

## CONVERTING MAIL REPORTERS TO TOUCHTONE DATA ENTRY

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**BACKGROUND:** The Current Employment Statistics Survey (CES) conducted by the Bureau of Labor Statistics (BLS) is a monthly survey of over 390,000 business establishments. The survey collects information on employment, payroll, and hours. The employment data are regarded as a key barometer of current economic activity, and also serve as an input into other economic indicators, while the hours figures are considered one of the group of leading economic indicators.

As its' name suggests, the hallmark of the CES survey is its timely collection and publication of information. In general, there are about 2 weeks of data collection prior to tabulation and publication of preliminary estimates. Revised estimates are published after 5 weeks of collection, and final estimates are published after 8 weeks.

Until recently, data collection was almost exclusively via mail. Under mail collection, response rates for preliminary estimates average 55%. In an effort to improve response rates and, thus, reduce revisions between the preliminary and subsequent estimates, BLS has embarked on a long-term program to introduce various automated collection methods into the CES. [Werking and Clayton, 1991]

In 1985, BLS introduced Computer Assisted Telephone Interviewing (CATI) into the CES. In 1986, automated self-reporting using a touchtone phone was introduced. This method, referred to as Touchtone Data Entry (TDE), allows the respondent to dial a computer and report their data using the number pad on their phone. Currently, over 60,000 businesses, representing over 30% of sample employment, report each month using the TDE system. Response rates under TDE average 80%.

While TDE reporting yields much higher response rates than mail, it is essentially a "self reporting" collection method--respondents must call in on their own. To assist respondents in the reporting process,

BLS currently mails an "advance notice" postcard to each respondent at about the time their data are normally available. This postcard notifies the respondent that the reporting period is approaching. Then, as the cutoff time for receipt of data for preliminary estimates approaches, interviewers place short nonresponse prompt (NRP) "reminder" calls to sample units who have not yet reported.

Until now, the primary focus has been to convert large units (those with 50 or more employees) which generally report after the cutoff date for preliminary estimates to TDE. This focus was driven by the desire to reduce the size of the revision between preliminary estimates and subsequent estimates. The most effective way to accomplish this was to concentrate efforts on the largest sample units which have the greatest weight in preparing estimates.

To affect this transition, BLS used CATI as a "change vehicle". Groups of large reporters who reported late were systematically converted to CATI for a 6-month time period. During this period, an experienced interviewer contacted the respondent each month to collect the data. The interviewer worked to educate the respondent on the importance of the CES program and of timely reporting. After this 6-month period, the respondent was transferred to TDE. Through this process we were able to improve response rates for these large units from the 40% range when on mail to about 90% on CATI. TDE response rates have averaged 80%.

**CONVERSION OF SMALL SAMPLE UNITS TO TDE:** As conversion of the larger sample units to TDE is nearing completion, BLS has begun to look toward converting smaller sized sample units to TDE. Conversion of these units to TDE would have several major benefits:

- improve response rates
- lower overall survey costs
- improve sample control

*Improve Response Rates-* Because it eliminates the delay associated with mail-back and internal handling of forms, TDE will naturally improve response rates by the percent of sample which fails to be processed but

has been sent by the respondent. Previous studies have shown that about 9% of all forms returned by mail are received in the 3 days following the cut-off date for preliminary estimates. These reports would be included if reported via TDE.

*Lower Survey Costs-* Previous cost studies have shown that TDE costs are about 40% less than mail. Under mail collection, the survey form must be placed in envelopes, mailed out, opened when received, prepared for key entry, and entered into the data base. Under TDE, the respondent receives an advance notice postcard (easier and cheaper to mail), then calls in their data. Once the respondent calls in their data, it is in machine-readable form and can be quickly and easily merged into the survey processing estimation system (no key entry).

*Improve Sample Control-* Under TDE, the survey manager has instant access to the status of each case. The manager can simply look at the data file on the computer and see if a report has been received. Under mail, the report may be on the respondent's desk, in the mail, in the mailroom, or awaiting key entry. This uncertainty makes nonresponse follow-up activities very difficult and potentially wasteful. Currently, late mail reporters are sent a delinquency postcard. However, for the reasons cited above, this postcard is mailed after initial estimates have been prepared.

One issue which must be addressed in this second phase of TDE conversion is how long a time-frame to allow for conversion. If the current procedures (6-months on CATI) were continued, it would take 10 years to convert the 235,000 sample units with employment under 50. This seemed to be an unacceptably slow pace. Therefore, it was determined that we would convert these smaller units directly from mail to TDE. It was felt that direct conversion could be accomplished at a much faster pace and would still provide a major improvement in program performance and operations. In making this determination the following were considered:

- smaller units already have higher response rates than larger units. The response rate for smaller units averages 60% under mail compared with 40-45% for larger size classes. Thus, there is less need for CATI to educate these units regarding timely reporting.
- an earlier small-scale feasibility test of direct mail to TDE conversion yielded promising results.

- the expected cost savings seemed to out-weigh the improvement in response rate that would result from a full 6 months of CATI conversion.

- the workload associated with providing nonresponse prompting calls to thousands more units could be effectively replaced with automated FAX messages.

FAX to Replace Postcards and Telephone Calls: The emerging use of FAX machines by business suggests that survey organizations may be able to use this type of communication to replace mail. A small feasibility study of the availability of FAX for CES reporters [Rosen, and Clayton, 1992] suggested that this is a viable method of communication. In the 1992 study, we found that about 75% of CES respondents had FAX machines and were willing to receive messages.

Thus, for units being converted from mail to TDE we would replace the advance notice postcard with a FAX message. We would also use FAX for nonresponse follow-up activities, replacing the postcard currently sent to mail units and the interviewer call used for larger TDE units.

Test of Conversion Procedures: In March 1994, BLS began a 5-State test of procedures for conversion of small-sized establishments directly from mail to TDE reporting. This paper reports on the results of this test.

*Single Call Conversion:* Under this approach, an experienced interviewer calls the respondent to screen for the use of a touchtone phone and availability of a FAX machine. If the unit has a touchtone phone and FAX machine, then the interviewer explains TDE and requests that the respondent begin reporting via TDE. The interviewer also confirms all contact information such as name and address, answers any questions, explains the timeliness requirements of the survey, and reviews CES definitions.

Units that have a touchtone phone and a FAX machine are then sent a *Respondent Reporting Package* which includes a new survey form, instructions on how to use the TDE system, and more information about the CES Survey. All this material is packaged in a convenient folder.

Research Issues: A number of methodological and procedural issues needed to be addressed. These included:

- *Availability of Touchtone Phone:* Our research to date has shown that about 90% of businesses have touchtone phones. However, most of the units converted thus far were large units.

- *Availability of FAX Machine:* Our previous feasibility study which was conducted on larger size classes suggested that about 80% of businesses had FAX machines.

- *Willingness to Receive FAX Messages:* Again, our previous feasibility study indicated that respondents did not mind receiving a FAX in lieu of a postcard or a telephone call.

- *Transition:* Here we are concerned with implementing procedures that will effect a smooth transition from one collection method to the other. If this transition is not smooth, response rates may suffer or units may drop out of the survey entirely.

- *Timeliness of Response:* As mentioned earlier, we expected an improvement in the response rate, even for units that were already timely reporters. This is because of the elimination of the mail delay. Because of the use of FAX for nonresponse follow-up, we also expected improvement in the response rate for less timely reporters. Under mail reporting, units that do not report by the cut-off for preliminary estimates received a nonresponse prompt postcard after the initial reporting deadline. The nonresponse FAX message would be sent before the cut-off for preliminary estimates.

- *Effectiveness of FAX Messages:* The 1992 FAX test indicated that the advance notice FAX message was slightly more effective than a postcard and that the FAX message for nonresponse was somewhat less effective than an interviewer call.

- *Attrition:* To be an effective reporting vehicle, the attrition rate associated with the reporting method must be manageable. A 1993 study of attrition of current TDE units compared to mail indicated that TDE attrition was somewhat less than that under mail [Rosen, Clayton, and Wolf, 1993].

**RESULTS:** The methodology for conversion of sample units from mail to TDE appears to be highly successful. During the first four months of the test, over 1,200 units were converted to the TDE/FAX system. For these units, the response rate for preliminary estimates rose from 78% under mail to 90% under TDE/FAX.

Figure 1 summarizes the results for the key methodological issues discussed above.

**Figure 1. Summary of Results**

Touchtone availability	87%
FAX availability	81%
Willingness to receive FAX	98%
Transition to TDE	No problems
Timeliness of response	
for preliminary estimates	90%
Effectiveness of FAX	
for nonresponse	60%
Attrition	Insufficient number of months to measure

*Availability of Touchtone Phone:* While 87% of the sample units in the test had touchtone phones, there are some differences when this figure is disaggregated into smaller size categories. As figure 2 shows, very small establishments, those with less than 10 employees, are less likely to have a touchtone phone. This suggests that to completely automate data collection we may need to explore other automated collection technologies such as voice recognition.

*Availability of FAX:* Overall, 81% of the units with a touchtone phone also had a FAX machine. The incidence by size of firm is shown in Figure 2. These findings show a somewhat higher incidence of FAX than our earlier feasibility test. The results of the current study (two year later) may reveal a continuing trend toward smaller businesses having FAX machines, a trend that is beneficial for respondent contact. As with touchtone availability, very small units were less likely to have a FAX machine.

**Figure 2. Incidence of Touchtone Phone and FAX Machine by Size of Firm**

Size of Firm:	Touchtone Phone	FAX Machine
0-4 Employees	75%	62%
5-9 Employees	78%	73%
10-19 Employees	90%	85%
20-49 Employees	93%	89%
50 or more	100%	88%
Total	87%	81%

*Transition to TDE:* Overall, the transition from mail to TDE seems to have gone quite smoothly. This is best

exemplified by looking at the timeliness of response for the initial month of conversion compared with recent pre-conversion months. Figure 3 compares the response rate for preliminary estimates for two panels of units. The March panel contained 95 units, while the April panel contained 192 units. The overall response rate rose by 5-7 percentage points.

This increase was expected simply because of the elimination of the mail delay. Additionally, these units now receive a nonresponse prompt FAX message several days prior to the cut-off for data receipt for preliminary estimates. Prior to conversion, they received no nonresponse prompt notification prior to the cut-off date. The degree of improvement appears to be greater when the pre-conversion response rate is lower. The two States where selected units had response rates in the 70% range, the post-conversion response rate improves to over 90%. This is likely the result of the nonresponse prompt FAX message.

It should be pointed out that during the first few months of the study we specifically converted mail units with relatively good reporting histories. This was to minimize risk to data collection while the States operating the system became familiar with it and systems and procedures were being tested. During subsequent months, units with more representative reporting patterns were converted.

**Figure 3. Response Rate for Initial Month of TDE Conversion Compared with Mail**

State:	5-months before	March '94
Georgia	N=20 82%	80%
Pennsylvania	N=44 88%	89%
Maine	N=31 73%	90%
North Carolina	N=0 --	--
Tennessee	N=0 --	--
Total	N=95 82%	87%

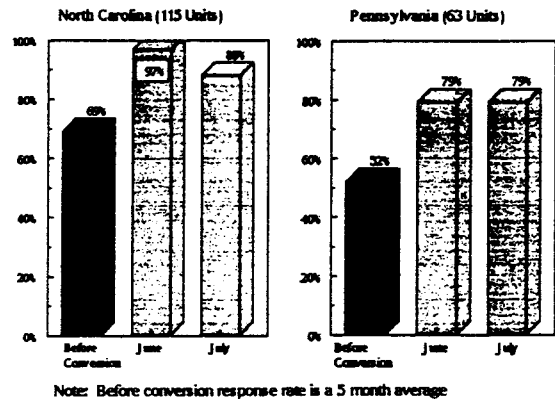
  

State:	5-months before	April '94
Georgia	N=50 90%	92%
Pennsylvania	N=43 94%	93%
Maine	N=52 79%	92%
North Carolina	N=20 73%	95%
Tennessee	N=27 94%	89%
Total	N=192 87%	94%

**Timeliness of Response:** Overall, the response rate for the 1,239 units converted to FAX improved from 78% to 90%. However, this aggregate figure includes many units with good reporting histories that were converted

during the early months of the study. Figure 4 illustrates the degree of improvement which is possible for sample units with more representative reporting patterns.

**Figure 4. Representative Panel of Mail Respondents Converted to TDE/FAX in June 1994**



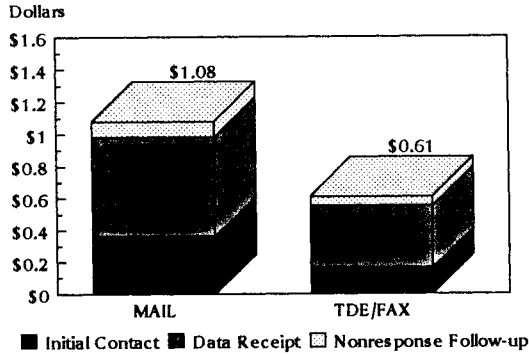
In these examples, we achieved a 23-27 percentage point improvement in performance using TDE/FAX.

There are four factors which contribute to this improved performance:

- *Direct contact with the respondent*-this allows us to confirm name, phone number, etc. and solidify the reporting arrangement.
- *Elimination of the mail delay*-the mail delay likely results in a 6-9% decrease in response.
- *Advance notice FAX with "due date"*-the FAX message provides a specific target date for reporting.
- *Nonresponse prompt FAX message*-this provides sample units with a second reminder to report. This is not feasible under mail collection.

**COSTS:** In addition to improving response rates and improving overall sample control, TDE/FAX is very cost effective. Figure 5 provides a cost comparison of mail collection with TDE/FAX. Costs are broken down into the three major components of data collection--initial contact, data receipt, and nonresponse follow-up.

**Figure 5. Direct Cost of Data Collection:  
Mail vs TDE/FAX**



**Initial Contact:** For mail, this includes a host of labor intensive activities required to preparing the mail-out (ie. folding, stuffing, metering, etc.) as well as the cost of the mailing. For FAX, this task is accomplished by pressing a few key strokes on a personal computer. The one-page FAX message requires about 45 seconds on the telephone line, or about 15 cents, compared with 29 cents for first class postage.

**Data Receipt:** For mail, data receipt includes the cost of return postage as well as the labor cost to key enter the data. Under TDE, the respondent calls a toll-free number and reports the data. A typical TDE call takes less than 2 minutes. The data are already in machine-readable form and can be quickly merged into the State processing system. Charges for a two minute phone call are about 40 cents, while postage for mail is 29 cents and key entry adds an additional 40 cents to the cost.

**Nonresponse follow-up:** For mail, this involves printing and mailing a delinquency postcard to units that fail to report by the cut-off date for initial estimates. Under FAX, delinquent units are sent a one-page FAX reminder. Cost for both the mail and FAX component are comparable. However, the FAX message is delivered prior to the deadline for initial estimates while the postcard is received after the deadline.

**FAX NONRESPONSE SYSTEM:** The FAX nonresponse system utilizes a FAX board resident on the TDE collection PC. Special programming and interfaces were written to directly access the TDE data files and customize a message for each sample unit. A sample of the Advance Notice FAX message is displayed in Figure 6.

The system is designed to stagger the sending of messages based on the unit's length of pay period. Thus, units with a weekly payroll are sent their message earlier than those with a monthly payroll. The system also automatically retries the phone number up to three times. Performance measures for this system were presented in *An Operational Test of FAX for Data Collection*, ASA, 1992. The current version of the system operates in essentially the same manner.

**Figure 6. Example of Advance Notice FAX Message**

ATTN: RICK ROSEN  
 COMP: BLS/OEUS/WIES/BDAR ID:9076543  
 DATE: 10/00/94 14:46:32  
 FROM: STATE AGENCY NAME

If possible, please report by November 18

**CURRENT EMPLOYMENT STATISTICS SURVEY**

**TOUCHTONE  
COLLECTION  
ADVANCE NOTICE**

Please call in your  
Employment, Payroll and  
Hours data as soon as  
they become available  
using our toll-free number

**1-800-999-9999**

Thank you for your cooperation  
If you have any questions, call STATE CONTACT  
1-800-555-5555

Form approved  
O.M.B.No. 1220-0011  
Disclosure statement  
located on form 790

If you have already  
reported your data,  
please disregard  
this notice.

**YOUR DATA ARE IMPORTANT**

**CONCLUSIONS:** Direct conversion from mail reporting to TDE can be accomplished if planned and implemented in a coordinated manner. Such a conversion will have the dual benefit of improving response rates and lowering survey costs. Full conversion can be accomplished in a little as 3-4 years for the 235,000 smaller sample units.

One aspect of the survey process which must be watched closely is the potential impact that these changes in technology will have on the survey organization. The rapid introduction of automated data collection will likely affect the survey organization in a number of significant ways.

Automated collection will shift work from labor-intensive and largely clerical occupations (ie. mail handling, data entry, etc.) to technical occupations (ie. manipulating data files, running computer programs, monitoring receipt of data on the PC, etc.). Thus, existing staff must either be re-trained to perform these new functions or assigned to other duties.

For over 50 years the State Employment Security Agencies which collect CES data have geared their entire operation around handling and processing mail. They will need to re-engineer their operating procedures around automated receipt and handling of data.

This increased reliance on technology brings with it new risks. What if the collection PC goes down? What if phone service is interrupted? What if electric power goes out? To accommodate these possibilities we have built several layers of backup capability; including use of an uninterruptable power supply for short-term power outages, backup PC's, TDE, and FAX boards in the event of a hardware failure, and the ability to forward calls to an emergency collection site with only a few minutes notice.

**Note:** Any opinions expressed in this paper are those of the authors and do not constitute policy of the Bureau of Labor Statistics.

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