



PILOT STUDY DATA REPORT 13-084

**National Survey of Business Competitiveness
(Pilot Study)**

April 2014

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Prepared for

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PILOT STUDY: NATIONAL SURVEY OF BUSINESS COMPETITIVENESS

APRIL 2014

ERSR10

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|--------------------------------|--|
| Title: | Pilot Study: National Survey of Business Competitiveness (ERSR10) |
| Objectives: | The main purpose of this pilot study is required to obtain specific information that will allow SESRC to evaluate and modify (if necessary) the study design for the REIS main study. The results/findings of the pilot study (e.g. evaluating cost, incentive use, and contact sequence) will be primarily used for informing any proposed changes in the main study. |
| Abstract: | <i>USDA's Economic Research Service</i> sponsored a survey of US businesses to examine the challenges firms are facing in today's economy. SESRC sent postal letters describing the study and invited 5,210 respondents to complete a mail questionnaire, an internet based questionnaire, or a telephone interview. |
| Method: | Using a Tailored Design Method survey protocol, a mixed mode (telephone, mail and web) survey was implemented. The sample was divided into 5 different groups with different experiments on the contact/token incentive sequence. Each group had different contact methods at different phases. |
| Results: | 623 respondents completed the mail survey, 729 respondents completed or partially completed the web survey, 16 respondents completed the short web survey, and 119 respondents completed or partially completed the telephone interview, yielding a response rate of 28.4%. Group 3 (Web First), started with a prior letter and a \$2 incentive, followed by a mail questionnaire with a \$2 incentive and a replacement questionnaire and followed by telephone reminders, had the highest response rate out of the 5 experimental groups. |
| Timeframe: | November 2013 through February 17 th , 2014 |
| Sponsor: | Timothy Wojan Resource and Rural Economics Division Economic Research Service, USDA 355 E Street SW Washington, DC 20024 (202) 694-5419 twojan@ers.usda.gov |
| Principal Investigator: | Danna L. Moore, Ph.D. |
| Study Directors: | Yi Jen Wang, M.A. and Kent Miller, M.A |
| Data Manager: | Dan Vakoch, M.S. |
| SESRC Acronym: | ERSR10 |
| Data Report Number: | 13-084 |
| WSU IRB Number: | 12680 |
| Deliverables: | Data Report, SAS Frequency listing, CATI script, paper questionnaire, and a copy of the web survey screenshots. |

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I. SURVEY ADMINISTRATION AND DESIGN

Background and Objectives

The Social and Economic Sciences Research Center (SESRC) at Washington State University (WSU) collaborated with the USDA's Economic Research Service (ERS) to conduct a mixed mode survey of business establishments to examine the challenges business firms face in today's economy. The study consists of two phases. The first phase is a mixed survey mode pilot study with about 5,300 establishment respondents. The goal of the pilot is to evaluate the mixed mode survey implementation practices in order to determine and select the most effective survey mode sequence and use of token incentive combinations to maximize response rates within the budgeted resources for the full study. The second phase is the full study phase and is scheduled to start in spring, 2014.

The main purposes of the pilot are (1) to evaluate the mixed mode survey implementation practices in order to determine and select the most effective survey mode sequence and use of token incentive combinations to maximize response rates within the budgeted resources for the main study; and (2) to inform any proposed changes in the main study based on results of the pilot study.

Information was collected over a 12 week period from November 2013 to February 2014. The findings will contribute to a better understanding of how increasing international competition and the increasing knowledge of economic activity in the U.S. are affecting the economic vitality of rural areas and the conditions associated with businesses making effective adjustment to these pressures.

This report describes the final results of the pilot study.

Population and Sample

The population for the pilot study was business establishments with more than five employees in the tradable industries defined as mining, manufacturing, wholesale trade, transportation and warehousing, information, finance and insurance, professional/scientific/technical services, arts, and management of businesses. While the focus of the survey was on establishments in nonmetropolitan (rural) counties,

Section I. Survey Administration and Design

establishments from metropolitan counties were also sampled in adequate numbers to allow for comparative analysis. Businesses were selected at random from strata defined by establishment size categories, industry codes (NAICS), and metropolitan or nonmetropolitan status of the county.

For the pilot study, the sample includes two sub-components--the sample from the 1996 Rural Business Survey (n=2,493) and the Bureau of Labor Statistics sample (n=2,804). These 5,296 cases were prescreened before the pilot study started to determine if the firm was in business or had closed, to update business contact information, and identify a representative for directing survey contacts. (The results of the prescreening are reported under separate cover in the Confidential SESRC Data Report 13-083).

Questionnaire Design

SESRC worked collaboratively with Tim Wojan and representatives of the Rural Division of ERS to develop a paper questionnaire for this pilot study. The survey included both closed- ended and open-ended questions. Once the questionnaire was finalized, it was programmed into SESRC's web survey format and data entry program as well as the Voxco Computer Assisted Telephone Interviewing System (CATI).

The paper questionnaires were printed in color on 11" x 17" white paper and stapled together to form a 16-page, 8 ½" x 11" questionnaires with a large title and multiple pictures on the first page designed to generate interest in the survey.

The final Internet version contained 83 screens, including an introductory screen and a survey completion screen. It contained 254 data points, of which 29 had an open-ended response component to them.

Telephone Prescreening

SESRC prescreened the 1996 Rural Business Survey samples (n=2,493) and the Bureau of Labor Statistics sample (n=2,804) from 9/12/2013 to 10/31/2013. The purpose of this contact was to: 1) determine if establishment is still in business, 2) update business contact information (mail address, telephone, email, and web URL), and 3) identify a representative for the establishment for directing survey contacts. All cases received at least one call attempt for the prescreening.

Section I. Survey Administration and Design

Overall, SESRC updated 13.0% (n=345) of the business names, 31.9% (n=850) of the telephone numbers, 28.7% (n=765) of the email addresses, 71% (n=1891) of the web URLs, 81.0% (n=2157) of the contact names, 80.1% (n=2132) of the contact titles, and 39.1% (n=1042) of the mail addresses out of the 5297 total cases from the prescreening. In addition, 32 businesses were found to be no longer in operation and 36 businesses had a company policy not to do surveys. They were removed from the final sample for the pilot study.

A total of 5,210 cases were then divided into 5 different experimental groups for the pilot study.

II. SURVEY IMPLEMENTATION AND PROCEDURES

Human Subjects Review

SESRC submitted the project design and questionnaire to the Institutional Review Board at Washington State University (WSU-IRB) for review of procedures for conducting research with human subjects and compliance with federal regulations. The survey procedures and materials were determined to be exempt by the WSU/IRB. The study was assigned WSU IRB # 12680 and the review was completed on July 20, 2012.

Survey Design and Contact Procedures

SESRC uses Tailored Design Method¹ (TDM) survey procedures to conduct surveys. Key elements of TDM survey procedures are to implement carefully designed and timed contacts to respondents. For this survey, respondents from each experimental group received one postal pre-notification letter at the beginning of the study and then received different combinations of telephone, postal or email contacts sequences throughout the data collection period. The pilot study phase included a test of 5 experimental treatments. **Table 1** shows the contact sequence for each experimental treatment group.

¹ Dillman, Don A.; Smyth, Jolene D.; Christian, Leah M. 2009 *Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method (3rd Edition)*. New York: Wiley.

Section II. Survey Implementation and Procedures**Table 1. Pilot Study Contact Sequence**

| | Date | Group 1 Mail First | Group 2 Telephone First | Group 3 Web First | Group 4 All Options | Group 5 Control Group |
|------------------------------|------------|----------------------------------|------------------------------------|---------------------------------|------------------------------------|---------------------------------|
| Prescreen | 9/12~10/31 | Phone contact | Phone contact | Phone contact | Phone contact | Phone contact |
| Phase 1 | 11/12/2013 | Prior Letter (n=1042) | Prior Letter (n=1041) | Prior Letter (n=1042) | Prior Letter (n=1043) | Prior Letter (n=1042) |
| Phase 2 | 11/22/2013 | 1st QSTR Mailing (n=1042) | Phone Contact 1st attempt | 1st Email Contact (n=289) | | Phone Contact 1st attempt |
| Phase 2 (Group 4) | 11/23/2013 | | | | 1st QSTR Mailing (n=1041) | |
| Phase 3 | 11/26/2013 | 1st Email Reminder (n=317) | Phone Contact Continues | - | 1st Email Reminder (n=345) | Phone Contact Continues |
| Phase 4 | 12/2/2013 | - | Phone Contact 2nd attempt | - | - | Phone Contact Continues |
| Phase 5 | 12/11/2013 | 1st PC Reminder (n=898) | Phone Contact Continues | 1st QSTR Mailing (n=945) | 1st PC Reminder (n=886) | Phone Contact Continues |
| Phase 6 | 12/20/2013 | 2nd QSTR Mailing (n=497) | Phone Contact Continues | 1st PC Reminder (n=931) | 2nd QSTR Mailing (n=747) | Phone Contact Continues |
| Phase 7 | 12/23/2013 | Phone Contact 1st attempt | | - | Phone Contact 1st attempt | |

Section II. Survey Implementation and Procedures

| | | | | | | |
|------------------------------|------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Phase 7 (Group 3) | 12/30/2013 | | 1st QSTR Mailing (n=834) | | | |
| Phase 7 (Group 1) | 1/2/2014 | 2nd QSTR Mailing (n=845) | | | 2nd QSTR Mailing (n=88) | 1st QSTR Mailing (n=852) |
| Phase 8 | 01/06/2014 | Phone Contact Continues | 1st Email Reminder (n=340) | 2nd QSTR Mailing (n=848) | Phone Contact Continues | 1st Email Reminder (n=381) |
| Phase 9 | 01/08/2014 | Phone Contact Continues | 1st PC Reminder (n=796) | - | Phone Contact Continues | 1st PC Reminder (n=826) |
| Phase 10 | 01/14/2014 | Phone Contact Continues | 2nd QSTR Mailing (n=780) | Phone Contact Continues | Phone Contact Continues | 2nd QSTR Mailing (n=807) |
| Phase 11 | 01/21/2014 | Phone Contact Continues | Refusal Mailing (n=92) | Phone Contact Continues | Phone Contact Continues | Refusal Mailing (n=95) |
| Phase 12 | 01/27/2014 | Phone Contact Continues | Phone Contact Continues | Phone Contact Continues | Phone Contact Continues | Phone Contact Continues |
| Phase 13 | 02/03/2014 | 2nd Email Reminder (n=270) | 2nd Email Reminder (n=267) | 2nd Email Reminder (n=242) | 2nd Email Reminder (n=245) | 2nd Email Reminder (n=334) |
| Phase 14 | 02/10/2014 | Refusal Mailing (n=74) | Phone Contact Continues | Refusal Mailing (n=70) | Refusal Mailing (n=84) | Phone Contact Continues |

Section II. Survey Implementation and Procedures

Telephone Interviews

All groups except for Group 3 received an average of three call attempts over the twelve week data collection period; Group 3 received an average of four call attempts. These call attempts alternated days of the week and time of the day. If an interviewer called at an inconvenient time for the respondent, the interviewer would then attempt to schedule a specific time to re-contact the individual for an interview. Eastern and central time zone cases were called with a specific early morning call attempts (5am to 7am PST) to achieve an 8am to 10am to reach businesses as they are starting work for the day.

All respondents who refused to complete the telephone interview were offered the web survey option.

Table 2. ERSR10 Pilot Study Data Collection Telephone Statistics

| | Total |
|---|---------------------------|
| Data collection period | 11/18/13 ~ 02/14/14 |
| Average call length (minutes: seconds) | 34:14 |
| Number of interviewers trained (including staff) | 29 |
| Number of cases monitored | 4 |
| Number of cases spot checked | 27 |
| Percentage of completed interviews monitored | 6% |
| Average number of call attempts | 3 |
| Completed telephone interviews per hour | 0.14 |
| Average hours to get one complete | 7.17 |

Refusal Prevention

During the telephone interview, if a respondent refused to do the survey on the phone, they were offered an option of completing the survey online and were sent an email with the survey information and the web link to the questionnaire immediately. After examine the calling records and the cases' final codes, 188 cases out of 751 refusals were converted to complete either a web or mail questionnaire. The refusal conversion rate was 25.03%.

Section II. Survey Implementation and Procedures

Table 3. Telephone Refusal Conversion Statistics

| | Calls | Refusal | CM by Phone | CM by Mail or Web | IE | Hours | CM Per Hour (total) | CM Per Hour (Phone) | CM Per Hour (Mail or Web) |
|----------------|-------|---------|-------------|-------------------|----|-------|---------------------|---------------------|---------------------------|
| Total # | 15033 | 751 | 119 | 188 | 82 | 854 | 0.36 | 0.14 | 0.22 |

III. CASE DISPOSITION AND RESPONSE RATES

SESRC provides two kinds of response rates for the survey: the *cooperation rate* and the *response rate* based on the American Association for Public Opinion Research (AAPOR) guidelines. These calculations are based on the operational definitions and formulas for calculating response rates, cooperation rates, refusal rates, and contact rates on www.aapor.org.

A breakdown of the response rates is given in **Table 4. Sample Disposition and Response Rate** on the following pages.

The **cooperation rate** is the ratio of completed and partially completed² interviews to the number of completed, partially completed and those who refused to complete the survey. The formula for AAPOR cooperation rate 4 is:

$$\frac{(I + P)}{[(I+P) + R]}$$

Where I = number of completed interviews P=
number of partially completed interviews R =
number of refusals

A **70.8% cooperation rate** was achieved for this pilot study as of the time this report is prepared. (72.3% for Group 1, 71.6% for Group 2, 76.4% for Group 3, 70.6% for Group 4, and 60.7% for Group 5.)

The **response rate** is the ratio of completed and partially completed interviews to the total eligible sample. This formula is considered one of the industry standards for calculating response rates and complies with AAPOR Standard Definitions (American Association for Public Opinion Research) Response Rate (AAPOR response rate 4). This calculation removes all ineligible cases from the formula. The formula is:

² A completed interview/questionnaire refers to a respondent answered all of the questions or most of the questions and the last question of the questionnaire. A partial completed interview/questionnaire refers to a respondent didn't answer all the questions and broke off before reaching the last question. A case is considered a partial completed case if at least the first three questions were answered.

Section III. Case Disposition and Response Rates

$$(I + P)$$

$$\frac{(I + P)}{[(I + P) + (R + NC + O) + e (UH + UO)]}$$

Where I = number of completed interviews

P= number of partially completed interviews

R= number of refusals

NC = number of non-contacts

O= other

UH= unknown household

UO= unknown other

e= eligible

A **28.4% response rate** was achieved for this study as of the time this report is prepared. (30.6% for Group 1, 29.3% for Group 2, 32.1% for Group 3, 31.1% for Group 4, and 19.0% for Group 5.)

Section III. Case Disposition and Response Rates

Table 4. Sample Disposition and Response Rates

| | Group 1 | Group 2 | Group 3 | Group 4 | Group 5 | Overall |
|--|------------|-----------------|-----------|-------------|---------------|---------|
| | Mail First | Telephone First | Web First | All Options | Control Group | |
| <i>Eligible, Interviewed</i> | | | | | | |
| Phone Complete (CM) | 12 | 51 | 10 | 17 | 29 | 119 |
| Web Complete (WC) | 106 | 121 | 180 | 104 | 93 | 604 |
| Mail Complete (MC) | 176 | 101 | 114 | 177 | 55 | 623 |
| Ineligible Mail Complete | 4 | 1 | 6 | 7 | 0 | 18 |
| Web Short Version Complete | 0 | 0 | 0 | 3 | 0 | 3 |
| Web Short Version Partial | 3 | 7 | 1 | 0 | 5 | 16 |
| Web Partial Complete | 17 | 28 | 33 | 23 | 24 | 125 |
| <i>Eligible, non-interview</i> | | | | | | |
| Refusal and break off | 111 | 108 | 92 | 119 | 118 | 548 |
| Web refusal | 3 | 3 | 2 | 5 | 0 | 13 |
| Non-Contact (CB, EB, EM, GB, HB, MB, SB, SG, SH, WB) | 186 | 165 | 186 | 181 | 210 | 928 |
| Respondent unavailable (RN) | 5 | 3 | 9 | 13 | 12 | 42 |
| Answering Machine (AM, SM) | 204 | 218 | 207 | 191 | 249 | 1069 |
| Answering Machine Left Message (LM, SL) | 50 | 63 | 38 | 60 | 64 | 275 |
| Physically or mentally unable (DF, HC) | 1 | 0 | 0 | 0 | 1 | 2 |
| Language problem (LG, LS) | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Unknown eligibility, non-interview</i> | | | | | | |
| Always busy (BZ, SZ) | 4 | 5 | 7 | 1 | 5 | 22 |
| No answer (NA, SA) | 26 | 46 | 29 | 31 | 38 | 170 |
| Call blocking (BC, SC) | 6 | 2 | 2 | 3 | 3 | 16 |
| Return to sender | 46 | 39 | 45 | 34 | 48 | 212 |
| <i>Not eligible</i> | | | | | | |
| Fax/data line (ED, SD) | 8 | 2 | 5 | 7 | 8 | 30 |
| Disconnected number (DS) | 7 | 6 | 9 | 11 | 17 | 50 |
| Temporarily out of service (CC) | 6 | 6 | 3 | 1 | 2 | 18 |
| Wrong Number (WN) | 4 | 6 | 6 | 5 | 13 | 34 |
| Missing Phone Number (MP) | 9 | 7 | 3 | 7 | 3 | 29 |
| Company has less than 5 employees (IE) | 14 | 8 | 19 | 21 | 12 | 70 |
| Business does not operate in the USA (I4) | 0 | 0 | 0 | 0 | 1 | 1 |
| Company no longer in business (I3) | 6 | 13 | 4 | 6 | 2 | 31 |
| Company Policy to not do surveys (CP) | 24 | 29 | 33 | 22 | 27 | 135 |

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Section III. Case Disposition and Response Rates

Table 4 Continued

| | Group 1 Mail First | Group 2 Telephone First | Group 3 Web First | Group 4 All Options | Group 5 Control Group | Overall |
|---|--------------------------|-------------------------------|-------------------------|---------------------------|-----------------------------|---------------|
| Other (OT) | 8 | 5 | 6 | 2 | 4 | 25 |
| Duplicate (DP) | 0 | 3 | 0 | 1 | 0 | 4 |
| Total Sample | 1041 | 1043 | 1042 | 1041 | 1042 | 5209 |
| I=Complete Interviews to Full Survey | 294 | 273 | 304 | 298 | 177 | 1346 |
| P=Partial Interviews to Full Survey | 17 | 28 | 33 | 23 | 24 | 125 |
| R=Refusal and break off | 114 | 111 | 94 | 124 | 118 | 561 |
| NC=Non Contact | 445 | 449 | 440 | 445 | 535 | 2314 |
| O=Other | 2 | 0 | 0 | 0 | 1 | 3 |
| UH=Unknown Households | 82 | 92 | 83 | 69 | 94 | 420 |
| UO=Unknown Other (Mail/Web only) | 46 | 39 | 45 | 34 | 48 | 212 |
| eligible | 0.87 | 0.88 | 0.87 | 0.88 | 0.86 | 0.87 |
| Response Rate 1 I / (I + P) + (R + NC + O) + (UH + UO) | 29.80% | 28.10% | 31.40% | 30.70% | 18.10% | 27.60% |
| Response Rate 2 (I + P) / (I + P) + (R + NC + O) + (UH + UO) | 30.10% | 28.80% | 31.50% | 30.70% | 18.60% | 28.00% |
| Response Rate 3 I / ((I + P) + (R + NC + O) + e(UH + UO)) | 30.30% | 28.60% | 32.00% | 31.10% | 18.50% | 28.10% |
| Response Rate 4 (I + P) / ((I + P) + (R + NC + O) + e(UH + UO)) | 30.60% | 29.30% | 32.10% | 31.10% | 19.00% | 28.40% |
| Cooperation Rate 1 I/(I+P)+R+O) | 71.20% | 69.80% | 76.20% | 70.60% | 58.80% | 69.90% |
| Cooperation Rate 2 (I+P)/((I+P)+R+O)) | 71.90% | 71.60% | 76.40% | 70.60% | 60.50% | 70.70% |
| Cooperation Rate 3 I/((I+P)+R)) | 71.50% | 69.80% | 76.20% | 70.60% | 59.00% | 70.00% |
| Cooperation Rate 4 (I+P)/((I+P)+R)) | 72.30% | 71.60% | 76.40% | 70.60% | 60.70% | 70.80% |
| Ineligible Rate | 1.92% | 2.01% | 2.21% | 2.59% | 1.44% | 1.96% |

IV. SURVEY RESULTS

Completes by Mode

There are 623 mail completes, 604 web completes, and 119 phone completes out of the pilot study sample (5210 cases). The majority (91%) of the completes came from either mail or web questionnaires, with only 8.8% from telephone interviews. (See **Table 5. Number of Completes by Mode.**)

Table 5. Number of Pilot Study Full Survey Completes by Mode

| Mode | Frequency | Percent |
|------------------------|-----------|---------|
| Mail Completes | 623 | 46.3% |
| Web Completes | 604 | 44.9% |
| Phone Completes | 119 | 8.8% |
| total | 1,346 | 100% |

Group 3 has the most completes (n=304) overall, followed by Group 4 (n=298), Group 1 (n=294), Group 2 (n=273), and Group 5 (n=177).

Table 6. Number of Pilot Study Full Survey Completes by Groups

| | Groups | Mail Completes (#/%) | Web Completes (#/%) | Phone Completes (#/%) | Total Completes |
|--------------------|---------|-------------------------|---------------------------|-----------------------------|--------------------|
| Mail First | Group 1 | 176 (13.1%) | 106 (7.9%) | 12 (0.9%) | 294 (21.8%) |
| | Group 4 | 177 (13.2%) | 104 (7.7%) | 17 (1.3%) | 298 (22.1%) |
| Web First | Group 3 | 114 (8.5%) | 180 (13.4%) | 10 (0.7%) | 304 (22.6%) |
| Phone First | Group 2 | 101 (7.5%) | 121 (9.0%) | 51 (3.8%) | 273 (20.3%) |
| | Group 5 | 55 (4.1%) | 93 (6.9%) | 29 (2.2%) | 177 (13.2%) |
| | Overall | 623 (46.3%) | 604 (44.9%) | 119 (8.8%) | 1,346 (100%) |

When looking at the number of completes by mode, Group 4 and Group 1 have the most mail completes (n=177 and n=176 respectively) while Group 5 has the least mail completes (n=55). Group 3 has the most web completes (n=176) while Group 5 has the least web completes (n=93). Group 2 has the most telephone completes (n=51) while Group 3 has the least telephone completes (n=10).

Section IV. Survey Results**Table 7. Most and Least Pilot Study Full Survey Completes Mode vs. Groups**

| Mode | Most Completes (#) | Least Completes (#) |
|------------------------|--------------------------------------|---------------------|
| Mail Completes | Group 4 (n=177) & Group 1 (n=176) | Group 5 (n=55) |
| Web Completes | Group 3 (n=180) | Group 5 (n=93) |
| Phone Completes | Group 2 (n=51) | Group 3 (n=10) |

Response Burden

Table 8 displays the number of web completes by treatment group, the average time of completion, and the median time of completion after correction for “timed out” or error cases. The adjusted average time of a web complete ranges from 22:45 minutes to 27:47 minutes. It should be noted that the telephone first group has less time on average and at the median. Telephone group respondents may have completed a small portion of the survey by telephone and elected to abandon the telephone interview and finish the survey over the web. The median time was 23:41 minutes and this is the value where half of the responses are less than this value and half are greater than this value.

Table 8. Pilot Study Full Survey Web Completion and Completion Time Statistics

| Group | # completes | Average time | Median times | Max. time | Min. time |
|----------------------------------|-------------|--------------|--------------|-----------|-----------|
| Group 1 - Mail First | 106 | 0:24:19 | 0:23:21 | 0:48:56 | 0:10:11 |
| Group 2 - Telephone First | 121 | 0:22:45 | 0:22:23 | 0:43:19 | 0:11:02 |
| Group 3 - Web First | 180 | 0:27:47 | 0:26:02 | 1:24:56 | 0:10:12 |
| Group 4 - All Options | 104 | 0:25:01 | 0:24:31 | 1:07:54 | 0:12:20 |
| Group 5 - Control Group | 93 | 0:24:49 | 0:22:52 | 0:46:50 | 0:17:21 |
| Total | 604 | 0:25:47 | 0:23:41 | 1:24:56 | 0:10:11 |

A short web questionnaire with only nine questions was developed for the telephone refusal cases. The goal of this short questionnaire is to obtain essential information from respondents who refused to complete the telephone interview. The refusals from telephone contacts were sent a postal letter with the web link to this short web questionnaire close to the end of the data collection inviting them to complete this 5 minute survey.

Section IV. Survey Results**Table 9. Pilot Study Short Survey Web Completion and Completion Time Statistics**

| Group | # completes | Average time | Median times | Max. time | Min. time |
|----------------------------------|-------------|--------------|--------------|-----------|-----------|
| Group 1 - Mail First | 3 | 0:03:34 | 0:04:01 | 0:04:37 | 0:02:04 |
| Group 2 - Telephone First | 7 | 0:05:40 | 0:03:29 | 0:20:31 | 0:01:56 |
| Group 3 - Web First | 1 | 0:02:38 | 0:02:38 | 0:02:38 | 0:02:38 |
| Group 4 - All Options | 0 | - | - | - | - |
| Group 5 - Control Group | 5 | 0:03:12 | 0:03:01 | 0:03:43 | 0:02:42 |
| Total | 16 | 0:04:18 | 0:03:18 | 0:20:31 | 0:01:56 |

It takes 7.17 hours (see **Table 2**) on average to get one telephone interview and a completed interview averages about 34:14 minutes; while it takes about 25:47 minutes to complete a full web questionnaire and 4:18 minutes to complete a short web questionnaire. (See **Table 8. Pilot Study Full Survey Web Completion and Completion Time Statistics.**)

There was no information on the average time to complete a mail questionnaire therefore the response burden was not calculated for the mail questionnaire.

Nonresponse Burden

The average length of refusal cases was recorded in **Table 10**. On average, all groups except for Group 4 receives three call attempts during the data collection period. Group 3 receives an average of four call attempts. One last call attempt was added for Group 3, which had the highest response rate, closer to the end of data collection in order to increase response rate. The overall telephone nonresponse burden is 0.243 hours across all groups.

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Table 10. Telephone Nonresponse Burden

| Refusals length | seconds | hour |
|-----------------------------|----------------|--------------|
| 1st attempt | 128.53 | 0.036 |
| 2nd attempt | 157.57 | 0.044 |
| 3rd attempt | 152.01 | 0.042 |
| 4th attempt | 119.78 | 0.033 |
| On average RP length | 141.81 | 0.039 |
| Sum of 3 attempts | 438.11 | 0.122 |
| Sum of 4 attempts | 557.89 | 0.155 |

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Sample

The pilot study survey results of all completes and partial completes to the full interview for the two sample source groups (BLS and 1996 RBUS sample sources) showed almost equally split proportions in the results, 52.22% 1996 and 47.78% BLS sources respectively. **Table 11** shows that there was no significant differences of the number of completes across the five groups. Overall, both 1996 and BLS sample groups were responding comparatively to the survey treatments as indicated by the percentages of response in each group.

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Table 11. Number of Pilot Study Full Survey Completes and Partial Completes by Sample Source

| GROUP | SOURCE | | |
|------------------------------------|--------|-------|-------------------|
| | 1996 | BLS | Total |
| Frequency | | | |
| Percent | | | |
| Row Pct | | | |
| Col Pct | | | |
| Group 01 -- Mail First | 159 | 151 | 310 |
| | 10.85 | 10.31 | 21.16 |
| | 51.29 | 48.71 | |
| | 20.78 | 21.57 | |
| Group 02 -- Telephone First | 154 | 145 | 299 |
| | 10.51 | 9.90 | 20.41 |
| | 51.51 | 48.49 | |
| | 20.13 | 20.71 | |
| Group 03 -- Web First | 172 | 164 | 336 |
| | 11.74 | 11.19 | 22.94 |
| | 51.19 | 48.81 | |
| | 22.48 | 23.43 | |
| Group 04 -- All Options | 168 | 152 | 320 |
| | 11.47 | 10.38 | 21.84 |
| | 52.50 | 47.50 | |
| | 21.96 | 21.71 | |
| Group 05 -- Control Group | 112 | 88 | 200 |
| | 7.65 | 6.01 | 13.65 |
| | 56.00 | 44.00 | |
| | 14.64 | 12.57 | |
| Total | 765 | 700 | 1465 ³ |
| | 52.22 | 47.78 | 100.00 |

³ This final number does not include 6 missing cases. The total number of completes and partial completes to the full survey is 1471. However, six respondents ripped off their IDs on the paper questionnaire so we cannot link them back to their sample information therefore they were not included in this table.

NAICS Code Coverage

The occurrence of all NAICS codes included for this survey is shown in **Table 12** at the 2 digit level. The Wholesale trade (42) has the highest response rate (19.18%) in the BLS sample and Manufacturing (33.58%) has the highest response rates overall. The only NAICS sectors demonstrating serious nonresponse problems are Agriculture (11) and Other services (81) included in the overall sample. However, these sectors are not included in the study population for the main study.

Table 12. Number of Completes by NAICS Codes⁴

⁴ NAICS: 11 Agriculture, 21 Mining; 31 Manufacturing; 32 Manufacturing; 33 Manufacturing; 42 Wholesale Trade; 48 Transportation; 51 Information; 52 Finance and Insurance; 54 Professional/Technical Services; 55 Management of Companies and Enterprises; 71 Arts, Entertainment and Recreation; 81 Other Services.

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| NAICS2 | | SOURCE | | |
|--|---------------------------------|------------------------------------|--------------|--|
| Frequency Percent Row Pct Col Pct | 1996 | BLS | Total | |
| 11 | 4 0.27 100.0 0 0.52 | 0 0.00 0.00 0.00 | 4 0.27 | |
| 21 | 2 0.14 12.50 0.26 | 14 0.96 87.50 2.00 | 16 1.09 | |
| 31 | 134 9.15 82.72 17.52 | 28 1.91 17.28 4.00 | 162 11.06 | |
| 32 | 209 14.27 75.18 27.32 | 69 4.71 24.82 9.86 | 278 18.98 | |
| 33 | 407 27.78 83.40 53.20 | 81 5.53 16.60 11.57 | 488 33.31 | |
| 42 | 0 0.00 0.00 0.00 | 128 8.74 100.0 0 18.29 | 128 8.74 | |
| 48 | 0 0.00 0.00 0.00 | 65 4.44 100.0 0 9.29 | 65 4.44 | |
| 51 | 4 0.27 10.00 0.52 | 36 2.46 90.00 5.14 | 40 2.73 | |

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| | | | |
|--------------|---------------------------------|-----------------------------------|----------------------------|
| 52 | 0 0.00 0.00 0.00 | 25 1.71 100.0 0 3.57 | 25 1.71 |
| 54 | 2 0.14 1.48 0.26 | 133 9.08 98.52 19.00 | 135 9.22 |
| 55 | 0 0.00 0.00 0.00 | 87 5.94 100.0 0 12.43 | 87 5.94 |
| 71 | 0 0.00 0.00 0.00 | 34 2.32 100.0 0 4.86 | 34 2.32 |
| 81 | 3 0.20 100.0 0 0.39 | 0 0.00 0.00 0.00 | 3 0.20 |
| Total | 765 52.22 | 700 47.78 | 1465 ⁵ 100.0 |

5 This final number does not include 6 missing cases. The total number of completes and partial completes to the full survey is 1471. However, six respondents ripped off their IDs on the paper questionnaire so we cannot link them back to their sample information therefore they were not included in this table.

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Table 13 shows the number of completes and partial completes to the full survey by establishment size from the BLS sample only. The larger establishments with more than 100 employees are underrepresented. 6.8% of the BLS sample for the pilot study was larger establishments but only 4.3% completed the pilot study.

Table 13. Number of Completes and Partial Completes to the Pilot Full Survey by Establishment Size

| Establishment size | SOURCE | | |
|--------------------|--------------------------------|--------------------------------|----------------------------|
| | 1996 | BLS | Total |
| 5 | 168 11.47 26.21 21.96 | 473 32.29 73.79 67.57 | 641 43.75 |
| 20 | 357 24.37 64.44 46.67 | 197 13.45 35.56 28.14 | 554 37.82 |
| 100 | 240 16.38 88.89 31.37 | 30 2.05 11.11 4.29 | 270 18.43 |
| Total | 765 52.22 | 700 47.78 | 1465 ⁶ 100.0 |

Table 14 provides the distributions of establishment sizes in the 1996, BLS, and the overall sample frames well as their respective distributions exhibited in the pilot study results. One concern we have is that larger businesses are not responding well in any of the protocols and at a much lesser rate than

⁶ This final number does not include 6 missing cases. The total number of completes and partial completes to the full survey is 1471. However, six respondents ripped off their IDs on the paper questionnaire so we cannot link them back to their sample information therefore they were not included in this table.

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was experienced in the 1996 RBUS survey and at a lower rate for the BLS sample compared to their distributions in respective sample frames.

Table 14. Comparison of Pilot Study Sample Frame to Completion by Business Size

| | Pilot Sample Frame Composition | | | Pilot Study Completes | | |
|---------------|--------------------------------|--------|--------|-----------------------|--------|--------|
| | Overall | 1996 | BLS | Overall | 1996 | BLS |
| 5 | 43.34% | 17.18% | 66.58% | 44.14% | 22.42% | 67.92% |
| 20 | 34.57% | 43.29% | 26.82% | 37.42% | 46.11% | 27.89% |
| 100 | 22.09% | 39.53% | 6.60% | 18.44% | 31.46% | 4.18% |
| Number | 5297 | 2451 | 2759 | 1164 | 785 | 717 |

Table 15 shows the number of completes by metro or non-metro areas from the BLS sample only. The percentage of businesses from metro or non-metro areas matches the focus of the study which is the rural area.

Table 15. Number of Pilot Study Completes by Metro/Non Metro Area for BLS Sample

| | Sample composition # (%) | Pilot Completes # (%) |
|------------------|-----------------------------|--------------------------|
| Non Metro | 1,805 (65.39%) | 529 (73.78%) |
| Metro | 955 (34.61%) | 188 (26.22%) |
| Total | 2759 | 717 |

Telephone Prescreening

868 cases or 64% of the completed surveys in the pilot study had completed telephone pre-screening, 481 cases or 35% had other dispositions (see **Table 16**). These other results included 364 cases or 27% with an eligible but non-interview disposition (e.g. refusals, call backs, Language problem, answering machine, etc.), 49 cases or 3.6% were unknown eligibility (e.g. always busy, no answer, call blocking, etc.) and non-interview, and 65 cases or 4.8% were not eligible cases (e.g. fax line, disconnected numbers, temporary out of service, wrong number, missing phone number, etc.) from the telephone prescreening.

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Table 16. Pilot Study Completes Only vs. Prescreening Final Results

| Prescreening Results | Number | Percent |
|---|---------------|----------------|
| Completes or partial completes | 868 | 64.48% |
| Eligible, non-interview | 364 | 27.04% |
| Unknown eligibility, non-interview | 49 | 3.64% |
| Not eligible | 65 | 4.82% |
| Total | 1346 | 100% |

Telephone prescreening can be helpful in getting updated contact information and a successful prescreening contact would provide a contact person's name and an email address. Of those completing the prescreening, 81% provided a contact name (See **Table 17**).

Section V. Pilot Study Final Results**Table 17. Pilot Study Prescreening Updates Summary**

| | | Sample Type | | | | | |
|------------------|---------------|-------------|-------|------|-------|---------|-------|
| | | BLS | | 1996 | | Overall | |
| | | n | % | n | % | n | % |
| Item List | Business name | - | | - | | 345 | 13.0% |
| | Phone number | - | | - | | 850 | 31.9% |
| | Email | 470 | 38.9% | 295 | 20.3% | 765 | 28.7% |
| | URL | 377 | 31.2% | 289 | 19.9% | 1891 | 71.0% |
| | Contact name | 961 | 79.5% | 1196 | 82.3% | 2157 | 81.0% |
| | Contact title | 983 | 81.3% | 1149 | 79.1% | 2132 | 80.1% |
| | Address | - | | - | | 1042 | 39.1% |
| | Total Number | 1209 | 100% | 1453 | 100% | 2662 | 100% |

Refusal Short Form Letter

A refusal letter with a link to a shortened questionnaire was sent to the respondents from all groups who refused to participate during the telephone contacts at the end of the data collection. Out of the 415 letters sent, only 15 completed the shortened questionnaire. The response rate is 3.6%.

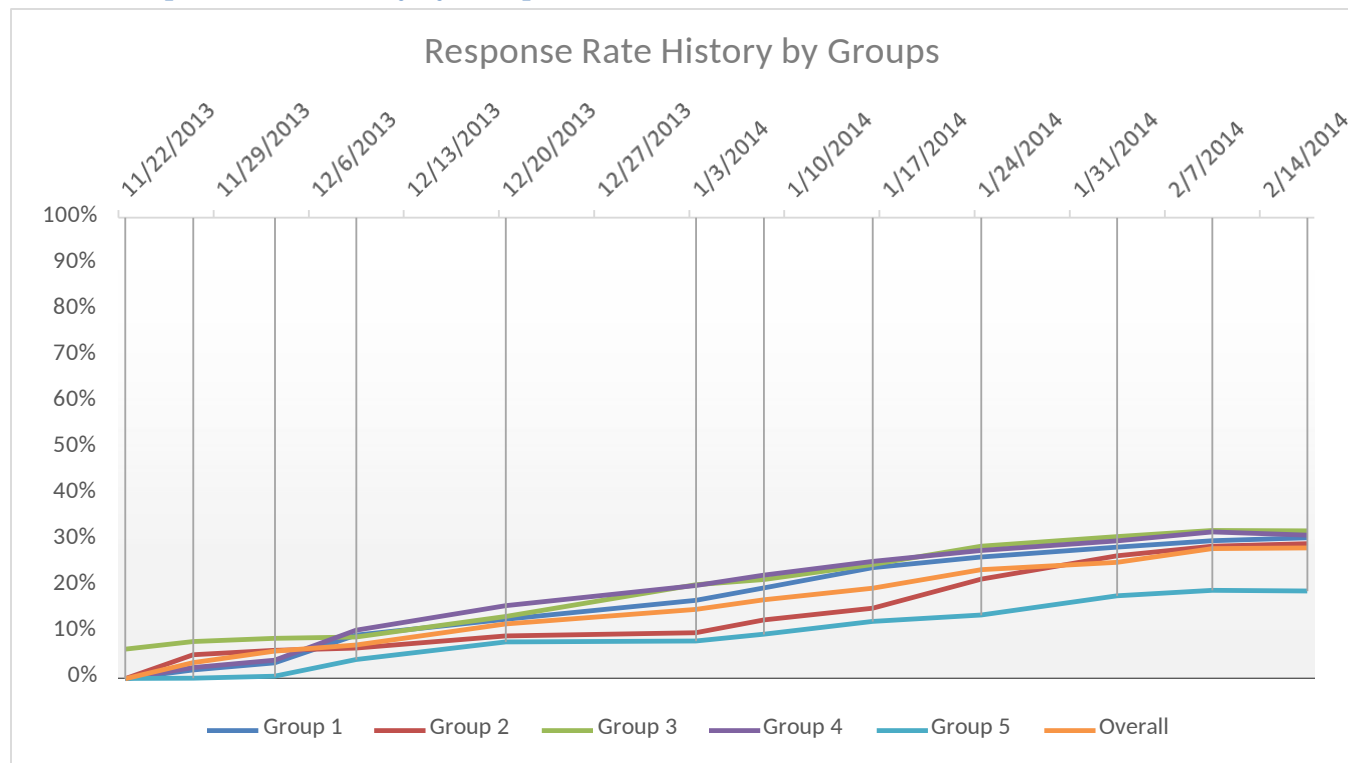
Section V. Pilot Study Final Results**Contact Sequence****Table 18. Response Rate⁷ History for All Groups**

| Date | Group 1 | Group 2 | Group 3 | Group 4 | Group 5 | Overall |
|------------|---------|---------|---------|---------|---------|---------|
| 11/22/2013 | - | - | 6.4% | - | - | - |
| 11/27/2013 | 1.90% | 5.20% | 8.10% | 2.40% | 0.10% | 3.50% |
| 12/03/2013 | 3.40% | 6.15% | 8.80% | 4.00% | 0.50% | 5.99% |
| 12/09/2013 | 9.50% | 6.65% | 9.10% | 10.50% | 4.15% | 7.33% |
| 12/20/2013 | 12.90% | 9.30% | 13.50% | 15.80% | 7.97% | 11.92% |
| 01/03/2014 | 17.00% | 9.97% | 20.40% | 20.20% | 8.16% | 15.04% |
| 01/08/2014 | 19.74% | 12.76% | 21.53% | 22.40% | 9.59% | 17.12% |
| 01/16/2014 | 24.09% | 15.29% | 24.79% | 25.40% | 12.38% | 19.67% |
| 01/24/2014 | 26.38% | 21.59% | 28.79% | 27.77% | 13.78% | 23.68% |
| 02/03/2014 | 28.56% | 26.69% | 30.87% | 29.85% | 17.98% | 25.31% |
| 02/10/2014 | 29.95% | 28.78% | 32.16% | 31.82% | 19.18% | 28.26% |
| 02/17/2014 | 30.6% | 29.3% | 32.1% | 31.1% | 19.0% | 28.4% |

⁷ Note that the response rate history uses raw response rates calculated during data collection period. A fully examined disposition was done **after** the data collection is completed. During the data collection period, the raw response rate didn't calculate the potential non Partial-Completed (PC) cases and no data correction was done.

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Chart 1. Response Rate History by Group



After the prescreening stage, those protocols that were mail first in sequence (Groups 1, 3, 4--30.6%, 32.1% and 31.1% respectively) were outperforming the telephone first sequences groups (Group 2 and Group 5--29.3% and 19.0%). These groups brought more completed questionnaires into the study early on.

The two highest response rate groups are Group 3 (32.1%) and Group 4 (31.1%). The commonalities between these two groups were that they used token cash incentives early on in the mailing protocol and both protocols used cash incentives twice. Group 3 used a token cash incentive, \$2, in the pre- notice letter and again in the first questionnaire mailing combined with two day priority postage mailing. The second questionnaire mailing for Group 3 did not include an incentive and was sent via first class post. The distinguishing characteristic for Group 4 was the treatment of using token cash incentive combined with two day priority mail post (higher class postage and packaging) two times in the questionnaire mailings. Group 4 also had the most mail completes compared to the other groups.

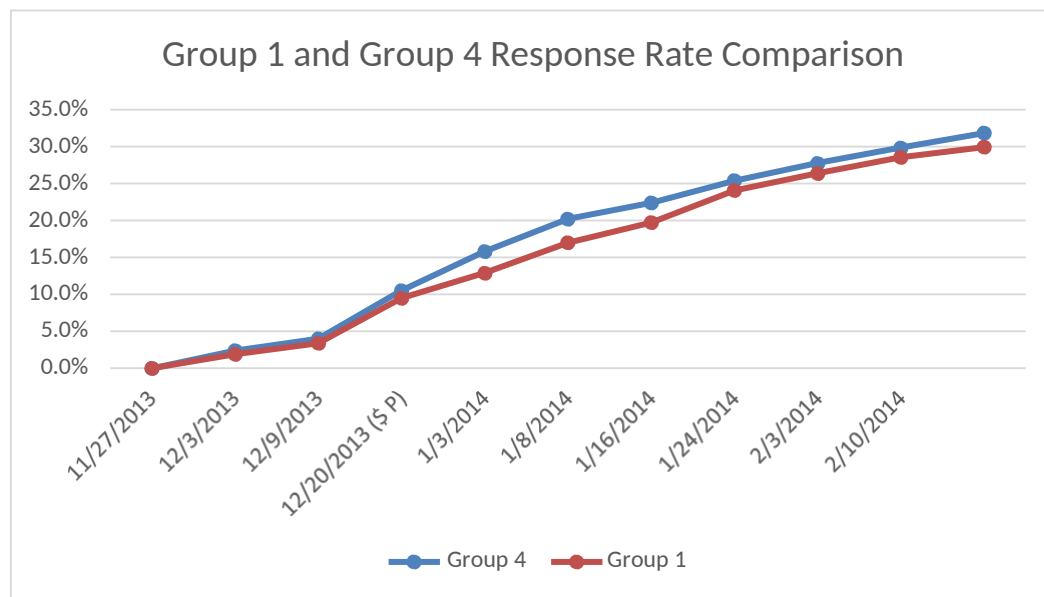
Group 1 had the third highest response rate (30.6%) and was only 0.5% lower than Group 4. Group 1 and Group 4 had almost identical contact sequences except that the first questionnaire mailing for

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Group 3 was sent by First class mail instead of two day priority postal mail. In preliminary results, the number of mail completes and web completes between Group 1 and Group 4, were almost identical with 176 mail completes and 106 web completes from Group 1 and 177 mail completes and 104 web completes from Group 4. (See **Table 6.**)

Although Group 4 had the second highest response rate, the cost of this protocol is more expensive compared to Group 1 with an almost identical outcome. *The use of two two-day priority mailing protocol did not appear to have a significant impact on the number of completes compared to the use of first class postage questionnaire mailing with a onetime use of two day priority mailing questionnaire mailing protocol.* **Chart 2** shows the response rate comparison between group 1 and Group 4 through February 2014.

Chart 2. Response Rate Comparison between Group 1 and Group 4



These outcomes are consistent with previous findings in the establishment survey literature. Cash incentives are most effective when delivered early in the survey contacts. Cash incentives when attached to questionnaire mailings are more effective. Although the literature shows that cash incentives combined with higher class postage, priority mail is more effective, it only made a difference of less than 3% compared to cash incentives combined with First class mailing in the pilot study. Looking at the response rate history between Group 1 and Group 4, Group 1 had a response rate of 12.9% and Group 4 15.8% on the same day the second questionnaires were sent. When looking at the

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final response rate between Group 1 and Group 4, Group 4 was only leading by less than 1%. The protocol with priority mailing is 6.5 times more expensive compared to a first class mailing (Priority: \$5.60 per case vs. First Class: \$0.91 per case).

Interestingly, Group 3 with the \$2 incentive pre-notice letter with web link followed quickly by an email reminder with a clickable link and access code (email augmentation) had almost double the number of completes by web compared to the other groups. Group 3 had a response rate of 13% just by sending out a pre-notice letter and an email reminder to the non-respondents with an email address, which was about 30% of the total Group 3 sample. This finding suggests that a pre-notice letter with an incentive and providing an email augmentation is very effective if an email is available and has a cost saving advantage as this strategy drives respondents to the web and thus reduces questionnaire mailing postage costs and data entry costs and the follow-up telephone interviewing costs.

The overall treatment groups as of March 2014 have evened out and are relatively equal with the number of completes across groups. The only group that had a lower response rate was Group 5 which did not include any mailings with cash incentives and were sent via First Class mailing.

VI. SESRC's RECOMMENDATIONS FOR THE FULL STUDY

1. Increase sample size

Due to the lower response rates from the pilot study results, SESRC recommends adding more sample for the full study in order to meet the study goal of 17,000 completes. A starting sample size of 60,000 was proposed for the full study under the assumption that the response rate for the full study will be similar to pilot study results, around 33% with an ineligible rate of 3.2%.

2. Oversample large establishments

SESRC recommends oversampling large businesses for the BLS sample due to their low response rate in the pilot study.

3. Prescreen the proprietary sample only

Since the pool of successfully prescreened establishments had a cooperation rate of 100% by definition, the higher response rate for cases with an identified contact merely reflects this higher cooperation rate than for the sample as a whole. In addition, the assumption in the original plan that phone intensive contact would generate a large share of completes and significantly reduce nonresponse did not prove to be the case. The effective strategy suggested by the pilot study is a much larger mail/web distribution, phone contact to complete a small share of surveys and more effectively direct respondents to the web, and limited ability of repeated phone contacts to significantly reduce nonresponse. The value of telephone prescreening in pilot only marginally improved completion rates, and that this marginal benefit will be substantially reduced in the mode sequence adopted in the full study that does not rely on phone first contact. Given the increase in time burden and cost burden for prescreening, and the doubling of the sample size it is recommended that prescreening not be done for the BLS sample.

However, eligibility will be a concern for that part of the sample in the main sample drawn from a proprietary sample frame. SESRC did not have the SSI sample in the pilot study so the prescreening effort will provide experience with this new type of sample frame for the full study.

Section VI. SESRC's Recommendations for the full study

Therefore SESRC recommends to prescreen proprietary sample (commercial SSI) for the full study.

4. Change Incentives to \$1 instead of \$2

SESRC recommends changing the incentive amount from the originally approved two payments of \$2 to two payments of \$1 in order to compensate for the larger sample size. The proposed full study will start with an advance letter including a survey web link and a \$1 incentive. The goal is to have as many respondents completing the web survey prior to sending out the paper questionnaires. Another \$1 incentive will be included with the first questionnaire mailing. By reducing the incentives from \$2 to \$1, it will allow all sample cases to receive incentives in the advance letter and the 1st questionnaire mailing, if necessary.

5. Use web first (Group 3) contact sequence for full study

SESRC recommends using procedures (Group 3 Web First) from the pilot study that obtained the highest response rate. Based on the pilot study results, the best way to combine the most effective and cost effective elements are shown in **Table 19**.

To offset the cost for the extra sample (30,000) needed for the full study, it is anticipated that the remaining budget won't be enough to cover two day priority mail postage for all cases in the full study. If obtaining 17,000 completes is necessary, the cost saved from reducing incentives and high cost postages across the entire sample will help make it possible to increase the sample size. The priority treatment did not make a significant difference in response compared to the other treatment groups during the pilot study, we recommend the use of first class postage and not to use priority class mail postage.

Telephone will be used early to prescreen the proprietary (SSI) sample and to contact businesses without a sufficient address in the sample. Telephone reminders will be conducted after the two questionnaire mailings are done, followed by an email reminder to non-respondents with an email address obtained from the previous telephone contacts. A refusal conversion letter to telephone refusal cases inviting them to complete the short web survey will be sent at the end of data collection as the last push to increase response rate.

Section VI. SESRC's Recommendations for the full study

Table 19. Contact Sequence for the Full Study

| | |
|-------------------|--|
| SSI Sample | n=3,619 |
| BLS Sample | N=56,381 |
| Prescreen | Telephone contact for SSI sample |
| Phase 1 | Advance Letter with survey web link & \$1 |
| Phase 2 | 1st Questionnaire with survey web link and \$1 via First Class |
| Phase 3 | Thank you postcard |
| Phase 4 | 2nd Questionnaire with survey web link via First Class |
| Phase 5 | Telephone contact |
| Phase 6 | Email reminder |
| Phase 7 | Refusal short form letter |

6. Use the same survey instrument

The results from the Pilot study showed the current questionnaires worked well for all three modes. It is SESRC's recommendation that the full study should maintain the same questionnaire for all modes (web, mail and telephone). SESRC recommends adding one question (see Q52) at the end of the questionnaire for the full study-asking if the respondent agrees to be contacted in the future if we have questions regarding their answers. This is commonly done in business surveys and will serve as a precaution to help ensure the data quality if any data was in doubt after collected.

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50. What is your gender?

- 1 Male
- Female

51. How long have you worked at this business?

_____ number of years worked

52. Could we contact you again in the future if we have questions or need additional information about your answers?

- Yes, by email -+ Email address _____
- Yes, by phone -+ Phone number _____
- Yes, by mail -+ Mailing address _____
- No

53. If you have any additional comments about this survey or innovation in general, please write them in the box below.

Thank you!!

Please return your completed questionnaire in the envelope provided
or to:

National Survey of Business Competitiveness
Social & Economic Sciences Research Center
Washington State University
PO Box 641801
Pullman, WA 99164-1801

VII. SURVEY RESULTS

The frequency listings of the pilot study survey a result is included in Appendix A. The open-ended comments is included in Appendix B.

The most relevant frequency listings to the research objectives of the main study are the self-reported innovations rates from Question 27, reproduced below:

In the past 3 years, did this business produce any new or significantly improved goods?

| Cumulative | Q27A | Frequency | Percent | Cumulative Frequency | Percent |
|------------|------|-------------------------|---------|-------------------------|---------|
| Don't know | | 1 | . | . | . |
| Missing | | 17 | . | . | . Not |
| Applicable | | 178 | . | . | . |
| Skipped | | 129 | . | . | . Yes |
| | | 872 | 73.71 | 872 | 73.71 |
| No | | 311 | 26.29 | 1183 | 100.00 |
| | | Frequency Missing = 325 | | | |

In the past 3 years, did this business provide any new or significantly improved services?

| Cumulative | Q27B | Frequency | Percent | Cumulative Frequency | Percent |
|------------|------|-------------------------|---------|-------------------------|---------|
| Don't know | | 2 | . | . | . |
| Missing | | 20 | . | . | . Not |
| Applicable | | 163 | . | . | . |
| Skipped | | 129 | . | . | . Yes |
| | | 739 | 61.89 | 739 | 61.89 |
| No | | 455 | 38.11 | 1194 | 100.00 |
| | | Frequency Missing = 314 | | | |

In the past 3 years, did this business introduce new or significantly improved methods of manufacturing or producing goods or services?

| Cumulative | Q27C | Frequency | Percent | Cumulative Frequency | Percent |
|----------------|------|-------------------------|---------|-------------------------|---------|
| Don't know | | 1 | . | . | . |
| Missing | | 19 | . | . | . |
| Not Applicable | | 234 | . | . | . |
| Skipped | | 129 | . | . | . Yes |
| | | 685 | 60.89 | 685 | 60.89 |
| No | | 440 | 39.11 | 1125 | 100.00 |
| | | Frequency Missing = 383 | | | |

Section VII. Survey Results

The relatively high innovation rates owing either to social desirability bias or differences in the interpretation of “new or significantly improved” was anticipated in the Supporting Statement. We examine the likely effectiveness of auxiliary questions to differentiate “substantive innovators” from “nominal innovators” by computing associations amongst these variables and performing a preliminary cluster analysis. If the auxiliary variables are only weakly associated and/or if the cluster analysis is unable to identify highly distinctive groups then it is unlikely that the latent class analysis used in the main study will be able to identify distinct subpopulations in the sample that are useful for differentiating innovators.

Descriptive statistics for the relevant items of the auxiliary questions are reproduced below:

| Variable | N | Mean | Std Dev | Label |
|----------|------|---------|---------|--|
| Q13A_r | 1508 | 0.49735 | 0.50016 | Training requirements documented? |
| Q13B_r | 1508 | 0.44761 | 0.49741 | Track training completions? |
| Q16_r | 1508 | 0.44430 | 0.49705 | Use computers on a daily basis? |
| Q24_r | 1508 | 0.45557 | 0.49819 | Document good work practices? |
| Q25_r | 1508 | 0.42241 | 0.49411 | Monitor customer satisfaction? |
| Q26_r | 1508 | 0.51658 | 0.49989 | Processes changed customer complaints? |
| Q28A_r | 1508 | 0.21883 | 0.41359 | Innovation activities abandoned? |
| Q34D_r | 1508 | 0.23276 | 0.42273 | Fund additional innovation projects |
| Q37D_r | 1508 | 0.25199 | 0.43430 | Trade secret protections |

Questions Q13A through Q26 are indicators of the extent to which data drives decision-making within the establishment. The relatively high share of establishments answering these questions affirmatively suggests that these variables by themselves may not be effective in identifying the subset of substantive innovators among self-reported innovators. In contrast, not more than a quarter of respondents answered any of the last three questions in the list affirmatively. In addition, all three questions are thought to have a much more direct link to substantive innovation activities within the establishment. We will have more faith in the potential value of the data driven decision-making variables (Q13A-Q26) in differentiating substantive from nominal innovators if they tend to be strongly correlated with Q28A, Q34D or Q37D

All the associations between the listed auxiliary variables are significant. The strength of these associations are demonstrated for Q34D (would surplus funds be used to fund additional innovation projects) with the data-driven decision making variables. The strength of the association is most easily interpreted as an odds ratio from the estimation of relative risk between pairs of binary

Section VII. Survey Results

variables. Respondents answering Q34D affirmatively would be twice as likely to answer the data-
decision making variables affirmatively with the exception of Q16.

Associations with Q34D

| | Q13A | Q13B | Q16 | Q24 | Q25 | Q26 |
|-------------------------|--------------------|--------------------|-------------------|--------------------|--------------------|------------------|
| Tetrachoric Correlation | 0.2511 (0.0427) | 0.2475 (0.0427) | 0.174 (0.0437) | 0.3528 (0.0407) | 0.3311 (0.0412) | 0.3614 0.0408 |
| Odds Ratio Lower 95th | 1.5787 | 1.5625 | 1.2704 | 2.1298 | 1.9939 | 2.1948 |
| Odds Ratio Upper 95th | 2.5799 | 2.5359 | 2.0536 | 3.4985 | 3.2516 | 3.6711 |

Disjoint cluster analysis provides a rough analogue to the latent class analysis to be used in the main study. Applied to the pilot data the cluster analysis demonstrates that the set of variables is effective in differentiating observations. For the disjoint cluster analysis we set the maximum number of cluster to four to parallel the four latent classes we anticipate observing in the data: 1) data driven non-innovators, 2) nominal innovators, 3) non-innovators, and 4) substantive innovators. Examining the means of cluster variables across clusters helps interpreting cluster membership. Cluster 3 is the largest cluster and cluster means suggest that both data-driven decision-making and the other indicators of substantive innovation are very rare within this cluster. Cluster 3 corresponds closely to the archetype of a non-innovating establishment. In contrast, establishments in cluster 4 overwhelmingly pursue data driven decision-making practices and are the group most likely to demonstrate other substantive innovation behaviors. Cluster 4 comprises about 21% of the sample which is close to the identification of 24% of manufacturing firms being “highly innovative” in a qualitative study of rural English firms (David and Smallbone 2000). Differentiation of the remaining two clusters is not as clear cut but this exploratory analysis supports the classification of Cluster 1 establishments as data driven non-innovators and cluster 2 as nominal innovators.

| Cluster | Cluster Means | | | | | | |
|---------|---------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | Q13A_r | Q13B_r | Q24_r | Q25_r | Q26_r | Q28A_r | Q34D_r |
| Q37D_r | | | | | | | |
| 1 | 1.000000000 | 0.915211970 | 0.568578554 | 0.371571072 | 0.416458853 | 0.119700748 | 0.221945137 |
| 2 | 0.040000000 | 0.000000000 | 0.370000000 | 0.613333333 | 0.866666667 | 0.270000000 | 0.326666667 |
| 3 | 0.034907598 | 0.000000000 | 0.193018480 | 0.041067762 | 0.127310062 | 0.127310062 | 0.075975359 |
| 4 | 1.000000000 | 0.962500000 | 0.793750000 | 0.887500000 | 0.906250000 | 0.434375000 | 0.396875000 |

Section VII. Survey Results

Cluster Summary

| Cluster | Frequency | RMS Std Deviation | Maximum Distance from Seed to Observation | Radius Exceeded | Nearest Cluster | Distance Between Cluster Centroids |
|---------|-----------|----------------------|---|--------------------|--------------------|---------------------------------------|
| 1 | 401 | 0.4003 | 1.7717 | | 4 | 0.9758 |
| 2 | 300 | 0.4081 | 1.7264 | | 3 | 1.0625 |
| 3 | 487 | 0.2993 | 1.7810 | | 2 | 1.0625 |
| 4 | 320 | 0.3864 | 1.7128 | | 1 | 0.9758 |

The use of auxiliary questions to differentiate substantive innovators from nominal innovators is critical to deriving valid comparisons of rural and urban innovation rates. The strategy is also novel in innovation surveys. Cognitive interviewing confirmed that these auxiliary questions were easily understood by respondents. Preliminary analysis of these pilot data provides assurances that the auxiliary questions will be effective in differentiating self-reported innovators. The significant advantage that latent class analysis has over cluster analysis is that class membership is probabilistic in contrast to cluster membership that is distinct, allowing more flexibility in arriving at the class size which best captures the phenomenon of interest. The formidable task in the main study will be providing external validation of the latent class structure.

REFERENCES

North, D. and Smallbone, D. 2000. "The innovativeness and growth of rural SMEs during the 1990s," *Regional Studies* 34(2):145-157.

VIII. Full Study Survey Instrument

Proposed Advance Letter for Full Study

WASHINGTON STATE
 UNIVERSITY

Social and Economic Sciences Research Center

April xx, 2014

«CONTACT»
« BNAME»
«ADDRIn «UNIT"
«CITY>| «STATE" «ZIP»«dash»«ZIP4"

Dear «CONTACT":

We are writing to let you know that the Economic Research Service of the U.S. Department of Agriculture has asked us to contact you for an important national study of businesses. *The goal of this study is to increase our knowledge on how businesses stay effective and what types of things can help businesses meet new needs that arise.*

The Department of Agriculture provides many programs aimed at helping all types of businesses throughout the country but they would like to do more. We hope this study helps government understand how it can be helpful. It is critical to understand the link ages of what keeps businesses vital and the availability of resources.

To complete the survey type this web page address in your Internet browser's address bar (not the Google or Yahoo search bar), and then type in the following access code:

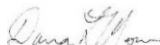
<http://opinion.wsu.edu/business> Access Code: «RESPID**

We hope you will take the time to complete this important survey. Gaining a full understanding of the situation U.S. firms are facing in today's economy depends upon you and others like yourself. Your responses will be kept strictly confidential and your name will not be connected to your answers in any way.

If you have any questions about this effort, or would prefer to participate by telephone please feel free to contact us at 1-800-833-0867 or scsrowcb7@wsu.edu.

Thank you in advance for your help. We appreciate it very much. A small token of appreciation is enclosed with this letter as a way of saying thank you.

Sincerely,


Danna L. Moore Ph.D.
Principal Investigator

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