

THE IMPACT OF PROMPTING ON RESPONSE RATES: Experience with Touchtone Reporting in the CES Program

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KEY WORDS: Nonresponse, Advance Notice, Response Rates, Mode effects

Purpose

This paper presents research findings to determine the impact of Advance Notice and nonresponse prompting (NRP) for sample units who report to the Current Employment Statistics (CES) program using touchtone data entry (TDE).

Background

Achieving high response rates in a timely and cost-effective manner is top priority in the CES program, conducted by the Bureau of Labor Statistics. CES provides monthly estimates of total employment, production and non-supervisory worker employment and related hours and earnings. CES includes data collection methods such as mail, FAX, the Internet, CATI, EDI, and TDE. The latter constitutes roughly 47% of the CES survey sample, or approximately 160,000 establishments.

Early in January TDE respondents are provided reporting forms to record their CES information for the current year. After the 12th of the month, respondents call a toll-free number and use the number keypad on their phone to report their information to an automated computerized data collection system. TDE respondents have 9-15 workdays to prepare and report their data each month before the publishing of first closing or preliminary estimates. Low response rates for the preliminary estimates lead to revisions that are often larger than desired.

In an effort to obtain high response rate, TDE reporters may be prompted twice each month. The first prompt is an Advance Notice and is generally sent out around the middle of the month. The Advance Notice can be a postcard or a FAX message. The postcards are mailed after the 12th of the month; the FAX messages are sent out each day during the week where Monday's messages are referred to as ADV1, Tuesday's as ADV2, up to ADV5 for Friday's messages. In general Advance Notice is by FAX unless the respondent does not have a FAX machine or does not wish to receive FAX messages. In the final week of the month, respondents who have not yet reported may receive a NRP message, which is either a telephone call or a FAX message. The NRP messages are staggered throughout this week where Monday's messages are referred to as NRP1, Tuesday's as NRP2, up to NRP5 for Friday's messages.

For NRP, large firms receive phone calls and smaller ones receive FAX messages.

Faxes are relatively inexpensive compared to postcards and phone calls. Thus, from the standpoint of cost effectiveness, it is essential to determine whether or not these three modes of contact are equally effective in producing the desired response rates, and whether the more expensive modes justify the extra cost. This study attempts to measure the impact of Advance Notice and NRP on first closing response rates and compares the relative effectiveness of postcard, FAX and phone call, as a method of contact.

Results: Summary

Advance Notice only or NRP only lowers response rates. For the test conducted between March and July 2001, Advance Notice only lowered response rates by 10 to 11 percentage points, on average. There were no month by month statistically significant differences in the response rates between Call NRP and FAX NRP.

For the test conducted during August through December 2001, NRP only lowered response rates on average by 10 percentage points for Call NRP and by 8 percentage points for FAX NRP. Comparing the treatment with the control groups the average reductions were 14 and 7 percentage points for Call NRP and for FAX NRP, respectively. There was a statistically significant difference in response rates between the two treatment groups: FAX response rate was 8 percentage points higher, on average. Between the two control groups, there was no statistically significant difference in response rates.

Advance Notices and NRP are highly supplementary: they reinforce each other and are necessary for the maintenance of response rates that are at least 10 percentage points above those achieved in the absence of one or the other reminder messages.

Methodology

Two studies were conducted using randomly selected samples. In the first study, conducted from March through July 2001, we withheld NRP and provided only an Advance Notice message. In the second study, conducted from August through December 2001, we withheld Advance Notice and provided only an NRP message. Both studies tested the effect of suspension of NRP or Advance Notice on response rates for different contact modes.

Figure I outlines the study groups selected from the approximately 160,000 TDE respondent population, in terms of the sample size and composition. As can be seen, from the 105,069 eligible respondents the NRP group had 2,438 respondents and the Advance Notice group had 2,238 respondents. These, in turn, were split into a test and a control group of 1,219 for NRP (treatment and control) and 1,126 treatment and 1,112 control respondents for Advance Notice, and these again were split into two test and two control groups since the "mode" of Advance Notice or NRP varied. This allowed for examining and determining if the mode of contact has an impact on response. Advance Notice can either be by postcard or by FAX, whereas NRP may be by telephone call or FAX.

This process yielded 8 random samples of approximately equal size. These samples met the following treatment selection criteria:

- No multi or cross state multi reporters
- Quota sample units reporting for firms of sizes 1 - 7 (1 - 499 employees)
- NRP 0 and 1 - 5 (Monday through Friday NRP call and NRP FAX recipients)

The exclusions of probability sample units and firms of sizes > 7 were for convenience, and to insulate these units from any possible negative impact on response from affecting our production estimates (since these tests were conducted using live production sample). Over the course of the study some units of size 7 in the treatment NRP call groups were made FAX eligible and were removed from the Call treatment and Call control groups, while others either refused to participate or went out of business and were also removed from the samples. However, for the most part the sample units remained stable within their respective groups. Tables I and II below show the sample units for the first and last month of the tests.

**Table I. Sample Sizes for NRP Study Groups
March-July 01**

Month	Call Treat.	Call Control	FAX Treat.	FAX Control
March	617	616	602	603
July	614	514	602	600

**Table II. Sample Sizes for Advance Notice Study Groups
August-December 01**

Month	Postcard Treat.	Postcard Control	FAX Treat.	FAX Control
August	553	532	568	563
December	479	488	521	528

The 8 study groups are random samples. The 4 treatment groups, however, may not be completely independent samples in view that they came from the population which had been receiving Advance Notice and NRP messages if delinquent prior to the study. In

other words, the treatment group was, prior to its selection part of the control group. The question of independence, however, may be of minimal consequence over the time of the study in view of the longevity of the study (5 months for each). It can be assumed that the effect of the controlled pre-test condition dissipated over time in the treatment samples. The relatively large samples also allowed the use of the z-test statistic for testing of equality of proportions or proportional differences in the response rates.

To ensure reasonably high confidence of drawing conclusions about the effect of contact mode on response rates, it was desirable that the groups within and between each prompting mode were as similar as possible with respect to the factors that may have a bearing on the ability of respondents to report by first closing. These factors were assumed to apply equally to all respondents in the samples due to the randomness of their selection. In this regard we concur with Willimack et al. (2002) about the factors they list that bear on response rates of businesses, and note that these are equally relevant to this study.

The characteristics of the NRP study groups and the Advance Notice study groups are similar. However, with regard to inter-prompting mode comparison, there are considerable differences, except for length of payroll which shows an overall downward trend with increasing length of payroll (weekly, bi-weekly, semi-monthly, and monthly) for both. The almost symmetrical distribution of firm sizes for the FAX groups and the skewed distributions for the Call groups; also the downward sloping distribution and relatively fewer numbers of respondents with NRP4 and NRP5 for the FAX sample. The smaller number of units for NRP4 and 5 should give FAX respondents a slight edge on response rates over the Call units.

The apparent difference in size between prompting modes primarily reflects the current rules in place for respondent contact and differences in the availability of a FAX machine. Since calls have generally been perceived as more effective than faxes, the current NRP rules are to call all large size class firms.

Thus, the NRP Call group shows a disproportionate number of firms in the large size 7 class. For Advance Notice our current rule is to FAX to anyone that has a FAX machine (85% of units) and only send postcards if a FAX machine is not available (15% of units). The difference by size by prompting mode (Call versus FAX) for the Advance Notice study primarily reflects differences in the availability of FAX machine by size of firm.

Two related factors have a definite impact on first closing response rates: length of pay period, and length

of the collection period. Establishments with a weekly or semi-monthly payroll are more likely to have their data available shortly after the 12th of the month, and can report prior to the closing date. Bi-weekly payrolls are often not available until a few days before the cut-off date, while firms with a monthly payroll often do not have their data available until after the preliminary cut-off date. The distribution of units by payroll period in both studies is very much the same, and would not be a major factor contributing to differences in response rates between Call and FAX NRP. The other related factor is the number of data collection days or length of the data collection period. There were three months with 14 days, two months with 12, 11, and 10 days, and one with 9 days. Short collection periods yield lower response rates than do long collection periods, but these variations apply equally to the 8 study groups and should not produce differences in first closing response rates.

Analysis

I. NRP Test (No NRP)

NRP follow-up to Advance Notice by FAX or phone call improves response rates. The suspension of NRP leads to lower response rates. Table III shows the response rates of NRP test for the control and treatment groups between March through July, for Call and FAX NRP units.

Comparing treatment response with the control group response rates were lowered by between 7 and 16 percentage points for Call-NRP and 8 and 16 percentage points for FAX-NRP, an average difference in monthly response rates of 12 and 11 percentage points, respectively. In August, when NRP was reinstated, response rates of the treatment groups shot up to 76% and 80% for Call and FAX NRP, a gain of 8 and 12 percentage points, respectively. Although the 4 percentage point difference between Call and FAX NRP was not statistically significant ($\alpha > 0.10$), apparently the FAX group was more responsive to the reinstatement of NRP than was the Call group.

The pre-study month's response rates showed no statistically significant differences (with $\alpha > 0.07$) between the treatment and the control groups. However, in the post-study month, August, there was a statistically significant difference in response rates for the two FAX groups between treatment and control, with $\alpha < 0.05$. For the FAX treatment group the impact of Advance Notice resumption in August raised response rates from 67% to 80%, while for the control group the response rate stayed about the same (76% in July and 75% in August). The Call groups' response rates were 76% and 79%, for treatment and control, respectively. This increase for the treatment group was to be expected once normal NRP activities resumed and further

confirms the importance of nonresponse prompting. It is interesting to note that it only took one month of NRP resumption to return the response rate to the normal pre-test levels.

Table III. NRP Test Response Rates

		Call Group			FAX Group		
Month		Treat.	Cont.	Diff.	Treat.	Cont.	Diff.
Pre-test	Feb (14)	78%	82%	- 4%	79%	80%	- 1%
	Mar (14)	75%	82%	- 7%	74%	82%	- 8%
	Apr (11)	70%	81%	- 11%	66%	82%	- 16%
	May (9)	63%	78%	- 15%	63%	77%	- 14%
	Jun (12)	69%	79%	- 10%	69%	77%	- 8%
	Jul (11)	63%	79%	- 16%	67%	76%	- 9%
Average (Mar-July)		68%	80%	-12%	68%	79%	- 11%
Post-test	Aug (14)	76%	79%	- 3%	80%	75%	5%
	Average (Feb-Aug)		80%			78%	

Number in the month column refers to the number of collection days

II. Advance Notice Test (No Advance Notice)

In August through December Advance Notice was withheld from respondents in the two treatment groups. Table IV shows the response rates. July 2001 and January 2002 refer to the pre-test and post-test response rates, respectively, when treatment groups received an Advance Notice and the NRP follow-up. The absence of Advance Notice postcard lowered response rates, on average, by 14 percentage points for postcard group and the absence of Advance Notice FAX by 7 percentage points for FAX group. The differences in response rates for the treatment groups between postcard and FAX are statistically significant ($\alpha < 0.01$) in the 5 treatment months, as well as in the initial pre-test month. For August through December treatment response rates declined by 10 percentage points for postcard (74% to 64%), and by 8 percentage points for FAX (80% to 72%). Thus, Advance Notice postcard or FAX, relative to the pre-test response rates, adds roughly 10 percentage points to the final response rate. Relative to the control group, the postcard added 14 percentage points and the FAX message added 7 percentage points to final 5-month average response rates.

Absence of postcard Advance Notice had a larger negative impact on response rates for Call NRP than did absence of FAX Advance Notice for FAX NRP. The total negative impact for August through December was 72 percentage points for the postcard and 38 percentage points for the FAX, a difference of 34 percentage points. This difference in impact may have been due to the difference of 6 and 4 percentage points in the initial response rates of July between Call and FAX Treatment and Call and FAX Control. The average difference

between the Treatment groups for the 5 months was roughly 8 percentage points, and for the two Control groups it was 1 percentage point. In January 02 when Advance Notice was in effect again, the difference between Call and FAX NRP for the treatment groups declined to 3 percentage points (not statistically significant, a $>.28$) and to zero percentage points for the two control groups.

Table IV. Advance Notice Test Response Rates

	Call NRP			FAX NRP		
	Treat. No P. card	Cont.	Diff.	Treat. No FAX	Cont.	Diff.
Jul 01 (11)	74%	75%	1%	80%	79%	1%
Aug (14)	62%	77%	15%	71%	82%	11%
Sep (12)	67%	79%	12%	74%	79%	5%
Oct (10)	64%	78%	14%	74%	78%	4%
Nov (14)	65%	82%	17%	73%	81%	8%
Dec (10)	60%	74%	14%	67%	77%	10%
Average	64%	78%	14%	72%	79%	8%
Jan 02 (10)	72%	74%	2%	75%	74%	-1%

Interaction between Advance Notices and NRP

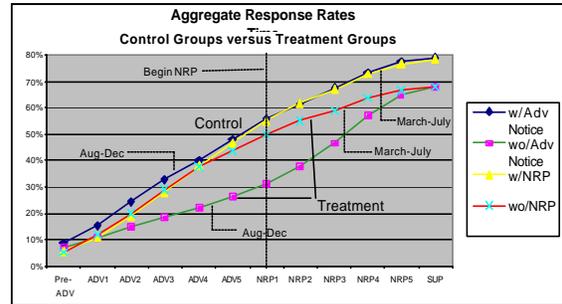
An interesting issue is whether rates above 70% can be achieved with only one prompt. This study shows that Advance Notice and NRP follow-up are strong supplements. It is with the combination of Advance Notice and NRP follow-up that response rates above 70% are produced. NRP follow-up adds at least 10 percentage points to the response rates of Advance Notices; Advance Notice adds approximately 14 percentage points to Call NRP and 7 percentage points to FAX NRP.

This supplemental effect is shown in the Figure II, which compares the daily cumulative response rates of Control versus Treatment groups, and Figure III which compares Call and FAX NRP with and without NRP, and with and without Advance Notice. The response rates are combined for the two Control groups and for the two Treatment groups, averaged for Call and FAX NRP and cumulated for each collection day over the two 5-month periods, beginning with the 12th of the month, the pre-Advance Notice day, through Advance Notice 1 (ADV1), up to and including ADV5, day 5, when Advance Notices are either send by postcard or by FAX, then when delinquent respondents are either called or faxed, beginning with NRP1, through NRP5, day 10, and supplemental day (SUP), the final closing day.

The two control groups, for March-July and August-December show similar trajectories over time, with decreasing returns, but with a slight advantage of Advance Notice FAX over Advance Notice postcard up to when NRP kicks in. From NRP1 on the two curves

follow the same pattern, arriving at an average response rate of 78% at first closing. The slight edge of FAX Advance Notice over postcard Advance Notice at the

Figure II



beginning of collection period is most likely because Faxes reach their destination on the day they are sent while postcards get to their destination several days after they are sent, although to compensate for later arrival time, postcards are generally send two or three days prior to when Faxes are send. But we do not know what transpires once the postcard or the FAX gets to its destination.

This is also seen comparing the Control trajectory with the Treatment trajectory for March-July, when NRP was withheld. Note that for the postcard Advance Notice, up to ADV4, the Treatment group's response rates follow closely the responses rates of the Control group. Thus, initially, Advance Notice FAX, probably because it is seen sooner by the respondent, produces a slightly higher response rate than does Advance Notice postcard, which is seen to impact the respondent approximately one day later.

The Advance Notice only curves begin very much like the two control group curves up through ADV5. However, the curves begin to diverge sharply on NRP1, the first day that NRP would have begun (and we withheld in the case of the treatment group). Thus the response curve tapers off more rapidly for the no NRP treatment group.

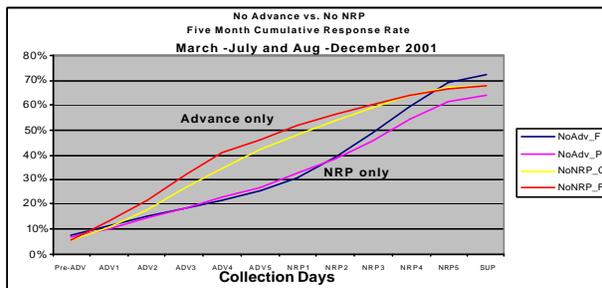
The NRP only treatment curves show a much different pattern. Since no Advance Notice is provided at the beginning of the reporting period, response is very slow during the ADV1-ADV5 period. Relying solely on the respondents' recollection to self-report, response is less than 30% at ADV5, compared with nearly 50% for the groups receiving Advance Notices. As NRP begins response rises sharply (in contrast to the diminishing returns of NRP for the other groups) and the gap closes to only 10 percentage points by end of the collection cycle.

In the end, both treatment groups arrive at the same response point of 60%, about 10 points below the

expected response rate of 70% exhibited by the two control groups.

In Figure III we show the response rates between postcard and FAX and between the two NRP modes of NRP contact. As can be seen from the Advance Notice only curve, Advance Notice FAX has a slightly higher initial response rate beginning with Pre-ADV up to NRP3 than does postcard; after NRP3 the response rates begin to narrow and to coincide at 68% final response rate. The final result is a response rate that is roughly 10 percentage points below those achieved when Advance Notice is followed by NRP.

Figure III



The daily incremental additions to the final response rates are shown in Tables V and VI. Table V shows that FAX Advance Notice produces 1% to 1.8% higher incremental response rate up to ADV4, then gradually diminishing these increments below those for postcard Advance Notice. There appears to be roughly a one or two day delay when the postcard is seen and acted upon by the respondent. Note that the Pre-Adv rates are 5.2% and 5.3%, but on ADV1 day the rates differ by 2.3% in favor of FAX NRP. Advance Notice postcard appears to take effect on ADV2 day when the response rate rises to 7.2%.

What is surprising is that, over the 5 month period, the final response rates are statistically highly different ($\alpha = .0048$) with 64.4% for Call treatment versus 72.4% for FAX treatment groups. The incremental additions to the response rate from pre-ADV through ADV5 are relatively equal, and begin to widen from 6.3% on NRP1 to 12.3% on NRP4 for FAX, and from 5.8% to 11% for Call on NRP4. It has been thought that the personal contact effect of call NRP produced a higher response rate than the FAX NRP. The absence of Advance Notice postcard showed response rates that were consistently below the FAX Advance Notice up to a total of 8 percentage points, with respect to the FAX final response rate. These 8 percentage points are approximately equal to the sum of the difference in the incremental response rates of 1 percentage point beginning with ADV5 and ending with the supplemental day (SUP). A post study verification of response rates conducted for the June 2002 first closing

(with 11 collection days) for the study groups showed no significant difference, with response rates of 80% and 82% for the treatment groups and 78% and 81% for the two control groups for postcard and FAX Advance Notices respectively. Thus, we are left with an anomaly of sorts in this aspect of the test. Why was FAX NRP apparently more effective than Call NRP?

Table V. Advance Notice Only Average Response Rates

Prompting Days	Postcard Treatment	FAX Treatment
Pre-ADV	5.2%	5.3%
ADV1	5.6%	7.9%
ADV2	7.2%	8.5%
ADV3	8.2%	10.0%
ADV4	8.1%	9.0%
ADV5	7.5%	5.5%
NRP1	6.0%	5.6%
NRP2	5.8%	4.6%
NRP3	4.8%	3.4%
NRP4	5.1%	3.8%
NRP5	3.0%	2.9%
SUP	1.5%	1.4%
Total	68.0%	67.9%

Table VI. NRP Only Average Response Rates

Prompting Days	NRP Call Treatment	NRP FAX Treatment
Pre-ADV	7.2%	9.3%
ADV1	2.7%	3.6%
ADV2	3.0%	3.2%
ADV3	3.0%	2.7%
ADV4	4.0%	3.7%
ADV5	3.8%	2.9%
NRP1	5.8%	6.3%
NRP2	8.0%	9.1%
NRP3	7.7%	9.5%
NRP4	11.0%	12.3%
NRP5	7.3%	8.5%
SUP	0.9%	1.3%
Total	64.4%	72.4%

Conclusions

Prompting matters, whether by Advance Notice alone, by NRP alone, or NRP as follow-up to Advance Notice. It is essential for the maintenance of response rates about 70%. One or the other achieves response rates about 60%. In combination the response rates rise well above the 70% level. The trajectory of the daily cumulative response rates for the two contact modes is concave to the X-axis, showing the traditionally smooth decreasing returns over time.

Advance Notices and follow-up NRP (call or FAX) are strong supplements. They reinforce their positive impact on respondents' behavior. The use of only one or the

other lowers response rates as much as 10 to 13 percentage points.

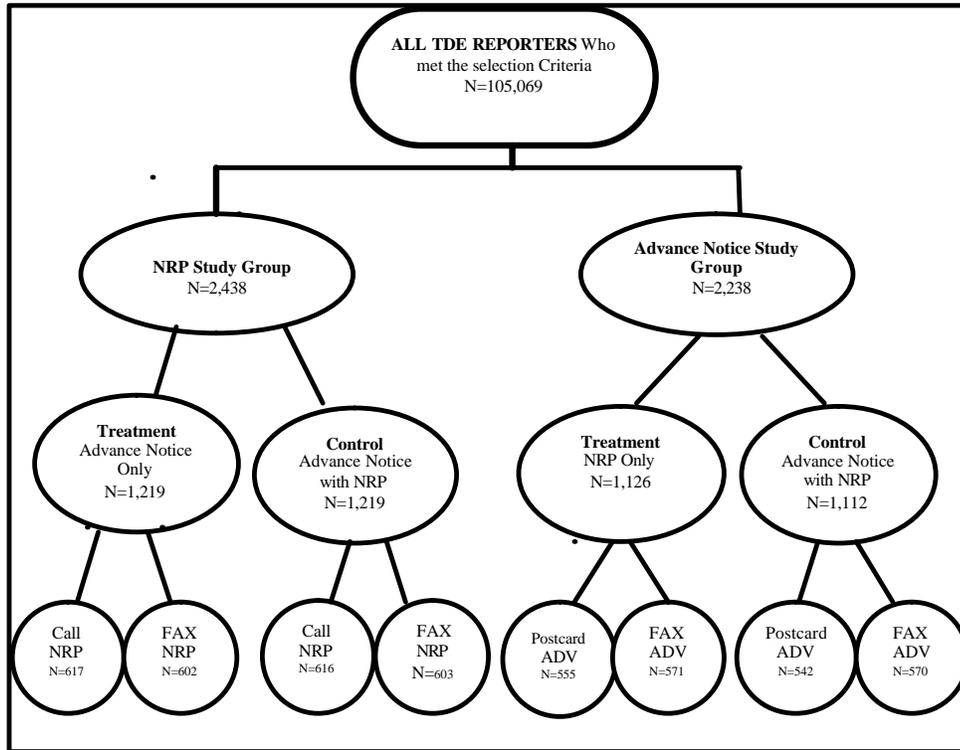
FAX NRP and call NRP together obtain response rates that are 2 or 3 percentage points different when Advance Notice is followed by the NRP-follow-up. However, the difference of 2 or 3 percentage points is not statistically significant.

Absence of Advance Notice has a larger negative impact on response rates for Call than for FAX NRP. The difference in response rates of approximately 8 percentage point was statistically significant. Thus, FAX NRP seems to show an advantage over Call NRP. When NRP follows Advance Notice, either by postcard or by FAX, there was no statistically significant difference in response rates between the two prompting modes.

While there was not a statistically significant difference in the control groups' final response rates between Call and FAX, it is clearly economically more efficient to resort to FAX for both Advance Notice and NRP. Call NRP has the advantage of making direct conversational contact with the respondent, to resolve numerous issues, such as correcting contact information and obtaining the data directly from the respondent. FAX does not enjoy these advantages.

Although an effort is made to have Advance Notice postcard arrive at the same time that Advance Notice FAX do, the evidence points to the postcard being seen by the respondent one or two days later.

Figure I. Test Sample Sizes



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