What Can Web Paradata Tell Us About 2012 Economic Census Business Reporting?

Elizabeth M. Hoeffel
Joanna Fane Lineback
Gianna Dusch

November 5, 2013

2013 Federal Committee on Statistical Methodology Research Conference
Outline

• Paradata Overview
• Economic Census Background
• Analysis
• Instrument Navigation
• Results
• Future Research
Paradata Overview

• “Paradata” refers to the process information that comes as by-product of data collection (Couper 1998)

• Some business survey paradata uses:
  – Examine respondent behavior
  – Analyze instrument performance
  – Investigate data quality

• Existing Census electronic paradata research:
  – American Community Survey
  – Government surveys
Economic Census Background

• **Purpose:** Official measure of American business and economy; key source data for the Gross Domestic Product (GDP) and other indicators of economic performance
• **Frequency:** Every 5 years ending in ‘2’ and ‘7’
• **Covers:** Approximately 4 million non-farm business establishments with paid employees
• **Modes:** Paper (all), software (multi-location companies), online (single-location companies)
• **Content:** Operational status, employment, payroll, receipts/revenue, detail of receipts/revenue, e-commerce activity, class of customer, inventories, selected expenses, detailed cost of materials, etc.
Analysis

• Research is exploratory in nature.
• Data from Centurion logins as of 7/28/13
• Covers 783,492 single-establishment businesses
• Number and type of forms vary
• Data still being collected
• Examined:
  – Frequency of user actions
  – Timing between events
  – Software usage
Main Menu

Please complete all forms listed below. You will have an opportunity to review your responses at the end of each form.

Company Address
ECON SINGLE

4700 SILVER HILL ROAD
SUITLAND, MD 207640000

- Below are your forms for the 2012 Economic Census. You will be able to submit your data to the Census Bureau once all your forms are completed without errors.
- Note: You can only submit your data once a day.

<table>
<thead>
<tr>
<th>Action</th>
<th>Status</th>
<th>Form</th>
<th>OMB</th>
<th>Due Date</th>
<th>Problem Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start</td>
<td>Not Started</td>
<td>MC-31106(L): Confectionery</td>
<td>No.: 0607-0938 Expiration: 12/31/2013</td>
<td>Feb. 12, 2013</td>
<td>0 With Errors 0 With Warnings</td>
</tr>
<tr>
<td>Start</td>
<td>Not Started</td>
<td>MC-99530: Ownership or Control</td>
<td>No.: 0607-0938 Expiration: 2013-12-31</td>
<td>Feb. 12, 2013</td>
<td>0 With Errors 0 With Warnings</td>
</tr>
</tbody>
</table>
### Review Screen

![Review Screen](image)

#### Item List
- **Mailing Address**: Errors/Warnings: Ok
- Reporting Unit Definition: Ok
- Item 1 - Employer Identification Number: Ok
- Item 2 - Physical Location: Ok
- Item 3 - Operational Status: Errors
- Item 4 - Months in Operation: Ok
- Item 5 - Sales, Shipments, Receipts, or Revenue: Errors
- Item 6 - E-Shipments: Ok
- Item 7 - Employment and Payroll: Errors
- Item 9 - Value of Inventories: Ok
- Item 10 - Inventories by Valuation Method: Ok
- Item 13 - Assets, Capital Expenditures, Retirements, and Depreciation: Ok
- Item 14 - Rental Payments: Ok
- Item 16 - Selected Expenses: Ok
- Item 17 - Detailed Cost of Materials, Parts, and Supplies: Ok
- Item 19 - Type of Operation: Ok
- Item 22 - Detail of Sales, Shipments, Receipts, or Revenue: Ok
- Item 26 - Receipts from Contract Manufacturing: Ok
- Item 30 - Remarks: Ok

[Main Menu]
Main Menu - 2nd Visit

2012 Economic Census

The foundation for measuring business activity across the U.S. economy

Main Menu

Please complete all forms listed below. You will have an opportunity to review your responses at the end of each form.

Company Address
ECON SINGLE

4700 SILVER HILL ROAD
SUITLEND, MD 207640000

- Below are your forms for the 2012 Economic Census. You will be able to submit your data to the Census Bureau once all your forms are completed without errors.
- Note: You can only submit your data once a day.

Start
Main Menu – 3rd Visit

2012 Economic Census
The foundation for measuring business activity across the U.S. economy

Main Menu
Please complete all forms listed below. You will have an opportunity to review your responses at the end of each form.

Company Address
ECON SINGLE

4700 SILVER HILL ROAD
SUITLAND, MD 207640000

- Below are your forms for the 2012 Economic Census. You will be able to submit your data to the Census Bureau once all your forms are completed without errors.
- Note: You can only submit your data once a day

Submit Forms

<table>
<thead>
<tr>
<th>Action</th>
<th>Status</th>
<th>Form</th>
<th>OMB</th>
<th>Due Date</th>
<th>Problem Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review</td>
<td>Completed</td>
<td>NC-31106(L): Confectionery</td>
<td></td>
<td>Feb. 12, 2013</td>
<td>0 With Errors 0 With Warnings</td>
</tr>
<tr>
<td>Review</td>
<td>Completed</td>
<td>NC-99530: Ownership or Control</td>
<td></td>
<td>Feb. 12, 2013</td>
<td>0 With Errors 0 With Warnings</td>
</tr>
</tbody>
</table>
Completing a Questionnaire: Minimum Steps

- Log-in successfully
- Visit the main menu
- Click the start button
- Visit the review screen
- Return to the main menu screen
- Submit the data
User Actions

• Log-in success
• Main menu visited
• Clicked on the start, resume, or review button
• Review screen visited
• Clicked on a link to a question from the review screen
• Submission
• Log-out
Logged In

Number of Times Visited (n=738,492)

- 1: 78%
- 2: 15%
- 3: 4%
- 4+ (4 or more): 3%
Start Button

Number of Times Visited
(n=738,492)

- 0: 1%
- 1: 29%
- 2: 64%
- 3+: 7%
Resume Button

Number of Times Visited
(n=738,492)

- 0: 80%
- 1: 14%
- 2+: 6%
Review Button Screen
Review Button Data

Number of Times Visited
(n=738,492)

- 80% visited 0 times
- 13% visited 1 time
- 7% visited 2+ times
Review Screen
Review Screen

Number of Times Visited (n=738,492)

- 0: 6%
- 1: 21%
- 2: 48%
- 3+: 26%
Submit Button

Number of Times Visited
(n=738,492)

0 1 2+

0% 12% 87% 1%

United States Census Bureau
Economics and Statistics Administration
U.S. CENSUS BUREAU
Logout Button

Number of Times Visited

- 0: 47%
- 1: 46%
- 2: 5%
- 3+: 2%

(n=738,492)
# Median Time: First to Last Action

<table>
<thead>
<tr>
<th>Number of Forms Started</th>
<th>Submitted (n=646,976)</th>
<th>Unsubmitted (n=85,910)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall* (n=738,492)</td>
<td>19’12”</td>
<td>10’37”</td>
</tr>
<tr>
<td>1 Form (n=214,569)</td>
<td>6’25”</td>
<td>5’17”</td>
</tr>
<tr>
<td>2 Forms (n=476,576)</td>
<td>25’07”</td>
<td>21’16”</td>
</tr>
<tr>
<td>3 Forms (n=41,741)</td>
<td>32’18”</td>
<td>41’16”</td>
</tr>
</tbody>
</table>

*Includes users that did not start any forms.
Operating System, Browser, and Device Used

- Operating System
- Browser
- Device

Windows
Mac OS X
iOS
Other OS
Internet Explorer
Chrome
Firefox
Safari
AOL Browser
Mobile Safari
Other Browser
Computer
Other Mobile
Smartphone
Other Device

Operating System Used

Browser Used

Device Used
Discussion

• Examined server-side paradata from the 2012 Economic Census Centurion software
• Paradata available for all users who successfully logged into the instrument
• Only covers single-establishment businesses
• Macro look at:
  – Frequency of user actions
  – Timing between events
  – Software and hardware usage counts
Discussion cont’d

• Almost 12% of users who logged in never submitted a form
• Half of users who logged into system never logged out
• The fewer number of forms, the less time a user spent in the system
• Users overwhelmingly use Windows, Internet Explorer, and desktop computers.
Future Research

• Integrate work from qualitative research
  – Investigate cases that did not submit
  – Errors and warnings
• Further research into software/hardware
• Incorporate additional auxiliary information
• Use client-side paradata to assist with questionnaire design
Contact Information

• elizabeth.hoeffel@census.gov