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Statistical Sampling and Its Use in the Small Engagement

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WHEN accountants first began to hear of statistical sampling as a means of selecting items to be examined in audit tests I think that most of us immediately built up a mental block against the use of this technique. If you had the same reservations that I had they probably were (1) we are not mathematicians, (2) the tables, books, etc., needed to design a sample would require an extra work bag on each engagement, (3) the time required for design and selection of the sample would make it impractical, and (4) most important, it would limit or infringe upon the important factor of the auditor's judgment.

In the Fall of 1961 I was asked to participate in a training course on statistical sampling and at the end of the course to make a number of test applications on audit engagements. This session proved to me that the objections concerning the necessity for a knowledge of higher mathematics, the volume of material needed to design a sample, and the elimination of the auditor's judgment were not valid. Subsequent use of statistical sampling techniques during the past two years has also eliminated the objection concerning time required for design and selection of the sample.

In Atlanta we are now in our third year of use of statistical sampling and to the best of my knowledge this technique is now being used to some extent on every engagement originating in this office. I think that this statement would be generally true for most offices of our Firm. We have found that the amount of time required for training our staff in the use of the plan can be measured in hours rather than days.

Why is statistical sampling considered of benefit in determining the extent of audit tests? We think the use of these techniques provides a more objective basis for expressing the audit purposes to be accomplished by tests of transactions and account balances and a more objective basis for designing, selecting, and evaluating samples in relation to such purposes.

In performing our examination of a client's financial statements we as accountants have always wondered whether our tests were too large or too small. By using statistical sampling techniques we have a means of expressing the extent of uncertainty, in dollar amounts, that may be tolerated in a given set of circumstances. How is this accomplished? In the past under conventional methods of sample selection we have determined the extent of the sample to be selected without actually expressing the dollar amount of undetected errors that could be tolerated. We might now say, for instances, that in making our test of accounts receivable we want reasonable assurance that the accounts receivable are not overstated by more than \$2,000. The \$2,000 then becomes our precision limit in designing the sample. The amount of the precision limit may be expressed as the minimum aggregate amount of undetected errors that would be considered material in relation to the financial statements.

The first criterion for setting the precision limit is materiality and within the limits of materiality our client's expectations concerning a desired precision may be considered. While some clients may expect us to do only the minimum amount of audit work necessary for expressing our opinion, others may have indicated that they expect us to design our audit tests with strict over-all objectives in mind or with closer precision in certain areas of our work such as cash and inventories.

In setting the precision limit we do not have to use the same precision for all phases of our examination; for instance, we may set a precision limit of \$2,000 for cash and receivables, \$4,000 for inventories, and \$5,000 on payrolls for the year. If the precision limits of \$2,000 for cash and accounts receivable, \$4,000 for inventories, and \$5,000 for payrolls were used our over-all precision for the four populations concerned would be \$5,000 if no errors were found during our examination, but we could also state that the precision of the individual populations is \$2,000, \$4,000, and \$5,000, respectively. While the reason for the noncumulative feature may not be readily apparent its mathematical validity has been clearly established.

As mentioned earlier, materiality is the first consideration in setting the precision limit. As you know, materiality cannot be set by any formulas but the decision on what is material is a judgmental decision of the auditor. For this reason the precision limit set in designing the sample may be subject to further consideration after the sample has been evaluated. The plan has been based on the

premise that no errors will be found and if this is so no further action is necessary. However, if errors are found the effect of these errors must be evaluated to arrive at an adjusted precision limit. To arrive at the adjusted precision limit the plan provides for projecting the total amount of errors in the population based on errors found in the sample.

Normally the adjusted precision limit will not be materially different from the one originally set. If this were true we would probably decide that the adjusted precision limit would still be immaterial in relation to the financial statements. For example, this would be so where a precision limit of \$2,000 had been set and upon evaluation of errors it is found that instead there is now a precision of \$2,100. Under these circumstances I think that most of us would decide that no further test would be necessary.

Sometimes we may lower our precision limit on the basis of prior experience with a particular client if we know that errors are normally found in the client's records. For instance, we might want a precision of \$2,000 but based on an evaluation of errors found in the prior year we would lower the precision limit to \$1,500 to offset expected errors. Of course, this would increase the sample size. By lowering the precision limit used in designing the sample we would also lower the adjusted precision limit.

You may recall that one of my reservations concerning the use of statistical sampling was the idea that it would infringe on the auditor's use of judgment. As you can see the setting of the precision limit requires the use of sound judgment.

Another area requiring the auditor's use of judgment is in establishing what we will refer to as the "reliability factor." In other words it determines the degree of mathematical assurance used in designing and evaluating the sample and the degree of reliance placed on internal control.

In the past we have based the extent of our tests on the existing internal control and this same approach is used in statistical sampling. The plan for statistical sampling has been designed to take into account the effectiveness of internal control. By assigning a mathematical value to internal control we may design a sample on which we rely for a portion of our over-all assurance on the degree of existing internal control. Where control is judged to be weak, less reliance is placed on such control and our sample size is increased. As you know, even where internal control is considered to be good

in all respects there is a limit to the effectiveness of such control and in these cases we rely on internal control for only a portion of our over-all assurance.

The plan for statistical sampling contemplates that statistical methods of selection will be used after the sample has been designed. The use of such methods of selection eliminates bias that may have been present under conventional methods of sample selection. An example of such bias could be selection of the last month for examination of vouchers because of the method of filing. The plan is also designed for test of transactions to cover the entire year rather than one accounting period. The sample size to provide the appropriate statistical assurance for a year will be substantially less than twelve times the size of the sample for one month. Usually the sample size will be only slightly more than that for one month and we shall have the same degree of assurance for the entire year, by examining only slightly more items, as we would have had for one month.

The Firm has made a study of the results of the use of our plan for statistical sampling. This study covered about 400 applications of tests of balance-sheet accounts and of transactions. The clients ranged from large to small and the applications were made where internal control was good, mixed, and bad. A majority of those who participated in the tests indicated they had increased confidence or satisfaction concerning the extent of work performed and the resulting conclusions. They also indicated that these techniques should be used in our audit practice.

Where applications were made the plan was discussed with about two-thirds of the clients. The majority of clients were favorably impressed by our use of it although a substantial minority were indifferent. A few indicated some concern about its effect on the audit time. A number of our larger clients have indicated an interest in using statistical sampling within their organizations.

The purpose in applying statistical sampling techniques is not to decrease audit time and our study indicates that its use will not cause a general decrease in such time. The study also indicates that the use of these techniques will not result in a material increase in audit time. About 86 per cent of the participants included in the study reported no significant increase or decrease in audit time as a result of using the plan. In the first year it is used on engagements, certain information must be obtained that is not required on future engagements. This non-recurring time accounts for a portion of the

increased time in some of the cases reported. As our audit staff and supervisory personnel become more familiar with the plan, we are finding that more efficient samples can be designed and more efficient selection methods used.

About one-third of the cases reported in the Firm's study related to the use of the plan on engagements requiring 250 man-hours or less. The results of the study indicate that in the smaller engagements there is a slight trend toward relatively higher increases in time than on larger engagements. However, we feel that the increased assurance obtained from the use of statistical sampling offsets the increase in time. I think that one cause of this trend toward higher time may be additional time required in selecting the sample. As you know, many of our smaller clients have inadequate filing systems and do not have personnel available to assist in the pulling and filing of documents, etc.

A comparison was made of the sample size resulting from the use of statistical sampling with that of the prior examination. A decrease in sample size was reported in slightly more than 50 per cent of the applications where a comparison could be made. It was interesting to see that a material decrease was reported in most cases where internal control was considered bad. It appears that in determining the extent of our test we may have been over-compensating for poor internal control.

Our experience in the Atlanta office indicates that the use of statistical sampling techniques is practical on the smaller audit engagements. In fact, many of our applications have been made for the smaller clients. In the applications made last year and during the current year we have found that the sample size has been less than that for preceding years under conventional methods of selection. These applications have included selection of accounts receivable for confirmation, test of aging of accounts receivable, test of inventory pricing and extensions, examination of vouchers, test of outstanding checks, test of payrolls and unrecorded liabilities. We have encountered some difficulty in selecting items for examination where tests of transactions cover the entire year and where there has been a trend toward an increase in time on small engagements, but I believe that the increased assurance obtained more than offsets the additional time required. We have also found that the use of the plan encourages a more thorough evaluation of internal control and more objective consideration of materiality.