ALTERNATIVE DUAL FRAME MIXED MODE SURVEY DESIGNS

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1. Introduction

Telephone interview sample surveys have been enthusiastically received by many survey researchers because of their great cost advantages over face-to-face interview surveys. The enthusiasm, however, must be tempered by an acknowledgement that telephone surveys are subject to greater noncoverage error. Currently about 7% of the households in the United States do not have a telephone in their residence. Corresponding estimates of noncoverage for area probability sampling range from two to five per cent. As disturbing as the level of noncoverage is to investigators, the nature of the household population not covered by telephones is also of concern. Thornberry and Massey (1978), using data from the National Health Interview Survey, report that households without telephones tend to be those with lower incomes, to be located in the South or in rural areas, to contain black persons, or to be single person households. Their analysis, as have others, also indicated higher coverage rates for the elderly household population. McGowan (1982), using four years of data from the National Crime Survey, presents demographic differences in the "telephone" and "nontelephone" population similar to those of Thornberry and Massey, but he also notes that the nontelephone population is much more heavily victimized than the telephone population. For example, the nontelephone population experienced higher rates of crimes of violence and household crimes (like burglary) than the rest of the population.

In addition to these observations about noncoverage error for telephone sample surveys, there is growing evidence that the nonresponse rates for many telephone surveys are higher than those expected from similar personal interview surveys. Higher nonresponse rates for telephone surveys are especially noteworthy among the elderly.

The lower cost of telephone surveys is thus accompanied by increases in total survey error that may for some topics and populations significantly reduce the accuracy of the survey findings and the attractiveness of the telephone sample survey methodology. One alternative is to combine the cost advantages of a telephone sample survey with the better coverage and response rate properties of an area probability sample and personal visit interview survey. A multiple frame sampling design (e.g., telephone and area sampling frame) can be combined with a dual mode data collection effort (i.e., telephone and personal visit interviewing modes) to provide a dual frame mixed mode survey design costing less than the personal visit survey, with improved error properties compared to a telephone sample survey design. The less expensive interviewing technique (i.e., telephone interviewing) is used extensively on the incomplete frame (i.e., telephone numbers), while the more expensive technique (i.e., personal visit interviewing) is used less extensively on a more complete frame.

The purpose of this paper is to review and explore the cost and allocation issues of designing dual frame, mixed mode surveys. Two estimators for dual frame designs are reviewed in section 2, and alternative administrative structures are explored in subsequent sections.

2. Estimators for Dual Frame Survey Designs

Consideration of dual frame area probability - telephone sample designs is a special case of the multiple frame problems examined by Hartley (1962). The less expensive telephone frame is totally contained within the more expensive area probability frame, which itself offers theoretically complete coverage of the population. Hartley suggested an estimator for the population total that would use data from the telephone frame, the nontelephone portion of the area frame, and the telephone portion of the area frame. In particular, the Hartley estimator for the dual frame area-telephone sample design is

$$Y = N_a \bar{y}_a + N_b (p\, \bar{y}'_b + q\, \bar{y}''_b)$$

where

- N_a is the total number of elements in the complete area frame;
- N_b is the total number of elements in the telephone frame;
- $\bar{y}_a$ is the sample estimate of the mean from the complete area frame;
- $\bar{y}'_b$ is the mean obtained from telephone households in the complete area frame;
- $\bar{y}''_b$ is the mean from telephone households from the telephone frame; and
- p is a constant for which $q = (1 - p)$.

The constants or weights p and q and the allocation of the sample to the two frames are determined such that the variance of the estimator is minimimized. The optimal values of p and q are obtained in terms of element variances in the telephone and nontelephone population, the relative sizes of the two populations, and the per unit cost of obtaining measurements from the two frames.

Lund (1968) extended the work of Hartley and offered a solution for p that was based on the realized sample sizes from the two frames and not the often unknown population sizes. Casady et al. (1981) presented optimal allocations between the two frames and derived a variance estimator for the dual frame estimator of the mean under assumptions of a cluster sample from both the area frame and the telephone frame. In particular, Lund proposed the dual frame estimator for a mean as

$$\bar{y} = [n_a/(n_a + n'_b)]\, \bar{y}'_b + [n'_b/(n_a + n'_b)]\, [p\, \bar{y}'_b + q\, \bar{y}''_b]$$

where

- n'_b is the number of telephone households selected from the telephone frame and
- n_a is the number of nontelephone households selected from the area frame.

Casady et al. derived the optimal value of p that minimizes the variance of $\bar{y}$, and showed that the variance estimate for a dual frame sample with clustered selection in both frames is given by

$$\mathrm{Var}(\bar{y}) \doteq \frac{n_a \sigma_a^2 \delta_b'}{(n_b' + n_a) M_a \bar{N}_a} + \frac{n_b'^2 \delta_a \delta_b'' \sigma_b^2}{(n_b' + n_a)^2 \left[\left(\frac{n_b'}{n_b' + n_a}\right) M_a \bar{N}_a \delta_b'' + M_b \bar{N}_b \delta_a\right]} + \frac{n_a n_b' \gamma \left[E(\bar{y}_b') - E(\bar{y}_a)\right]^2}{(n_b' + n_a)^2 M_a \bar{N}_a}$$

where

δ_a = design effect for the nontelephone households mean, area frame;
δ_b' = design effect for the telephone households mean, area frame;
δ_b'' = design effect for the telephone households mean, telephone frame;
γ = correlation between means of telephone and nontelephone households, area frame;
σ_a^2 = element variance for nontelephone households;
σ_b^2 = element variance for telephone households;

M_a = number of first stage selections from area frame;
M_b = number of first stage selections from telephone frame;
$\bar{N}_a$ = number of sample households per cluster from area frame ($M_a \bar{N}_a = n_a + n_b'$); and

$\bar{N}_b$ = number of sample households per cluster from telephone frame.

The optimal allocation of the sample to the two frames for the estimators proposed by Hartley, Lund, and Casady et al. is determined by minimizing the variance of the estimator given a simple cost model. The cost model consists of a single overhead cost and per unit costs to collect data from each frame. Although the past work forms the basis of the approach in this paper, the variance estimator and cost model tend to ignore several aspects of the dual frame mixed mode design allocation problem. The variance expression includes only sampling error of the estimator, failing to account for other important sources of error such as response error and response biases which may differ substantially between the frames. The cost model similarly fails to distinguish the costs of reducing these additional sources of error, and it does not fully account for unique administrative features that can be expected for dual frame survey operations. This paper addresses the last of these problems by examining several alternative administrative structures that might apply to a dual frame, mixed mode survey combining telephone samples and interviewing with area samples and personal visit interviewing. For each of the administrative structures examined, a cost model is developed that provides an optimal allocation and level of overall precision for the dual frame survey. Four administrative structures and their cost models are reviewed in the next section. Estimates of standard errors for the different models under assumptions about the costs are given in a subsequent section.

3. Effect of Dual Frame, Mixed Mode Surveys on Administrative Structures of Survey Organizations

The transition from personal visit to telephone interviewing requires that at least three basic developments be undertaken by a survey organization. First, questionnaire design for telephone surveys must be organized with the aim of constructing measurement techniques that are well suited to the telephone. For some questionnaires this is a trivial task; for others major renovation is desirable. Second, there are a variety of methodological developments that are typically needed to maximize response rates and minimize response error over the telephone. These usually involve some alteration in the training procedures for interviewers. Finally, supervision and monitoring procedures for the telephone interviewers must be developed and integrated into the interviewer evaluation plan. The last two adjustments arise most visibly with the use of centralized telephone interviewing facilities, where a staff of interviewers is located in a single facility and is continuously supervised.

The movement from a personal visit interviewing mode to a mixed mode survey requires additional adjustments. Assuming that overall survey production is not increasing, mixed mode telephone and personal visit surveys will reduce the workload for the existing personal visit interviewing staff. This staff may conduct telephone interviews from their homes, but evidence of the quality control potential of continuous supervision in the centralized facilities suggests that telephone interviewing by a dispersed, home-based interviewing staff is less desirable than a centralized facility.

Smaller personal interview workloads also will reduce the supervisory staff needed to handle that mode of data collection. The supervisory staff may be located in dispersed locations throughout the country or in central offices of the organization. The number of supervisory personnel may have to be reduced to adjust to mixed mode survey design, and some may be retrained for telephone survey operations if their residential location is compatible with that assignment.

The second impact of the use of dual mode designs is the simultaneous operation of all of the administrative activities needed for both personal and telephone interviewing. This includes training, questionnaire development, sample design and selection, editing and coding, interviewer supervision, and data processing. An appropriate cost model for a mixed mode design should include components reflecting cost elements for both structures. It is not clear how sensitive administrative costs are to the relative sizes of workload between the two modes. Undoubtedly there is a minimum level of costs required in either mode for most sample sizes. For that reason it is likely that the administrative costs of running two modes

simultaneously might threaten to eliminate cost savings achieved by using the less expensive telephone interviewing mode.

A variety of administrative structures could be proposed for a mixed mode design, each with somewhat different cost elements. Four models for mixed mode survey administration are examined subsequently as examples of structures to which existing personal visit interviewing survey organizations may move in a mixed mode operation. A basic set of assumptions applies to the models that are examined:

1) Overall administration of the mixed mode survey is conducted from a centralized headquarters, including functions such as questionnaire design, sample selection, and assignment of materials. Completed materials are returned to headquarters for processing. Central administration and processing requires 10 per cent of total costs.
2) Regional supervising offices distribute and collect materials from field staff. Each regional office can handle a maximum of 13 primary areas in which field staff are maintained.
3) If separate centralized telephone facilities are used, each telephone facility can accommodate up to 50 interviewers working several shifts.
4) Substantial turnover in interviewing (and, to a smaller extent, supervising) staff occurs. Hiring and training costs to replace staff are amortized over a total of 10 surveys.
5) Some units selected for telephone interviews will prefer to be interviewed in person. Five per cent of the telephone sample selections will require transfer to the personal visit mode for interviewing.

Four models for administrative structures for a dual frame, mixed mode survey design are presented in Figure 1. Each administrative model is represented by a diagram, an additional set of assumptions, and a cost model. The large rectangle in each diagram represents a central administration and processing headquarters to which other units report. Circles represent supervisory or administrative units to which interviewers, represented by lines below each circle, are attached. Some organizations have individual supervisors as these administrative units, while others will have regional or state offices. Smaller rectangles in the diagrams represent centralized telephone interviewing facilities with separate supervisory and interviewing staff devoted singularly to telephone interviewing. Each model has a different administrative arrangement for handling telephone interviews.

Model 1 is a structure common to survey organizations devoted to the personal interviewing mode. One time telephone surveys conducted by such organizations often use the existing personal visit interviewing structure, assigning both personal visit and telephone interviews to personal visit interviewing staff. Training and supervision for the telephone interviews is difficult under this model since interviewing staff conduct telephone interviews out of their own homes. Model 1 becomes more attractive than the models with centralized telephone interviewing facilities as long distance telephone charges increase.

Model 2 resembles an organizational structure more common to survey organizations conducting telephone surveys frequently. A single centralized telephone interviewing facility attached to the headquarters implements the telephone portion of a mixed mode survey. A one time mixed mode design may be somewhat expensive under such an organizational structure if the personal visit interviewing staff are not routinely utilized. But the model is attractive because close supervision of telephone interviewers in a centralized facility can reduce response errors and response biases.

One difficulty with Model 2 is the need to hire a large number of interviewers from a single labor market. Model 3 expands the single centralized facility to several such facilities located to reduce telephone charges and to improve the ability to find adequate numbers of interviewers. The organizational structure presents problems of coordination and work assignment that do not occur with a single facility, but those are reflected in the costs of maintaining separate facilities.

Model 4 is an alteration of Model 3 in which telephone facilities are attached directly to regional supervisory units. The administrative cost of operating mixed modes is shared at a regional level, but the difficulties of coordination and work assignment noted for Model 3 are increased for Model 4.

The specific assumptions and cost models presented for each administrative model cannot be elaborated in much detail in this brief presentation. The notation used in the models includes the following:

C = total costs
INT (.) = integer portion of the argument (.)
MAX (.,.) = maximum value of the arguments (.,.)
C_A = per unit area sample interviewing costs
C_B = per unit telephone sample interviewing costs

There are several similarities and differences among the assumptions and costs across the models. Each model has cost elements for the following:

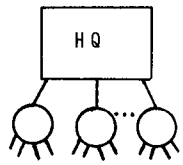
1) Regional supervisory offices, with costs amortized over 10 surveys.
2) Hiring and training personal interviewers, also amortized over 10 surveys.
3) Transfer of telephone sample cases to the personal visit mode, assuming the transferred personal visit interviews cost one-half the usual personal visit interviews since appointments can be made over the telephone. A $10 transfer charge is incurred from one mode to the other for Models 2 and 3.
4) Per unit personal visit and telephone interviewing charges.

Models 2, 3, and 4 include costs for hiring and training telephone interviewers, amortized over a total of 10 surveys. All interviewers conduct both personal visit and telephone interviews under Model 1; Models 2 and 3 require interviewers to

Figure 1
Four Administrative Models for Multiple Frame Mixed Mode Survey Designs

MODEL 1

PERSONAL INTERVIEWERS CONDUCT TELEPHONE INTERVIEWS FROM THEIR HOMES



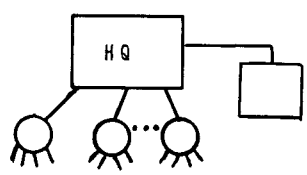
NEW OR DIFFERENT ASSUMPTIONS

1. REGIONAL SUPERVISORS ARE SUPPLEMENTED WITH AN ADMINISTRATIVE ASSISTANT FOR THE TELEPHONE INTERVIEWING; TOTAL COST OF EACH REGIONAL OFFICE $32,500 OR $3,250 PER STUDY.
2. HIRING AND TRAINING COSTS FOR EACH INTERVIEWER $1,500 OR $150 PER STUDY.
3. ALL INTERVIEWERS CONDUCT BOTH MODES, A MAXIMUM OF 15 PERSONAL INTERVIEWS AND 25 TELEPHONE INTERVIEWS.
4. NO TRANSFER COST FOR TELEPHONE SAMPLE CASES ASSIGNED PERSONAL INTERVIEWS, INTERVIEWS COST ONE-HALF OF USUAL PERSONAL INTERVIEW.
5. INTERVIEWER COSTS FOR PERSONAL - $80; INTERVIEWER COSTS FOR TELEPHONE - $50.

$$C = (0.1)\ C + 3{,}250\ \text{INT}\left[(m_A/13)+1\right] + 150\ \text{INT}\left[\text{MAX}\,(m_A\bar{N}_A/15,\ m_B\bar{N}_B/25)+1\right] + (0.5)\ C_A(0.05\ m_B\bar{N}_B) + C_A m_A\bar{N}_A + C_B m_B\bar{N}_B$$

MODEL 2

SINGLE TELEPHONE FACILITY, MULTIPLE REGIONAL SUPERVISORS



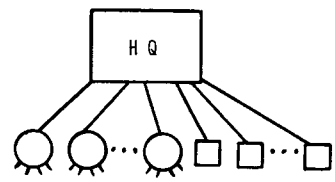
NEW OR DIFFERENT ASSUMPTIONS

1. REGIONAL SUPERVISORS COST - $20,000 OR $2,000 PER STUDY.
2. COST OF HIRING AND TRAINING A TELEPHONE INTERVIEWER - $1,100; $110 FOR EACH STUDY; FOR PERSONAL INTERVIEWER $150.
3. INITIAL COST OF FACILITY $87,500; $8,750 FOR EACH STUDY. MARGINAL COST OF ADDING EACH 10 INTERVIEWERS, $875 PER STUDY.
4. PERSONAL INTERVIEW COST $80 PER CASE; TELEPHONE, $40.
5. TRANSFER COSTS FOR 5% OF TELEPHONE CASES TO PERSONAL INTERVIEWERS - $10.

$$C = (0.1)\ C + 2{,}000\ \text{INT}\left[(m_A/13)+1\right] + 150\ \text{INT}\left[(m_A\bar{N}_A/13)+1\right] + 8750 + 875\ \text{INT}\left\{\left[\text{INT}\left((m_B\bar{N}_B/50)+1\right)-50\right]/10+1\right\} + 110\ \text{INT}\left[(m_B\bar{N}_B/50)+1\right] + \left[10+(0.5)\ C_A\right](0.05\ m_B\bar{N}_B) + C_A\ m_A\ \bar{N}_A + C_B\ m_B\ \bar{N}_B$$

MODEL 3

SEPARATE TELEPHONE FACILITIES AND REGIONAL SUPERVISORS



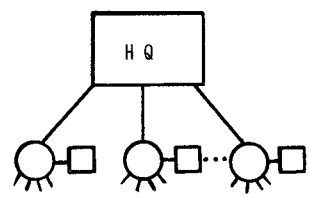
NEW OR DIFFERENT ASSUMPTIONS

1. COST OF HIRING AND TRAINING ONE PERSONAL INTERVIEWER: $1,500 - $150 EACH STUDY; FOR TELEPHONE INTERVIEWER $1,000 TOTAL; $100 EACH STUDY.
2. EACH TELEPHONE FACILITY COSTS $8,750 PER STUDY AND CAN SUPPORT A MAXIMUM OF 50 INTERVIEWERS.
3. INTERVIEWER COSTS FOR TELEPHONE INTERVIEW - $37.

$$C = (0.1)\ C + 2{,}000\ \text{INT}\left[(m_A/13)+1\right] + 150\ \text{INT}\left[(m_A\bar{N}_A/30)+1\right] + 8750\ \text{INT}\left[(m_B\bar{N}_B/50)/50+1\right] + 100\ \text{INT}\left[(m_B\bar{N}_B/50)+1\right] + \left[10+(0.5)\ C_A\right]\ (0.05\ m_B\bar{N}_B) + C_A m_A\bar{N}_A + C_B m_B\bar{N}_B$$

MODEL 4

TELEPHONE FACILITIES IN EACH REGIONAL OFFICE



NEW OR DIFFERENT ASSUMPTIONS

1. NEW REGIONAL OFFICE WITH EVERY 13 PRIMARY AREAS, 50 TELEPHONE INTERVIEWS, OR 1156 TOTAL INTERVIEWS. TOTAL COST OF OFFICE: $65,000 OR $6,500 PER STUDY.
2. TEN PERCENT OF PERSONAL INTERVIEWERS WILL ALSO DO 30 TELEPHONE INTERVIEWS IN THE CENTRALIZED FACILITY IN ADDITION TO THEIR 30 PERSONAL INTERVIEWS. THE HIRING AND TRAINING COSTS FOR THESE INTERVIEWERS WILL BE $1,750 OR $175 PER STUDY.
3. THERE ARE NO TRANSFER COSTS FOR CASES SWITCHED FROM TELEPHONE TO PERSONAL INTERVIEWS.
4. COST PER TELEPHONE INTERVIEW, $35.

$$C = (0.1)\ C + 6{,}500\ \text{INT}\left\{\text{MAX}\left[m_A/13,\ (m_B\bar{N}_B/50)/50,\ (m_A\bar{N}_A+m_B\bar{N}_B)/1156\right]+1\right\} + 150\ \text{INT}\left[(m_A\bar{N}_A/30)+1\right] + 25\ \text{INT}\left[(0.1)\ m_A\bar{N}_A/30)+1\right] + 100\ I_1\ \text{INT}\left\{\left[m_B\bar{N}_B - 30\ \text{INT}\left[((0.1)\ m_A\bar{N}_A/30)+1\right]/50+1\right] + (0.5)\ C_A\ (0.05)\ m_B\bar{N}_B + C_A\ m_A\bar{N}_A + C_B\ m_B\bar{N}_B\right.$$

conduct interviews in only one mode; and Model 4 uses 10 per cent of the personal interviewers to conduct telephone interviews as well.

Model 1 utilizes the existing survey organization facilities to conduct both personal visit and telephone interviews, but Models 2, 3, and 4 require the development of telephone interviewing facilities. Model 2, with one large facility, permits the expansion of the facility in units of 10 interviewers at a time. Models 3 and 4 add new facilities whenever at least 50 additional telephone interviewers are needed.

4. A Specific Example

Given these four models for the survey administration, the allocations of sample size to the two frames and modes was investigated for a single survey with a fixed overall budget of $1,000,000. A size for the allocation to the telephone sample was selected, and the size of the personal visit survey sample was determined which would satisfy the fixed budget of $1,000,000 under the appropriate cost model for each administrative model. The sample sizes for each frame which satisfied the cost constraint were then used to obtain the variance of a sample mean through the variance expression given by Casady et al. The allocation to the telephone sample was incremented repeatedly, solving for the personal visit interview sample size and obtaining the variance for a sample mean each time.

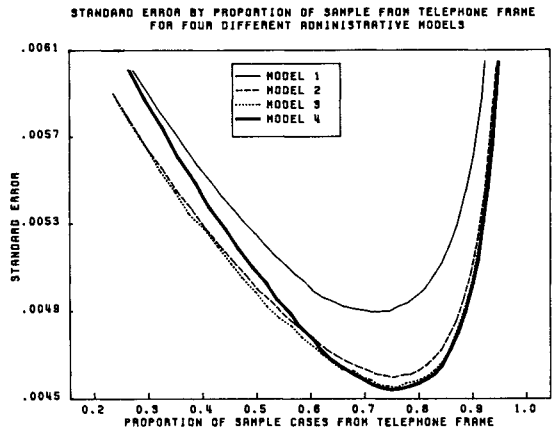
The empirical results presented in the paper are based on a proportion having a value of 0.5 for the nonphone population and 0.3 for the phone population. Other characteristics of the example are:

Proportion of units without telephones = 0.07
Element variance
for nonphone population = $\sigma_a^2 = 0.25$
for phone population = $\sigma_b^2 = 0.21$
Difference between nonphone and phone mean = 0.20
Design effect
for nonphone mean = $\delta_a = 1.055$
for phone mean (area sample) = $\delta_b' = 2.45$
for phone mean (phone sample) = $\delta_b'' = 1.08$
Cluster size
for area sample = $\bar{N}_a = 30$
for phone sample = $\bar{N}_b = 9$

Finally, the per unit interviewing charges differ among the four models. The personal visit interviewing charge is assumed to be $80 per visit for all four models. Telephone interviewing costs range from a high of $50 for Model 1, since interviewers do not have WATS lines in their homes, to a low of $35 for Model 4 where telephone charges are expected to be smallest with the largest number of regional centralized facilities.

Under these assumptions, and for the fixed budget of $1,000,000, allocations to the two frames and variances under each allocation were computed. Figure 2 presents for all four models the standard error of the mean by different proportions of the total sample allocated to the telephone frame. Models 2, 3, and 4 tend to have similar levels of precision for most allocations to the telephone frame, and those precision levels are higher than those observed for Model 1 at all allocations shown in the figure. An important reason for this finding is that the per unit cost for Model 1 telephone interviews is higher than for the other three models. The most striking finding, however, is the great similarity of the results for all four models.

Figure 2



The smallest standard errors are achieved for all four models when there is a 70 to 75 per cent allocation to the telephone sample. Telephone sample allocations in the range of 60 to 80 per cent achieve fairly similar levels of precision. For example, Model 4 achieves an optimal (i.e., minimum variance) allocation when approximately 75 per cent of the sample is allocated to the telephone sample, the remaining 25 per cent allocated to the personal visit interview mode. The standard error of the mean is 0.0046 for this allocation. At a 60 per cent or an 80 per cent allocation, the standard error of the mean is still only 0.0047, only a two per cent increase in the standard error. Thus, the optimal allocation between the two frames is fairly "flat," allowing a range of allocations to achieve nearly minimum variance.

The sample sizes, allocations, standard errors of the means, and various other characteristics of the optimal allocation is shown in Table 1 for each model. The optimal allocation to the telephone sample is near 75 per cent for Models 2, 3, and 4, and 71 per cent for Model 1. The minimum standard errors are fairly similar ranging from 0.00455 for Model 3 to 0.00490 for Model 1. For all four models, the largest share of total costs are devoted to interviewing; regional offices, hiring and training, and other cost elements considered in the models do not contribute importantly to the allocation problem. Other values for these cost elements could make them more influential to the allocation problem.

It is interesting to note that if the survey resources were entirely devoted to personal visit interviewing (i.e., a zero per cent telephone allocation), a considerably less precise estimate

of the mean would be achieved. Assuming Model 1 were appropriate, but with no telephone interviews, a total of 9,630 personal visit interviews could be conducted for the budgeted one million dollars. The standard error of the mean would be 0.00792, a 74 percent loss in precision compared to the optimal allocation for Model 3.

5. Concluding Remarks

The values for the cost elements presented in these models were developed through discussions with practicing survey field administrators, from documented survey costs, and from our own experiences with personal visit and telephone interview surveys. Many of these elements are not routinely available from survey organizations, and reasonable guesses about the values to use had to be made. The empirical analysis presented here should be assessed in view of the tentative costs employed. The work has been presented to stimulate others to offer more reasonable or more accurate estimates of these quantities.

The developments presented in this paper are only a preliminary examination of the problem of dual frame mixed mode survey design. More complete specification of survey errors for such designs is needed, as are improved and more accurate cost models. Extensions to variables with different element variances, design effects, and differences between telephone and nontelephone units may provide additional understanding about the nature of mixed mode designs. These and other developments in the multiple frame mixed mode survey design area are anticipated in the near future.

Table 1
Sample Size, Allocation to Telephone Sample, Standard Error of the Mean, and other Characteristics of the Optimal Allocations for Four Administrative Models of Multiple Frame Mixed Mode Survey Designs.

Characteristic	Model 1	Model 2	Model 3	Model 4
Sample size	13,464	15,624	16,024	15,612
Proportion telephone	0.713	0.752	0.758	0.754
Standard Error	0.00490	0.00460	0.00455	0.00460
Number of regional offices	10	10	10	14
Number of personal interviewers	384	130	130	142
Number of telephone interviewers		236	244	229
Regional office cost	$32,500	20,000	20,000	91,000
Personal interviewer training cost	$57,600	19,500	19,500	19,675
Telephone interviewer training cost		25,960	24,400	22,900
Cost of added telephone facilities	NA[1]	16,625	43,750	NA
Personal interview costs	$309,600	309,600	309,600	307,200
Telephone interview costs	$479,700	470,160	449,550	435,564

[1] Not Applicable

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