data checks
- Need to develop several different (quality) instruments



# The Myth of “Paperless” Collection With Business Surveys

- Often used to preview all questions
- Paper version of form often used to gather information
  - Single contact for company/consolidated data entry
  - Different offices/persons may be responsible for different parts of form
- Record-keeping tool (printout and pdf)

# Metric 1: Unit Response Rate (URR)



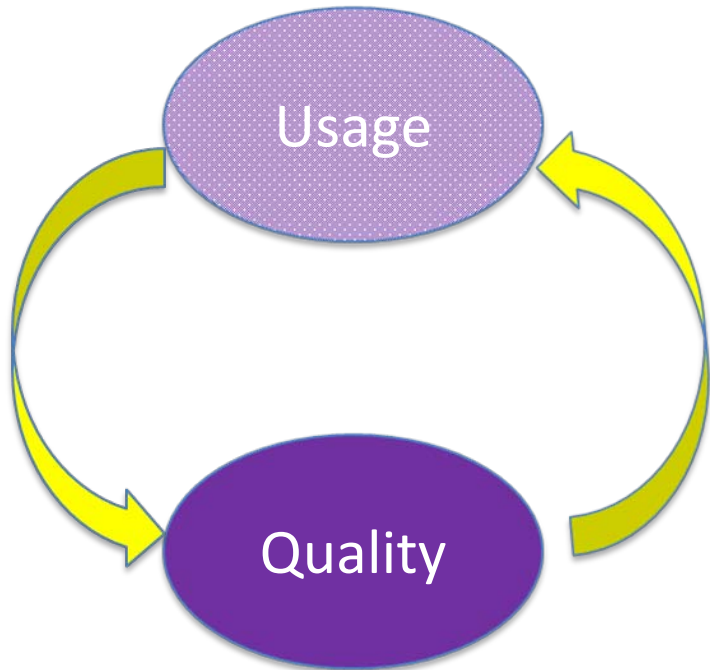
Unweighted proportion of responding units

- Reporting unit
- One rate per survey
- Can be computed by subdomain

*Would like to see:*

- Constant or increasing survey-level URR
- Increasing contribution to URR from **WEB** collection
- Increasing **WEB** URR for Large and Small Businesses

# Metric 2: Quantity Response Rate (QRR)



- Weighted proportion of an estimate obtained from directly reported data
  - Tabulation unit
  - One rate per **item**
  - Can be computed by subdomain

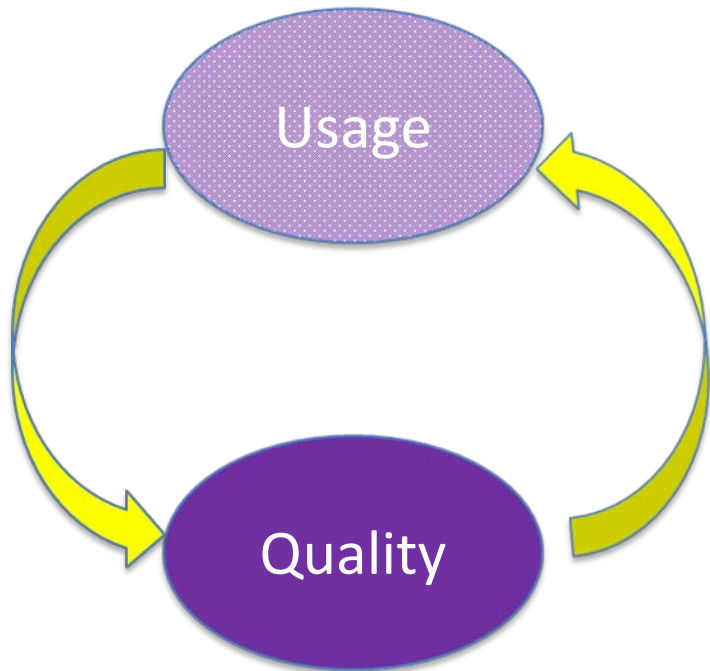
### *Would like to see:*

- Constant or increasing survey-level QRR (item)
- Increasing contribution to QRR from **WEB** collection
- Increasing **WEB** QRR for Large and Small Businesses

### *Would hope to see:*

- $QRR > URR$  for key item(s)
- Web QRR  $\rightarrow$  100%

# Metric 3: Source of Data Item (SDI)



- Unweighted proportion of responding units that retain reported data for an item
  - Tabulation unit
  - One rate per **item**
  - Can be computed by subdomain

A mode that solicits accurate data should have an SDI for all key items approaching 100%.

# Analysis Procedure

- Level
  - Survey level (URR and QRR)
  - Subdomain levels (URR, QRR, SDI)
    - Mode of Collection - Web, Mail, Fax, Other
    - Unit size - Certainty (Large) and Noncertainty (Not Large)
- Usage (Uptake), then Quality

# Case Studies

## Quarterly Services Survey (QSS)

- Company or EIN
- Stratified SRS-WOR design
  - New sample selected every five years
- One key variable (revenue)
  - Few reported zeros
  - Available administrative data
- Simple questionnaire

## Annual Capital Expenditures Survey (ACES)

- Company
- Stratified SRS-WOR design
  - New sample selected annually
- Nine key variables (capital expenditures)
  - Legitimate reported zeros (especially small businesses)
  - No administrative data
- Complex questionnaire

# QSS Form

## 5 SALES, RECEIPTS, OR REVENUE

### **Include:**

- Receipts from guest rooms or unit rentals for all establishments owned by this firm
- Receipts from rentals of public rooms such as ballrooms, conference rooms, etc.
- Sales of meals, alcoholic beverages, and other merchandise
- Sales of gaming operations
- Site rental and equipment usage fees
- Receipts from valet, laundry, parking, and other guest services provided by this firm
- For casino hotels, report sales net of promotional allowances
- Credit and cash net sales of merchandise
- Franchise or royalty fees
- Management fees
- Cost reimbursables from managed hotels

### **Exclude:**

- Revenue from casinos without accommodations
- Revenue from timeshares or vacation ownership
- Occupancy taxes
- Carrying or other finance charges
- Commissions (such as vending machine operators, government lottery tickets, or other stores)
- Non-operating receipts (such as interest income, income from investments, and receipts from the rental or sale of real estate)
- Sales made by departments and concessions operated by other firms in this firm's accommodation establishment(s)

### **Deduct:**

- The actual value of rebates and discounts granted to the purchaser, even if granted as an increase in trade-in allowances

\$ Bil.	Mil.	Thou.	Dol.

A. What was this firm's total revenue

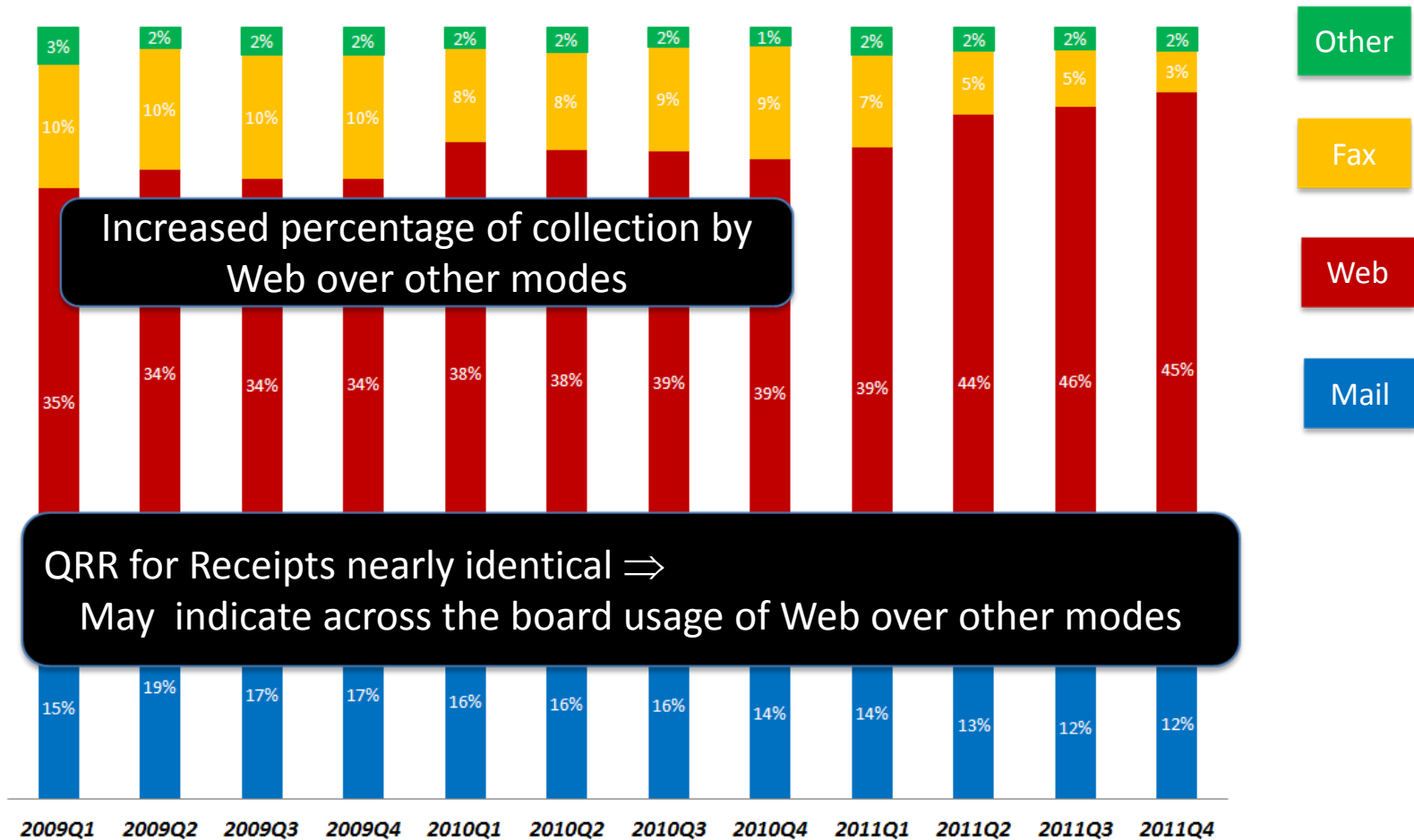




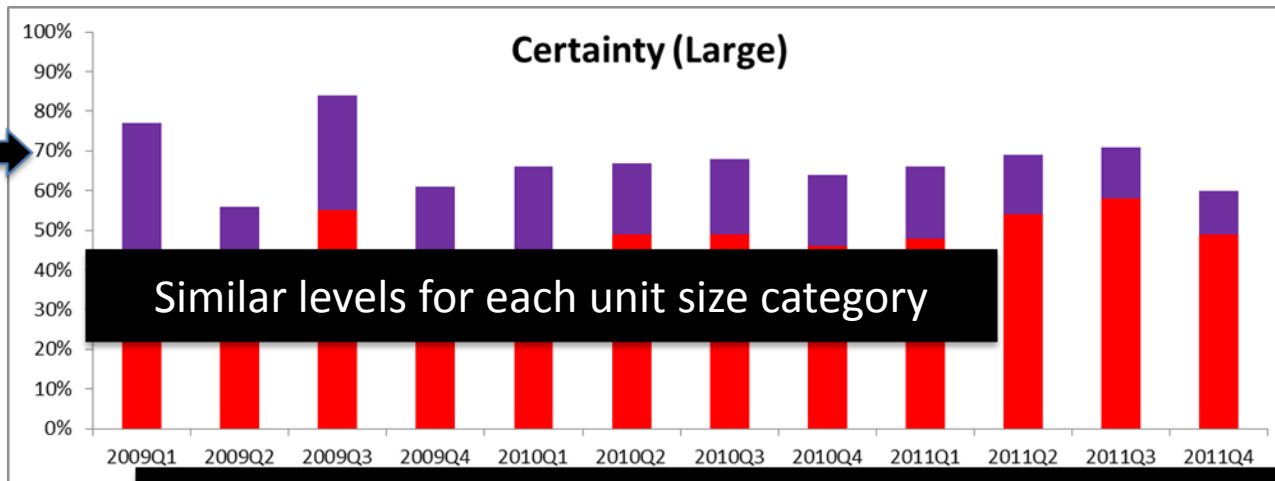
# 1<sup>st</sup> Study Question

- Is Web collection increasing?
- If yes,
  - Is it an across-the-board phenomenon or
  - Is it confined to the larger businesses?
- Metrics studied
  - URR
  - QRR

# QSS Unit Response Rates



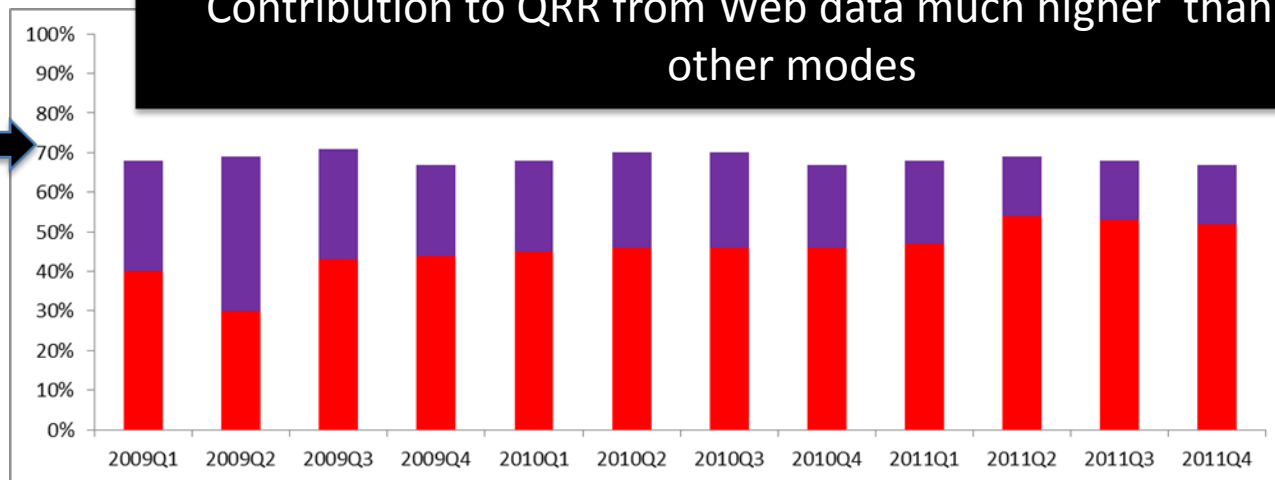
# QSS QRR Revenue By Unit Size and Collection Mode



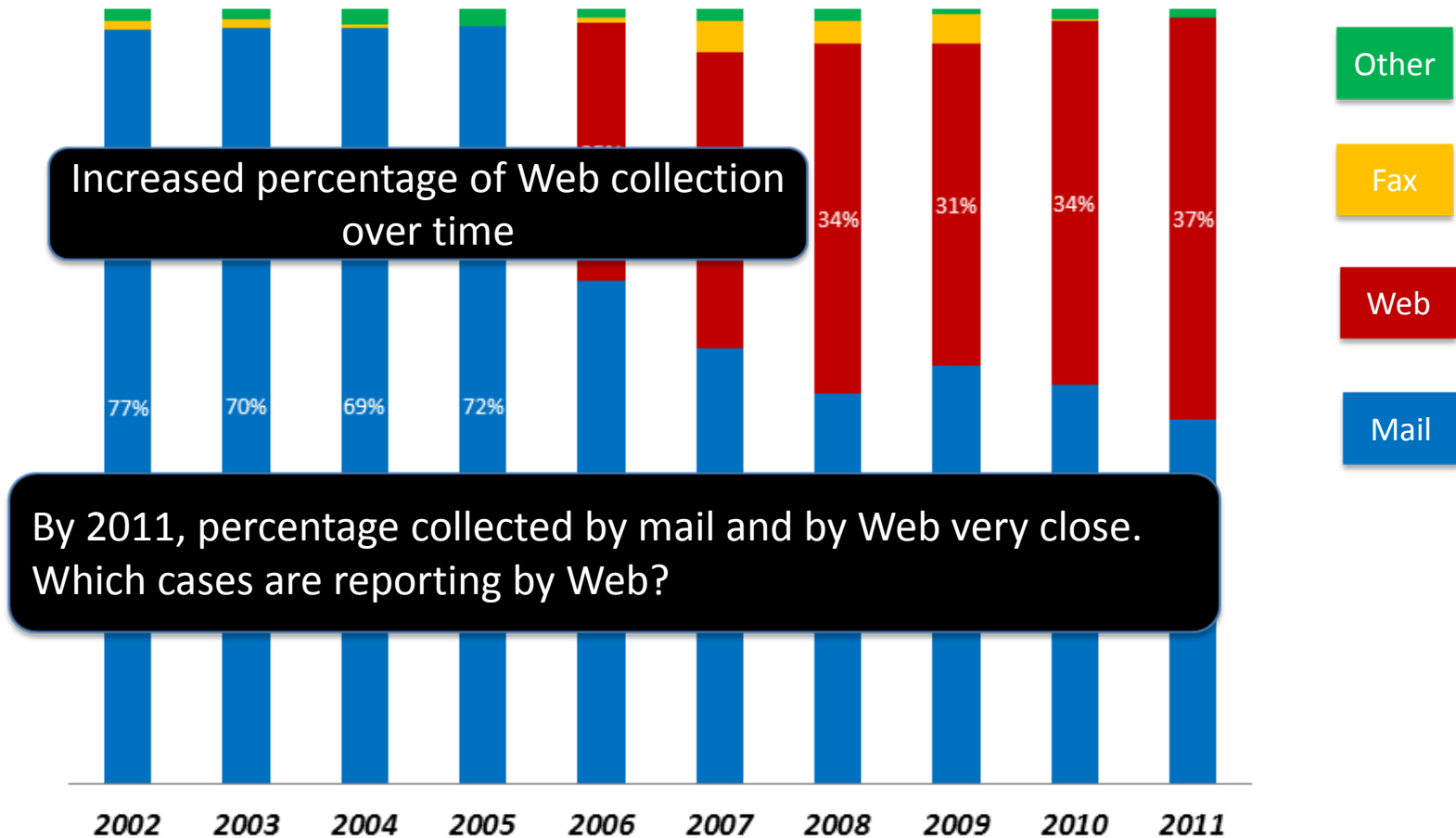
Web

Not Web

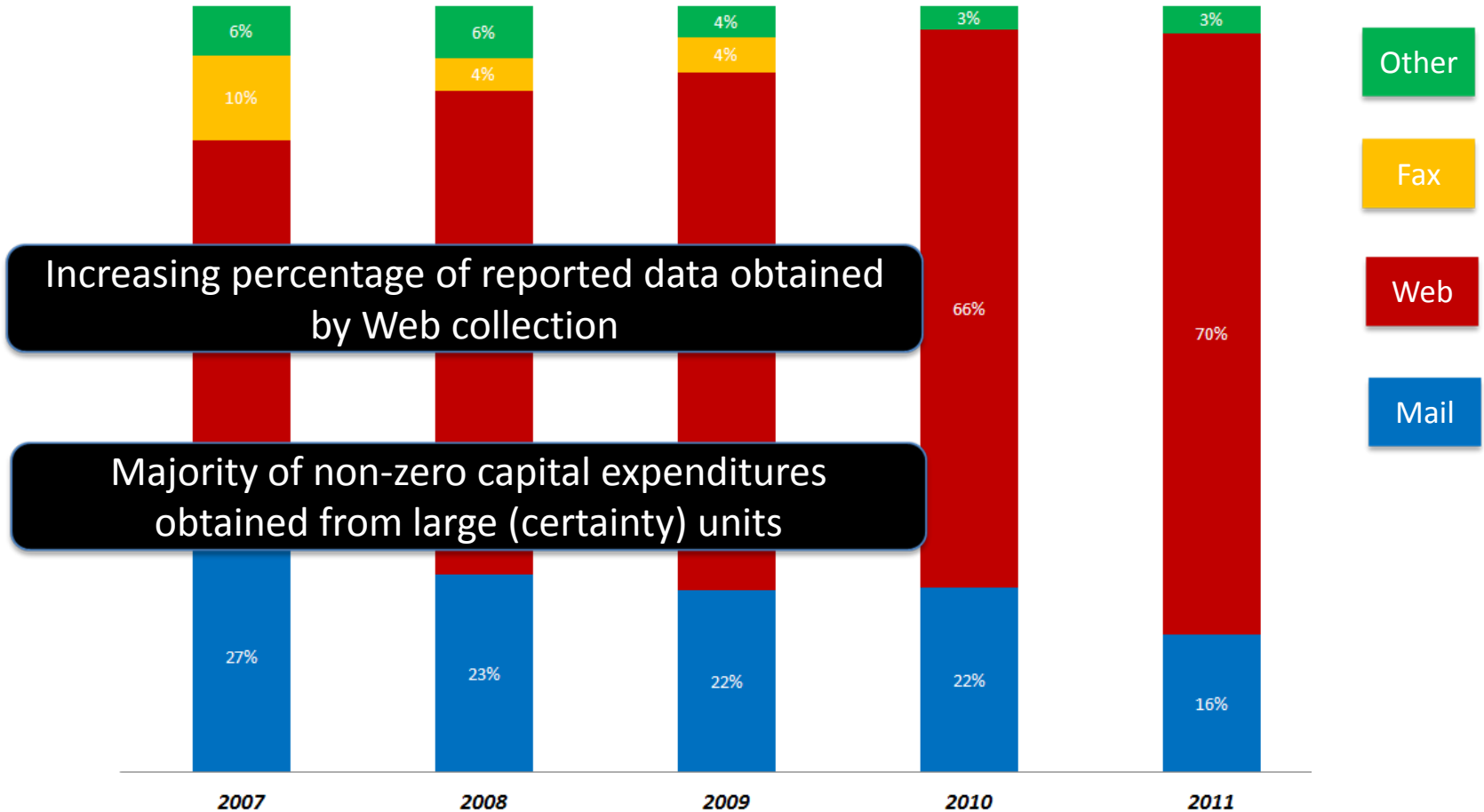
Contribution to QRR from Web data much higher than from other modes



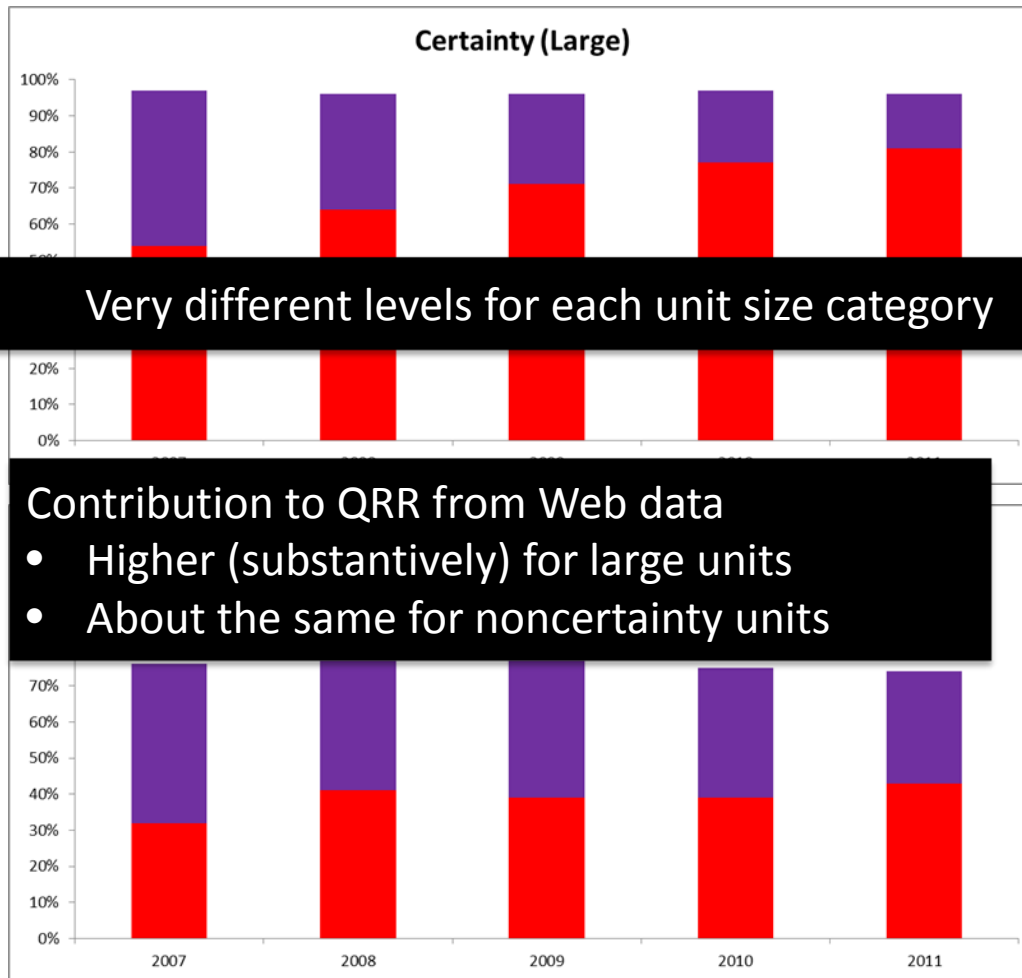
# ACES Unit Response Rates



# ACES QRR (Total Capital Expenditures)



# ACES QRR Total Capital Expenditures By Unit Size and Collection Mode



Very different levels for each unit size category

Contribution to QRR from Web data

- Higher (substantively) for large units
- About the same for noncertainty units

Web

Not Web

# 2<sup>nd</sup> Study Question

- Are there differences in data quality by mode of data collection?
- Are there interactions between unit size and mode of data collection in terms of quality?
- Metric used: SDI

# QSS SDI for Revenue

## Certainty

100%

### 5 SALES, RECEIPTS, OR REVENUE

#### Include:

- Receipts from guest rooms or unit rentals for all establishments owned by this firm
- Receipts from rentals of public rooms such as ballrooms, conference rooms, etc.
- Sales of meals, alcoholic beverages, and other merchandise
- Sales of gaming operations
- Site rental and equipment usage fees
- Receipts from valet, laundry, parking, and other guest services provided by this firm
- For casino hotels, report sales net of promotional allowances
- Credit and cash net sales of merchandise
- Franchise or royalty fees
- Management fees
- Cost reimbursables from managed hotels

#### Exclude:

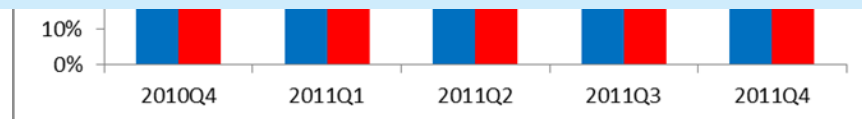
- Revenue from casinos without accommodations
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- Commissions (such as vending machine operators, government lottery tickets, or other stores)
- Non-operating receipts (such as interest income, income from investments, and receipts from the rental or sale of real estate)
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#### Deduct:

- The actual value of rebates and discounts granted to the purchaser, even if granted as an increase in trade-in allowances

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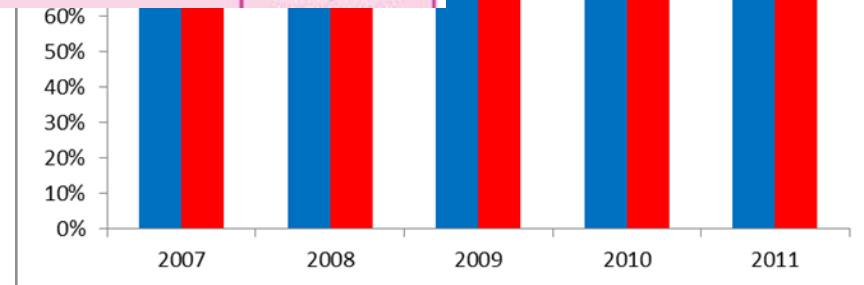
# ACES SDI for Total Capital Expenditures

Certainty

retained with collection

ITEM 2 CAPITAL EXPENDITURES													BL	ML	Thou.
Report the following domestic capital expenditures data for the entire company. (Refer to page 4 of instructions)													Example: if figure is \$1,179,125,020.00 report →		
													1	179	126
Row	CAPITAL EXPENDITURES (Refer to Page 2 of instructions)	Structures (1)			Equipment (2)			Other (Describe in Item 3) (3)			Total (Add columns 1+2+3) (4)				
		BL	ML	Thou.	BL	ML	Thou.	BL	ML	Thou.	BL	ML	Thou.		
20	Capital expenditures for NEW structures and equipment (Include major additions, replacements, and capitalized repairs to existing structures)														
21	Capital expenditures for USED structures and equipment														
22	<b>TOTAL capital expenditures</b> (Add Rows 20+ 21)														
											Total should equal Item 1A, Row 11				

ertainty



# Discussion

- Three simple metrics
  - Examined consistency (URR)
  - Provided insights into accuracy (QRR and SDI)
- Found differences in (voluntary) uptake
  - Across-the-board usage for QSS
  - Primarily confined to large businesses for ACES

# Discussion

- Identified interaction between mode and difficulty of questionnaire
  - Simple – minimal differences in quality by mode
  - Complex – higher proportion of retained reported data with Web collection

# Missed Opportunity?

- Demonstrated
  - Web collection in these survey yields quality data
  - Uptake of Web is not necessarily equally used voluntarily
- Contention
  - The collection instrument that *minimizes* the probability of response error for all units *maximizes* a major component of quality
- Need to learn **how** to bridge the gap in uptake

# Thank you!

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