AN EMPIRICAL STUDY OF NONSAMPLING ERRORS IN THE CONFIRMATION OF ACCOUNTS RECEIVABLE

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CHAPTER I

INTRODUCTION AND NATURE OF PROBLEM

Introduction

The basic objective of an examination of financial statements by an independent auditor is the expression of an opinion on the fairness of the financial statements. In expressing his opinion the auditor must also state whether the examination was made in accordance with generally accepted auditing standards. The auditing standards as approved and adopted by the membership of the American Institute of Certified Public Accountants include the following standard:

> Sufficient competent evidential matter is to be obtained through inspection, observation, inquiries, and confirmations to afford a reasonable basis for an opinion regarding the financial statements under examination.[1]

The third standard of field work, listed above, requires the auditor to obtain sufficient competent evidential matter to provide a basis for the auditor's opinion. Included among the sources of evidential matter is that of confirmations. This thesis reports the results of an empirical study of nonsampling errors connected with the confirmation of accounts receivable of a Stillwater, Oklahoma, business firm.

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[1] Auditing Standards Executive Committee, "Codification of Auditing Standards and Procedures," Statement on Auditing Standards, No. 1, (New York, 1973), p. 5.

Confirmations of accounts by direct correspondence is a firmly established audit procedure. The purpose is twofold: (1) to obtain external evidence by which the auditor can test the compliance with the accounting controls and (2) to verify the validity of the accounts receivable. The usual procedure in the confirmation process is to select only a sample of the accounts for circularization by either statistical sampling or judgement sampling techniques. Inferences applicable to the entire population are then drawn from the sample results.

Circularization of the accounts may be made by using either positive or negative confirmation requests. A positive confirmation is one which requests the recipient to respond whether or not the amount reported on the confirmation request is in agreement with his records. A negative confirmation is one which asks the recipient to respond only if the amount reported on the confirmation request is not in agreement with his records.

A third type of confirmation form which is available to the auditor is the blank confirmation. The blank form does not contain the balance owed, but instead the customer is asked to consult his records and supply the appropriate balance. The blank form is not as widely used as the negative and positive forms.

The type of confirmation request to be used in a specific case usually depends upon factors such as the dollar value of the balances, number of accounts, and the adequacy of internal control.[2] In some cases, the accounts may be stratified and positive requests used for one group and negative requests used for another group.

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[2]Auditing Standards Executive Committee, p. 59.

Behavior of Confirmation Recipients

The recipient of a positive confirmation request will take one (and only one) of the following actions.[3]

P_1 - The recipient will compare the confirmation request with his records and respond that the amount is correct.

P_2 - The recipient will not compare the confirmation request with his records and respond that the amount is correct.

P_3 - The recipient will compare the confirmation request with his records and reply that the amount is not correct.

P_4 - The recipient will not compare the confirmation request with his records and reply that the amount is not correct.

P_5 - The recipient will compare the confirmation request with his records and will not reply.

P_6 - The recipient will not compare the confirmation request with his records and will not reply.

These reactions can be summarized in matrix form as in Figure 1.

Sauls further dichotomized each of these groups by those confirmations which contain correct balances and those confirmations which contain incorrect balances, making a two-by-three-by-two matrix. For example, P_1 could be divided into groups P_{1a} (confirmation contained

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[3]Eugene H. Sauls, "On the Problems of Nonresponse and Improper Response to Confirmation Requests" (unpub. Ph.D. thesis, Michigan State University, 1969), p. 28.

the correct balance) and P_{1b} (confirmation contained an incorrect balance).

	Respond amount is correct	Respond amount is incorrect	Do not respond
Compare confirmation with records	P_1	P_3	P_5
Do not compare confirmation with records	P_2	P_4	P_6

Figure 1. Behavior of Confirmation Recipients

Auditors are unable to determine whether the recipient compared the confirmation request with his records; the auditor can only classify the action taken by recipients as either responding that the amount is correct (groups P_1 and P_2), that the amount is incorrect (groups P_3 and P_4), or nonresponding. The presumption is that returned confirmations were compared with the recipients' records (groups P_1, P_2, P_3, and P_4).

The reliability of the confirmation process would be clearer in an audit situation if the auditor were able to distinquish between groups P_1 and P_2 and between P_3 and P_4. Confirmation requests returned to the auditor without comparison with the recipients' records are of dubious value to the auditor. Making a distinction between groups P_5 and P_6 are of less importance since in both cases the recipients do not respond.

The distinction between groups P_1 and P_2 and Groups P_3 and P_4 can be made on an experimental basis by requesting confirmation of incorrect balances. Only by chance would a recipient make a proper response (i.e., take exception and provide the correct balance) to an incorrect balance without consulting his records.

Confirmation Errors

Two types of errors may occur in the confirmation of accounts receivable: sampling errors and nonsampling errors. Sampling errors are possible when less than 100 percent of the population is selected for confirmation. Nonsampling errors, on the other hand, may occur even when a complete enumeration of the population is selected for confirmation. These may arise from three sources: (1) nonresponse by the recipient, (2) improper response by the recipient, and (3) errors by the auditor in processing or examining the confirmation request.[4]

The risks arising from sampling errors can be quantified and estimated by the auditor in advance of the confirmation of the accounts. Unfortunately, nonsampling errors do not have this attribute. The present study focuses on the nonsampling errors since the sampling errors have been dealt with extensively in the literature. Nonsampling errors are of no less importance than sampling errors but less research has been conducted on the effect of nonsampling errors.

An empirical study of the nonresponse and improper response errors provided the basis for this study, including an examination of the effect on nonsampling errors of: (1) using different confirmation

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[4] L. Vance and J. Neter, Statistical Sampling for Auditors and Accountants (New York, 1956), p. 172.

forms, (2) requesting confirmation of incorrect account balances, (3) the direction of error when incorrect balances are circularized, and (4) the relative size of the error.

Significance of the Study

In conducting an audit in which accounts receivable are being confirmed, the auditor makes certain assumptions. Some of these assumptions have been subject to little if any empirical testing. For example, consider the following statements discussing negative confirmations taken from auditing textbooks:

> The auditor expects replies only when the debtor reports a difference; he may assume that no reply signifies the debtor's acceptance of the balance.[5]

> For a negative request, the auditor considers an account confirmed unless he receives a reply indicating a contrary conclusion.[6]

The validity of negative type confirmation requests rests upon the assumption that customers will respond to confirmation requests containing balances with which they disagree. This is not always tenable. Lack of replies may result from agreement with the balance (and thus, no reply is necessary) or because recipients may not reply because they do not know whether the balance is correct. An estimate of the proportion of customers falling into the latter two groups (combined) can be found by mailing negative confirmation requests with incorrect balances. The results of repeated experiments of this nature should be of

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[5]Norman J. Lenhart and Philip L. Defliese, Montgomery's Auditing (New York, 1957), p. 174.

[6]Robert L. Grinaker and Ben B. Barr, Auditing, The Examination of Financial Statements (Homewood, Illinois, 1965), p. 215.

importance to the auditing profession, inasmuch as the effectiveness of negative requests is dependent upon the rate at which recipients respond to incorrect balances.

Negative confirmation requests can also be used to study the effect of the direction of misstatement on the response and nonresponse rates. In the examination of asset balances, auditors tend to be more concerned with overstated balances than understated balances. If the direction of misstatement has an effect on the rate of nonresponse, the logical assumption would be that a greater proportion of recipients would respond to overstated balances. That is, a priori, one would believe a recipient more likely to respond to a confirmation request showing an amount greater than the correct amount rather than an understated balance.

Unintentional understatement of asset balances should be of equal interest to auditors. Grossly understated asset balances shown on the financial statements are no less unfair or misleading than grossly overstated asset balances. If evidence repeatedly shows a relatively higher nonresponse rate for understated balances, the effectiveness of negative confirmation requests may be questioned.

Positive confirmation requests provide another assumption that can be tested empirically. The assumption is that confirmations returned to the auditor, with or without exception being taken by the recipients, were compared to the recipients' records. Thus, the confirmations are felt to be persuasive evidence of the correctness of the balances. The positive confirmations may not always be accepted at face value, however, due to the possibility that some customers may sign and return the requests without verification. Confirmation requests processed in

this manner are of dubious value to the auditor but he has no basis for determining which recipients may have acted in this manner.

As with negative confirmation requests, positive confirmation requests can be circularized which contain incorrect balances. The results of this circularization should provide some evidence of the extent that recipients failed to verify the balances.

The foremost objective of this study is to provide some quantitative evidence as to how customers react to the receipt of a confirmation request. It is accepted that the confirmation process is imperfect, but little research has been performed to study the degree of imperfection. Quantitative evidence of this nature should improve the auditor's judgement in determining the most efficient form of confirmation request to use and aid him in handling nonresponses to the requests. Also, it is felt that experiements of this type will provide a better base for discussing alternative audit procedures.

Although some of the prior studies have cast some doubt on the credibility of the results of confirming accounts,[7] Hubbard and Bullington add this precaution:

> It is highly unlikely that any single study which could be made in the area of confirmation response problems could serve as a basis for changing present confirmation procedures. No single study should be permitted to cause such a change. Research performed to date, however, has indicated that potentially serious problems do exist. Certainly, the more research is conducted in the field, the stronger is the basis for initiating change.[8]

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[7] These results are summarized in Chapter II.

[8] Thomas D. Hubbard and Jerry B. Bullington, "Positive and Negative Confirmation Requests-A Test," The Journal of Accountancy, Vol. 133, No. 3 (March, 1972), p.49.

More specifically, this study is designed (a) to provide information as to the relative efficiency of the positive, negative, and blank forms of confirmation requests, and (b) to provide information regarding the effect on the response rates when balances are incorrect.

An additional problem confronts the auditor when some recipients fail to respond and inferences are based only on the responding customers. In such cases the assumption is made that the population of responding customers is representative of the nonresponding population, with statistical conclusions being made accordingly.[9] The nonresponding population may differ from the responding population and bias the results.[10] This problem is not specifically within the primary scope of the study; however, by sending misstated confirmation requests, the results should reveal differences in response rates based upon direction of error and degree of error.

Overview of Subsequent Chapters

Chapter II is a summary of similar or related studies that have been performed regarding confirmations. Five prior studies were found which were felt to contribute significantly to the present study.

The description of the experiment and the hypotheses tested are contained in Chapter III. The results and analyses are described in Chapter IV, and Chapter V of the study contains a summarization and recommendations for further research.

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[9] Vance and Neter, p. 244-5.

[10] For a discussion on this point along with further references, see James K. Loebbeck and John Neter, "Statistical Sampling in Confirming Receivables," The Journal of Accountancy, Vol. 135, No. 6 (June, 1973), p. 45.

CHAPTER II

PRIOR STUDIES

Introduction

This chapter contains summarizations of the empirical research conducted previously in the area of confirmations. While a great deal of writing has been done on subjects such as the purpose of confirming accounts, procedural aspects, timing, and on the application of statistical sampling, few empirical studies have been reported. Five studies, having significance for the present study, are reviewed in this chapter.

Two of the studies reviewed do not deal specifically with the confirmation of accounts receivable, but they do shed light on the reaction of recipients when the recipients are asked to verify or furnish certain information, generally of a financial nature. One study, by Maynes, was a test of the accuracy of the responses where one group of recipients were asked to consult their personal records and a second group of recipients were asked not to consult their records in furnishing the information. The second study, by Davis, Neter, and Palmer, tested the ability of bank customers to detect errors in bank account numbers.

Possibly the impetus for more empirical research dealing specifically with confirmation of accounts receivable was provided by Stone:

> In the area of receivables, for example, CPAs place substantial reliance on the confirmation procedure. Yet there is some question as to the reliability of confirmation results.
>
> A critical examination of confirmation procedures would seem advisable.[1]

Whatever the impetus, three additional studies were published following Stone's writing. These empirical studies dealt specifically with the confirmation of accounts receivable (and of liabilities, in two of the studies). Different forms of confirmation requests were tested and some of the accounts used in each of the three studies were intentionally misstated. The purpose of the latter was to examine the effect on the response rate of the direction and degree of error. Each of these studies will be reviewed and the results will be summarized in this chapter.

At the end of this chapter a critique of the prior studies is presented. This critique provides additional justification for the present study.

The Maynes Study

The first of the reported empirical studies relating to confirmations was conducted by Maynes[2] and was directed toward providing tentative answers for the following questions:

> The following questions indicate the content of the hypothesis tested: Do patterns of response errors differ for assets (e.g., personal debts)? What is the effect of record

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[1] Marvin L. Stone, "Problems in Search of Solutions Through Research," Empirical Research in Accounting: Selected Studies, 1968 (Chicago, 1969), p. 63.

[2] E. Scott Maynes, "Minimizing Response Errors in Financial Data: The Possibilities," Journal of the American Statistical Association, Vol. LXIII, No. 321 (March, 1968), pp. 214-27.

> consultation on the accuracy of reports? The effect of rounding? Is there a general tendency toward underreporting of balances? Or, alternatively, do respondents tend to overreport "small" amounts and underreport "large" amounts? What is the influence of the level of account activity on accuracy of reports of savings account balances? Is the direction of change in balances related to over and underreporting?[3]

The question concerning the effect of record consultation on report accuracy is of primary interest to the present study.

Maynes' study involved the mailing of questionnaires to members of the Census Federal Credit Union. The questionnaire requested the members to provide the shares balances (dollars) and/or loan balances as of June 30, 1963. Some of the members were asked to provide the data without consulting their records and others were asked to furnish similar data but to consult their records in doing so. A cover letter by the president of the credit union revealed the purpose of the questionnaire, in order to yield a better respondent cooperation.

The questionnaire mailing resulted in a response rate of 58.5 percent, which Maynes felt was high for a mail survey with no follow-up. Of those members who were asked to consult their records, 86 percent said that they in fact did so.[4]

For the respondents who were asked to consult their records and responded, 85 percent provided their savings account balances within one percent of the actual balance, 91 percent within five percent. Results for the "nonconsulters" were less accurate; only 70 percent

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[3]Maynes, p. 214.

[4]The questionnaires provided space for the members to indicate whether records were consulted, and if so, which record. If the members did not consult their records, they were asked to give a reason for not doing so.

were within five percent of the actual balance and 49 percent were within one percent.

While the results of Maynes' study cannot be unduly generalized (credit union members may differ in their reactions from "customers" and the purpose of the questionnaire was revealed), the results do point out the possible danger of over-reliance upon confirmation results.

The Davis, Neter and Palmer Study

The empirical experiment conducted by Davis, Neter, and Palmer[5] is more closely related to audit procedures than was the experiment by Maynes. The major purpose of their research "...was to determine by means of a statistically designed and controlled field experiment, the effectiveness of the confirmation of personal demand checking accounts."[6]

The participating firm was a large Minnesota bank. Internal auditors for the bank periodically mailed duplicate bank statements to their customers on a sample basis. The customers were requested to compare the duplicate with the original bank statement and report any differences to the internal auditors. (The duplicate statements were prepared from a separate computer run.) The purpose was to detect those instances, fraudulent or otherwise, that a customer was mailed a statement which differed from the records of the bank.

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[5]Gordon B. Davis, John Neter, and Roger R. Palmer, "An Experimental Study of Audit Confirmations," The Journal of Accountancy, Vol. 123, No. 6 (June, 1967), pp. 36-44.

[6]Ibid., p. 37

For the purposes of the experiment, a code number was added to both the bank statement and the subsequent audit statement. The instructions were then changed to include a request to the customer to compare the final account balance and the code number. The researchers altered the code numbers on some audit statements, before mailing, to ascertain the proportion of customers reporting the discrepancy. Positive confirmations and negative confirmations were used along with a negative confirmation form in which the customers were asked to report the discrepancy, if any, by telephone.

Responses to the positive confirmations were a high 91 percent; however, only 59 percent of the customers in this group detected (and reported) the error in the code number. A detection rate of 44 percent was reported for the negative confirmations, which was found to differ significantly (at a .05 level of significance) from the positive response rate. The authors attribute the use of second requests for positive confirmations as a partial explanation of the difference.

Response rates for negative requests (letter) and negative requests (telephone) did not differ significantly. However, the customers selected in the sample were restricted only to those customers living in the St. Paul area, eliminating the toll call problem.

In analyzing the effect of the size of the account on the detection rates, the authors found no significant difference in response rates for small and large accounts but found a positive correlation for detection rates and size of accounts. The conclusion reached was that ". . .it appears that the comparison and detection phase of the

confirmation task is treated more casually by small customers even though they return the confirmation request."[7]

This experiment provides evidence, as did the Maynes study, that reliability of the confirmation process is less than perfect. Imperfections in the confirmation process, whatever the degree, affects the reliability of the procedure and the auditor must be aware of this limitation. The findings of both experiments also make suspect the assumption that for auditing purposes evidence from an external source is preferable (i.e., more reliable) to internal evidence.

The Sauls Study

Sauls' experiment was the first reported research in which misstated account balances were used.[8] The two previous studies had important implications for the confirmation process but the experiments did not use misstated balances by which the effectiveness of the confirmation process could be studied directly by a controlled experiment. It could be argued that a person's reaction to a request to verify an account number may be different than to a request to verify a balance of an amount owed. The ability to verify an account number might be reasoned to have no effect on the recipient, whether the information is

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[7] Davis, Neter, and Palmer, p. 41.

[8] Eugene H. Sauls, "On the Problems of Nonresponse and Improper Response to Confirmation Requests" (unpub. Ph.D. thesis, Michigan State University, 1969). Portions of the study have been published in Eugene H. Sauls, "An Experiment on Nonsampling Errors," Empirical Research in Accounting: Selected Studies (Chicago, 1970), pp. 257-71, and Eugene Sauls, "Nonsampling Errors in Accounts Receivable Confirmation," The Accounting Review, Vol. XLVII, No. 1 (January, 1972), pp. 109-15.

is correct or incorrect. However, the correctness of an amount owed (and presumably, to be paid subsequently) does have an effect on the recipient's financial status. For this reason, it is felt that a person's reaction may not necessarily be the same for the two situations.

Sauls used two populations to select his samples, and he experimented with confirmation of both receivables and payables. Bank customers having personal or automobile loans were selected to test receivables, and payables were tested by using members of a credit union for the confirmation of their deposit accounts.

Sauls selected three sample groups from the bank customers. One group was sent the standard confirmation form containing the balance owed according to the bank records. A second group of customers were mailed standard forms but the balances owed were adjusted upward by approximately 10 percent of the balances.[9] The third group of customers received blank confirmation forms and were asked to provide the balances owed on their personal or automobile loans. Because of adverse customer reaction, Sauls was unable to mail second requests to those customers in the group receiving overstated balances.

The hypothesis that proper responses to first requests reflecting incorrect amounts were equal to or greater than 70 percent was rejected at the .05 significance level. A proper response rate of 43 percent was experienced.

A second hypothesis that improper responses to first requests reflecting incorrect balances were equal to or less than five percent

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[9]The average adjustment was $120.

was not rejected. Interestingly, Sauls reported no improper responses from the three sample groups.

Sauls also found no significant difference between nonresponses to first requests reflecting correct amounts. This led Sauls to conclude that "...there appears to be no reason to believe that the response rate is a function of the propriety of the account."[10]

The hypothesis that nonresponses to requests which provide the account balance equal nonresponses to requests which do not provide the account balance was rejected. Nonresponses to blank confirmations were almost double that of the nonresponses to requests containing the balance (54 percent and 28 percent, respectively). Sauls makes the proposal that the immediate solution to the problem of nonsampling errors is the use of blank confirmations and larger sample sizes (e.g., the response rate would be substituted for sample size in the statistical sampling models).

Carmichael, in reviewing the portion of the study relating to the bank experiment, suggested that Sauls' results should be interpreted with caution based upon the following points:

(1) Conclusions regarding the misstated balances were based upon a sample of only 13 items (13 responses from the sample of 30).

(2) The experiment was performed on only one business entity.

(3) The errors were all adverse to the customers' interests, thereby not testing for errors in the opposite direction.[11]

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[10]Sauls, The Accounting Review, p. 113.

[11]D. R. Carmichael, "Confirmation of Receivables," Current Reading, The Journal of Accountancy, Vol. 133, No. 6 (June, 1972), pp. 88-89.

Results for the credit union experiment by Sauls show the receipt of improper responses only in reply to requests which were incorrectly stated. Confirmation requests prepared on the blank forms, those on the standard positive forms, and those on a shortened, more simply-worded form yielded no improper responses. Combining the results of both the credit union and the bank, Sauls concluded:

> Recipients neither take exception to amounts which agree with their records nor provide incorrect data concerning their accounts when asked to provide such data.[12]

The foregoing conclusion does not seem to be supported in his study. While no improper responses were experienced for the sample groups mentioned, the sample sizes were relatively small. An improper response rate of zero in small samples should not be construed to mean that no improper responses would be experienced if the whole population had been tested. Rather, the results more properly should be interpreted as an indication that the number of improper responses would be relatively low.

In comparing the results of the bank experiment and the credit union experiment, Sauls found a significant difference in the proportions of proper responses. A smaller proportion of recipients responded properly to the bank confirmations than for the credit union confirmations, when in both cases the amounts were misstated in favor of the participating firms. Correspondingly, the proportions of non-responses for the bank requests (asset balances) was greater than the proportion of nonresponses for the credit union requests (liability balances).

Sauls, dissertation, p. 105.

The Hubbard and Bullington Study

A field experiment conducted by Hubbard and Bullington tested the effectiveness of both positive and negative confirmation requests.[13] In addition, the effect of the direction of error in the account balance was studied by overstating one-third of the account balances and understating one-third. The remaining one-third of the customers in the sample received confirmations containing book balances.

A Locally-owned distributor of petroleum products participated in the experiment. Approximately 90 percent of the firm's customers were non-commercial (heating fuel customers) with the remainder being commercial customers. Monthly statements were not mailed to customers except upon request. The average balance of the sample accounts was $107.

The amount of the misstatement was determined by a company officer by transposing numbers or some other seemingly possible typographical error. This procedure was followed in order for the company to be able to explain the discrepancy in terms of a clerical error. Misstatement of positive overstated and understated confirmation requests were 3.8 percent and 6.4 percent, respectively. Negative confirmation requests were misstated 3.1 percent and 1.7 percent for the overstated and understated balances, respectively.

Hubbard and Bullington found no significant difference in the error detection rates for understated and overstated negative

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[13] Thomas D. Hubbard and Jerry B. Bullington, "Positive and Negative Confirmation Requests - A Test," The Journal of Accountancy, Vol. 133, No. 3 (March, 1972), pp. 48-56.

confirmation requests.[14] For some unexplained reason the authors did not perform a test of significance for the difference in the error detection rates for overstated and understated positive type requests. The rates were presented in the study, however, and it appears that no significant difference exists (51.4 percent and 45.5 percent respectively). Further, no significant difference in error detection was found between positive and negative requests, which indicates positive type requests may not be superior to negative type requests. The variable, size of discrepancy, was not tested for its effect on response and error detection rates.

Other findings included a significantly higher response rate for noncommercial customers than for commercial customers and a significantly higher detection rate occurred in the accounts of customers who did not receive statements shortly before the confirmation request over those customers who did receive statements. The authors explain the latter result as likely an indication ". . .that people will not give proper attention to a confirmation request if they have recently received a statement with which they agree."[15]

The Warren Study

The most complete empirical research performed to date appears to be the study by Warren.[16] The primary object of his thesis was

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[14]Respondent error detection rates (incorrect balances identified divided by number of incorrect balance) were 44.1 percent for overstated balances and 35.3 percent for understated balances.

[15]Hubbard and Bullington, p. 55.

[16]Carl Stephen Warren, "Selection Among Alternative Confirmation Forms" (unpub. Ph.D. Dissertation, Michigan State University, 1973).

". . .to attempt to determine, on the basis of empirical analyses, which confirmation form should be chosen."[17]

Warren's field experiment was designed to consider several factors which possibly have an influence on the reliability of confirmation requests. These included: (1) type of accounts confirmed (asset versus liability accounts, for example); (2) size of account confirmed; (3) size of errors in accounts confirmed; (4) direction of error in accounts confirmed; (5) type of confirmation utilized; and (6) the interaction of errors.

Accounts confirmed were selected from the membership of a large credit union (the same which Sauls used) for university employees. Approximately one-half of the confirmation requests were for loan accounts (assets) and one-half were for share balances (liabilities). The average asset account balance in the sample was $451. The influence of size of errors in the balances was examined by misstating some balances by five percent and others by ten percent.

The experimental results revealed a significant difference in detection rates for positive and negative confirmations; 29 percent and 17 percent, respectively. Both of these detection rates are relatively low and Warren questioned the usefulness of confirmations for the type of population used in the experiment.

In testing the direction of error on the detection rate, the results revealed higher detection rates for accounts containing errors

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[17]Warren dissertation, p. 3. Excerpts of the study has been published in Carl S. Warren, "Non-Commercial Organization Confirmation Reliability in Audits - A Credit Union as a Case," The CPA Journal, Vol. XLIV, No. 2 (February, 1974), pp. 67-69.

unfavorable to the recipients. This led Warren to conclude that confirmations are more reliable at detecting overstated than understated asset balances. Similarly, confirmations were felt to be more reliable at detecting understated than overstated liability accounts.

Using cost-benefit analysis, Warren concluded that negative confirmations are least informative of the three types, and results were indeterminant as to whether the positive type or the blank type is the most informative (e.g., greater benefit). The ranking for cost, or benefits foregone, were negative, positive, and blank, in order of ascending costs. Thus, no one type of confirmation form was found to be the optional form or recommended for exclusive use.

Critique of Prior Studies

The studies reviewed in this chapter have provided some quantitative evidence of the action taken by recipients of confirmations, and each of the studies have raised questions of the effectiveness of the confirmation process. Differing research objectives and/or practical limitations imposed upon the researchers, however, has created a need for additional study of the effectiveness of confirming accounts. It is hoped the present study will benefit from the shortcomings of the prior studies.

A major deficiency in the previous studies is the lack of a great variety of participating businesses. With the exception of the Hubbard and Bullington study, the studies were conducted with the cooperation of banks and credit unions. Participation by other types of businesses would be preferable in subsequent experiments. The ability to generalize the results will be severely restricted until a

greater variety of results are available. The question which plagued the prior researchers, and still remains unanswered, is whether customers of other types of businesses react in the manner similar to that of bank customers and credit union members.

Although Maynes accomplished his research objective, his results cannot be generalized to be applicable to the confirming of account balances in an audit situation. Maynes revealed to the recipients the purpose of his questionnaire, making the recipients aware that they would not be affected personally whether they responded correctly, incorrectly, or did not respond at all. This is not similar to the confirming of account balances by an independent auditor.

The study by Davis, Neter, and Palmer is similarly not directly applicable to an audit situation even though it too provided useful results. The objective of these researchers was to test the rate of detection of errors in bank account numbers. Logically, one would expect the recipients to attach less importance to account numbers than to dollar balances owed by them or to them. The results of this study would have been of greater interest if errors had been introduced into both the account balances and the account numbers.

The more important conclusions contained in the Davis, Neter, and Palmer study, which cast suspicions on the confirmation process, were the difference in the error detection rates for positive and negative requests, and the difference in the error detection rates for customers having small balances and customers having large balances. While it would be inappropriate to overly generalize the reported results, additional doubt is cast upon the reliability of confirmation results.

Sauls' study, perhaps because it was a pioneer study, was deficient in some respects. The bank which participated in Sauls' study did not allow him to misstate balances in both directions nor did they allow him to mail second requests. As a result of the former limitation, Sauls was unable to compare the results for overstated balances with the results for understated balances. Also, Sauls did not misstate the account balances by differing percentages which would have allowed him to examine the effect on the results of material and immaterial errors in the accounts. Effect of the degree of error on the confirmation results has significance to the auditor for the reasons discussed in Chapter I.

Apparently because of limitations placed on Sauls by the participating bank, his sample sizes were relatively small. Consequently, Sauls' conclusions, in many instances, were based on a small number of respondents.

Hubbard and Bullington's study overcame some of the shortcomings of Sauls' study, but their study, in turn, contained other shortcomings. The study did include the participation of a trading firm and the researchers were able to misstate the accounts in both directions. However, the confirmations mailed by Hubbard and Bullington were returned by the recipients directly to the participating firm. This possibly biased the results by not giving the appearance that the purpose of the confirmation request was an independent audit. it is not known whether recipients would have reacted differently had they been led to believe an audit was being conducted.

The effect of the degree of error in the account balances was not tested by Hubbard and Bullington. Presumably, this was not done due to

the manner in which the amount of the error was determined. Additionally, the researchers did not experiment with the use of blank forms.

The study by Warren appears to be the most complete of the studies reviewed. Little criticism of the study can be offered. Warren's objective was to prepare a ranking of the various confirmation forms by applying cost-benefit analysis. The use of credit unions' accounts was satisfactory for this purpose, but had Warren used the accounts of another type of business, the results would have offered useful information in addition to his rankings.

The one area in which Warren's study may be subject to criticism is his use of the same credit union as Sauls used. Members of the credit union may have become aware of Sauls' experiment and subsequently recognized Warren's confirmations as being a similar experiment. If this were the case, some members may have responded differently than if they had not been aware of the nature of the confirmation.

The following Chapter of this study contains the description of the study and the hypotheses to be tested. The study has been designed to avoid as many of the foregoing shortcomings as is feasible.

CHAPTER III

DESCRIPTION OF EXPERIMENT AND HYPOTHESES TESTED

Introduction

The purpose of this chapter is to describe the methodology for conducting the present experiment and to state the hypotheses which were tested. The first major section of the chapter contains a description of the participating firm and of their accounts. The three confirmation forms used are described and the manner in which the samples were drawn is presented. This section also contains the procedure by which the account balances were adjusted for those customers selected to receive a confirmation request containing a misstated balance.

Eight hypotheses were formulated for testing. These hypotheses, the purpose of each, and the implications of the hypotheses are presented in the second major section of this chapter.

Description of Experiment

Participant

The manager of a locally-owned, prominent men's clothing store agreed to participate in this experiment by allowing access to and confirmation of the store's accounts receivable. Bates Bros. operates

a downtown shop in Stillwater, Oklahoma and a second shop located near the campus of Oklahoma State University. The accounts of a third store located in a nearby town were not used in the experiment.

Accounts receivable at March 23, 1974, totaled $61,254 for the two Stillwater stores. On this date, reports showed 1,087 active charge accounts of which 839 had non-zero balances. The mean balance of the accounts was $73.01.

Bates Bros. employs an outside data processing service center to process receivables. Data for transactions are submitted to the center and the center, in turn, provides various reports and month-end statements for mailing to the customers. An extra run of the statements was prepared for use in the experiment. The extra statements were used for sample selections and provided a means of obtaining balances, names, and addresses without interfering with the store's office workers.

Stillwater is a university town and one would expect that students would constitute a large proportion of the charge customers of Bates Bros. The store had no records which revealed the number of student customers without making an account-by-account search. A random sample of fifty customers was selected, and these names were compared with the current student directory to obtain an estimate of the proportion of student customers. Twelve customers of the sample were found to be students (24 percent). Had the estimated proportion been higher, for example, 50 percent or greater, separate analyses for student and non-student customers would have been prepared. It was not felt to be necessary with an estimated 24 percent, however, particularly in view of the small sample sizes.

Accounts Used

Extra copies of the March 23, 1974, monthly statements were obtained. The accounts were reviewed to delete those customers who were likely to have knowledge of the experiment. Customers eliminated were four O.S.U. accounting faculty members and one Ph.D. student in accounting. The name of the participating firm had not been revealed in the proposal for this thesis, so that fewer people at the University would be aware of the experiment and lessen the chance of producing biased results.

Bates Bros. uses a non-sequential five and six digit coding system for account identification. This numbering system did not lend itself to the use of a random number table so the accounts were renumbered sequentially.

Confirmation Forms

Three different confirmation forms were used in the experiment: positive, negative, and blank. The forms were printed on Bates Bros. stationary. A copy of each is presented in Appendix A.

The positive confirmation form contained standard wording, requesting confirmation of the amount shown on the form. Postage-paid return envelopes were sent with these forms.

Negative forms also contained standard wording, requesting a reply only if the customer disagreed with the balance shown on the form. Return envelopes were not provided with the negative requests.

Blank confirmation forms were a modification of the positive form. Space was provided for the customers to insert the balance owed

as of the confirmation date. Stamped, addressed envelopes were included with the blank confirmation requests.

A Stillwater CPA firm agreed to assist with the experiment by allowing the use of their name and address for the return of the confirmations. This enabled the confirmation requests to appear to be the result of an audit, hopefully adding realism to the experiment. Bates Bros. does not have an annual audit but the participating CPA firm does close the books and prepare periodic financial statements.

Recipients of positive and negative requests were put on notice that the confirmation forms were neither a request for payment nor a statement of their account. This was done to prevent customers from remitting monies with their replies and to reduce any conflict arising from the use of misstated balances.

Description of Samples

A random number table was used to select the accounts which would be circularized. The accounts selected were divided into six samples as follows:

k_1 - a sample of seventy accounts which were circularized without adjusting the balances of the accounts. This sample represented a control group and the accounts therein were confirmed using the standard positive confirmation form.

k_2 - a sample of seventy accounts, the balances of which did not appear on the confirmation forms. The customers were requested to insert the balances according to their records. The purpose of this sample was to

compare the proper response, improper response, and nonresponse rates with the results of sample k_1.

k_3 - a sample of seventy accounts circularized on positive forms, the balances of which were adjusted by a positive adjustment. One-half of the balances were increased by five percent and one-half by twenty percent. The purpose of this sample was to compare the rate of proper responses to overstated balances with those of understated balances and to compare the proper response rates of the two sub-samples.

k_4 - a sample of seventy accounts circularized on positive forms, the balances of which were adjusted by a negative adjustment. One-half of the accounts were decreased by five percent and one-half by twenty percent. The purpose of this sample was similar to that of sample k_3.

k_5 - a sample of seventy accounts, circularized on negative forms, the balances of which were adjusted by a positive adjustment. One-half of the balances were increased by five percent and one-half by twenty percent. The purpose of this sample was to determine an estimate of the proper response rate to negative confirmation requests and to compare the rates for the two sub-samples.

k_6 - a sample of seventy accounts, circularized on negative forms, the balances of which were adjusted negatively by five percent (one-half) and twenty

percent (one-half). The purpose of this sample was similar to that of sample k_5.

A total of 420 accounts was selected in the six samples. Six confirmations were returned by the post office because of incorrect addresses and current addresses could not be found for these customers. The six balances involved were small with no recent activity. These accounts were deleted from the samples

Two customers whose accounts were circularized were told of the nature of the experiment and these accounts were also deleted. The remaining accounts, 412 in number, are summarized in Table I.

TABLE I

SUMMARY OF SAMPLE SIZES

	k_1	k_2	k_3	k_4	k_5	k_6
Accounts Selected	70	70	70	70	70	70
Accounts Deleted:						
Improper Address			1	1	2	2
Informed of Experiment			1	1		
Total Accounts Deleted			2	2	2	2
Sample Sizes	70	70	68	68	68	68

Adjustment of Accounts

In addition to testing the effect of direction of error on the response rates, it was felt the effect of degree of error on the response rate would be beneficial. Samples k_3, k_4, k_5, and k_6 were each divided into two groups and one-half of the accounts in each sample were misstated by five percent, with a minimum adjustment of one dollar. This adjustment is subsequently referred to as a "minor" adjustment. The remaining one-half of the accounts in each of the four samples were misstated by twenty percent of the account balance; hereafter referred to as a "significant" misstatement.

The working definitions for the terms "minor" and "significant" were developed in quantitative terms for purposes of this study. This was a difficult task. Absolute guidelines are unavailable, except that it is generally agreed the terms should be defined in light of the surrounding circumstances and in relation to other associated items (such as total assets, net income, etc.). The accounting literature often suggests ten percent as a rough guideline for separating significant from nonsignificant (or minor) income statement items.[1] This is an arbitrary division just as any other percentage must be. A further complication is that the division between significant and nonsignificant adjustments necessarily depends upon the financial position of the individual customer. A 15 percent adjustment to an account balance might constitute a significant adjustment for one customer and a minor adjustment for another customer.

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[1]Eldon S. Hendriksen, Accounting Theory, rev. ed. (Homewood, Illinois, 1970), pp. 562-63.

Investigating the financial position of each customer selected to receive a misstated confirmation request was felt to be impractical. Therefore, the arbitrary procedure for determining significant and minor adjustments was used even though it had little theoretical support. The assumption made was that a 20 percent error in a customer's balance constituted a significant or material difference whereas a 5 percent error was not significant. Based upon the mean account balance of $73.01, the mean adjustment at 20 percent was approximately $14.60 and the mean adjustment was approximately $2.20 for the 5 percent adjustment rate. Table II contains these equivalent statistics by samples along with other selected data.

The first requests were mailed on April 4, 1974. Second requests, clearly marked as such, for samples k_1, k_2, k_3, and k_4 were mailed thirteen days later. Responses were coded as received to indicate whether the response was to the first or to the second request. All replies received subsequent to three days after the mailing of the second request were treated as responses to the second request even though the reply may have been on the form mailed in the first request. The reasoning was that the receipt of the second request likely triggered the response.

Employees of Bates Bros. and Heath and Riley, the participating CPA firm, were requested not to reveal to the customers the purpose of the confirmations. Customers calling or visiting the store regarding an incorrect balance were asked to note the exception, if any, on the confirmation form and return the form to the auditors. Two customers who were informed of the experiment were done so when they became overly anxious over the "error" in their account balance.

TABLE II

MEANS OF THE BALANCES AND MISSTATEMENTS FOR ACCOUNTS SELECTED FOR CIRCULARIZATION

	k_1	k_2	k_3	k_4	k_5	k_6
Sample Size	70	70	68	68	68	68
Sum of Balances - Before Adjustment	$4,385	$5,208	$4,465	$5,858	$4,256	$3,899
Mean Balance	$62.64	$74.40	$65.66	$86.15	$62.59	$57.34
Direction of Adjustment	None	None	Positive	Negative	Positive	Negative
Mean Adjustment:						
Minor Adjustment (5%)			3.77	4.37	4.57	2.93
Significant Adjustment (20%)			13.63	18.48	8.56	12.13

Responses were classified as "proper" or "improper" as received. A proper response is defined as a confirmation by the recipient of a correct balance or taking exception to and furnishing the correct balance when the request contained an incorrect balance. An improper response occurs when the recipient confirms an incorrect balance or takes exception to a correct balance.

In a few instances it was necessary to follow up on exceptions by customers. Items such as payments in transit and credits for returned merchandise were the more common items of this nature. In only one case did a customer correctly differ from the store's balance. This was found to be a case of posting a credit to the account of another customer. If the customers' figures (payment in transit, for example) or the difference was found to be a small service charge, the response was classified as a proper response.

Approximately two weeks following the mailing of the second request, a follow-up letter was mailed to all customers involved in the experiment. This letter explained the purpose of the experiment and emphasized that differences were not due to an error by Bates Bros. A copy of the follow-up letter is contained in Appendix B.

Hypotheses Tested

The remainder of this chapter is devoted to the formulation of hypotheses which were tested and the implications of the hypotheses. The eight hypotheses which follow were developed with the objective of providing answers to the following questions:

(1) How does the effectiveness of the blank form of confirmation request compare with the effectiveness of the standard positive

confirmation request? Hypotheses one, two, and three, applicable to this question, test the relative effectiveness of the two forms by comparing the proportions of proper responses, improper responses, and nonresponses for the two groups of customers selected to receive the respective forms.

(2) What effect does the direction of error in account balances have on the confirmation results? Hypotheses four and seven call for the comparison of results of confirming accounts when some account balances are overstated and others are understated. Separate tests were made for misstated positive confirmation requests and misstated negative confirmation requests.

(3) What effect does the degree of error have on the confirmation results? The purpose of hypotheses five and six is to compare the results of confirming account balances, some of which are misstated by a material amount and others are misstated by a minor amount. Hypothesis five tests the results for overstated balances and hypothesis six tests the results for understated balances.

(4) How effective is the negative form of confirmation request in comparison with the positive form? An answer to this question will be offered after comparing customer responses to negative requests with responses to positive requests. Account balances for both groups are misstated, and hypothesis eight is included for making this test.

The formal hypotheses to be tested are as follows:

Hypothesis 1 - The proportion of proper responses to positive confirmation requests which ask the recipients to confirm the account balances provided on the requests is equal to the proportion of proper responses to positive confirmation requests which ask the recipients to provide the balances.

Hypothesis 2 - The proportion of improper responses to positive confirmation requests which ask the recipients to confirm the account

balances provided on the requests is equal to the proportion of improper responses to positive confirmation requests which ask the recipients to provide the balances.

Hypothesis 3 - The proportion of nonresponses to positive confirmation requests which ask the recipients to confirm the account balances provided on the requests is equal to the proportion of nonresponses to positive confirmation requests which ask the recipient to provide the balances.

The foregoing three hypotheses were formulated to test the reaction of recipients of blank confirmations against confirmations which contain the account balances. If the proportions of proper response, improper response, and nonresponse for blank confirmations are at least as favorable as those for positive confirmations, the implication is that auditors should give serious consideration to using the blank confirmations instead of the standard positive forms currently being used. A proper response to a blank confirmation gives the auditor assurance that the recipient did consult his records whereas the auditor has no such assurance with a proper response to a positive confirmation.

It is reasonable to assume that responses to the blank confirmations may be lower than responses to positive confirmations since more effort is required of the recipients in processing the blank confirmations. Thus, it follows that a trade-off is possible between lower improper responses, a favorable condition, and a lower proper response rate accompanied by a higher nonresponse rate, an unfavorable condition.

Hypothesis 4 - The proportion of proper responses to positive confirmation requests which reflect overstated balances is equal to the proportion of proper responses to positive confirmation requests which reflect understated balances.

Hypothesis four suggests that the proper responses to overstated balances will not differ from the proper responses to understated

balances. The proposition is that recipients will respond in the same manner independent of the direction of error.

The alternative hypothesis is that unequal responses will be found for overstated balances and understated balances. This implies that recipients will respond differently when the errors in the balances are of possible benefit to the recipients.

If the null hypothesis is not rejected, the auditor will have a basis for assuming the responding population is representative of the nonresponding population as to direction or error. Alternatively, if the null hypothesis is rejected, implying that the one population is not representative of the other, this will be an indication that the risk of not detecting misstated account balances may be partially dependent upon the direction of error.

Hypothesis 5 - The proportion of proper responses to positive confirmation requests which reflect overstated account balances by a relatively minor amount is equal to the proportion of proper responses to positive confirmation requests which reflect overstated account balances by a significant amount.

The assumption underlying the use of confirmations is that recipients will respond to all incorrect balances, implying the degree of error in the balances does not influence the response rates. The objective of hypothesis five is to test the validity of this assumption.

Since the balances are overstated unfavorably to the recipients, one would expect that if a difference in response rates is found, the response rate for significantly adjusted balances would be more favorable than the response rate for minor adjustments. Auditors should prefer this direction of difference, in one sense, as they are generally more concerned with larger errors than smaller errors. However,

a significant difference in the response rate between the two groups would be indicative that the responding population is not representative of the nonresponding population. A one-tail test was used in making the test for significance of difference.

Hypothesis 6 - The proportion of proper responses to positive confirmation requests which reflect understated account balances by a relatively minor amount is equal to the proportion of proper responses to positive confirmation requests which reflect understated account balances by a significant amount.

Hypothesis six is similar to hypothesis five except that five is concerned with overstated balances and six is concerned with understated balances. The objective is also similar: to determine whether the degree of error influences the response rate of understated balances.

If recipients are influenced by the degree of possible benefit to them, the expectation is that the proper response rate will become less favorable as the size of the error increases. Counteracting this effect, however, may be the influence of the size of error on the response rate; the greater the error, the greater the response rate. Therefore, due to the uncertainty, a two-tail test was used.

Hypothesis 7 - The proportion of proper responses to negative confirmation requests which reflect overstated account balances is equal to the proportion of proper responses to negative confirmation requests which reflect understated account balances.

This hypothesis is the same as hypothesis four except for the substitution of "negative confirmation" for "positive confirmation." The proposition being tested is that recipients' reaction to incorrect balances is independent of the possible benefit to the recipients.

If this hypothesis should be rejected, potentially serious implications for auditing practice would be indicated. Should the proper response rate for overstated balances be significantly higher than for

understated balances, this would be an indication that negative confirmations are of benefit in detecting overstated balances. Also, the auditor might look upon the nonresponding accounts with increased suspicion, knowing that if errors exist the nonresponding accounts likely contain more understated balances than overstated balances.

Hypothesis 8 - The proportion of proper responses to negative confirmation requests which reflect misstated account balances is equal to the proportion of proper responses to positive confirmation requests which reflect misstated balances.

The proposition to be tested is that the rate of proper responses to incorrect balances is independent of whether positive or negative confirmation forms are used. While the positive forms are generally preferred by auditors because of the documentation provided, negative forms are easier to process and are less expensive. If no significant difference in the proper responses is found, this would appear to support a conclusion that the negative form is the more efficient of the two forms.

Summary

The methodology for conducting the experiment involving the confirmation of accounts receivable has been presented in this chapter. The accounts used in the experiment were those of a Stillwater clothing store. The mean of the store's accounts was $73.01 as of March 23, 1974, the effective date of the mailing.

Six samples were drawn randomly to allow for the comparison of response rates resulting from the use of different confirmation forms and confirmations containing misstated balances. Customers in one sample received standard-worded, positive confirmation requests and the customers in a second group were mailed the blank form of confirmation

requests and the customers in a second group were mailed the blank form of confirmation request. Proper response rates for the two samples were tested for significance of differences to support a conclusion of the more effective of the two forms.

Two additional samples involved the use of positive confirmation requests containing misstated balances. Balances for one sample were overstated and balances for the other sample were understated. The misstatement of the balances allowed an examination of the effect of the direction of errors on the confirmation results. Additionally, the misstatements for each of the two samples were evenly divided between minor and significant misstatements. The effect, if any, of the degree of error upon the proper response rates was tested to determine whether the difference was significant.

Customers selected in the remaining two samples were mailed negative confirmation requests also containing balances misstated by positive and negative amounts. The adjustments to the balances were again divided between minor and significant adjustments. Results from the mailing of the negative requests were examined for significance of difference in the rates of proper responses due to the direction of error. A second objective was to compare the responses to the misstated negarequests with the responses to the misstated positive requests.

Eight hypotheses were formulated for making the foregoing tests. The overall objectives of the hypotheses were to determine the order of effectiveness of the three confirmation forms and to test for significance of differences in proper response rates due to direction and degree of error. Experiment results and implications of the results are presented in the next chapter.

CHAPTER IV

EXPERIMENT RESULTS AND ANALYSES OF RESULTS

Introduction

Chapter IV contains the results of the empirical experiment, and the analyses of the results. A brief summary of the methodology which was presented more fully in Chapter III precedes the analysis.

Accounts for six samples were selected randomly from the accounts receivable of Bates Bros., a men's clothing store in Stillwater, Oklahoma, as of March 23, 1974. The customers selected in the samples were mailed confirmation requests utilizing one of three forms -- positive, negative, and blank. Amounts shown on the requests mailed to customers in four of the samples were intentionally misstated. These misstatements were divided into positive adjustments and negative adjustments, and the adjustments for each of the four samples were partly of a minor amount and partly of a significant amount. Forms used and adjustments to the accounts are summarized in Figure 2.

Customers in samples k_1, k_2, k_3, and k_4, not responding within ten days from the mailing of the requests were mailed second requests. No further follow-up was made for customers not responding to the second requests.

The confirmation requests were mailed under the name of a Stillwater CPA firm and the customers were instructed to reply directly to

	SAMPLE					
	k_1	k_2	k_3	k_4	k_5	k_6
Type of confirmation request used	Positive	Blank	Positive	Positive	Negative	Negative
Direction of misstatement of balance	None	None	Positive	Negative	Positive	Negative
Degree of misstatement:						
Sub-sample 1			5%	5%	5%	5%
Sub-sample 2			20%	20%	20%	20%
Second requests mailed	Yes	Yes	Yes	Yes	No	No

Figure 2. Description of Confirmation Forms

to the CPA firm. The intent was to encourage the customers to react to the requests as if a routine audit were being conducted by the auditors of the store.

As responses were received from the customers and after any necessary follow-up on customers' exceptions, the responses were coded as proper or improper. A proper response was a reply by a customer expressing agreement with a correct balance or disagreeing with an incorrect balance. Replies which indicated agreement with incorrect balances or disagreement with correct balances were considered improper responses. All other recipients were grouped as nonrespondents. Upon tabulation of the confirmation results, proportions were computed for each sample of the proper responses, improper responses and nonresponses. Differences in selected proportions were then tested for statistical significance according to the hypotheses selected for testing.

The following section presents the confirmation results for each of the samples. A subsequent section contains analyses of the results. The hypotheses are stated formally as the results are analyzed.

Results of Experiment

After a reasonable period of time had elapsed following the mailing of the second requests to nonresponding customers, the results were tabulated. The principal data being sought were the proportions in each of the six samples of proper responses, improper responses, and nonresponses. As the response results were being tabulated, the replies were also coded to indicate whether the replies were in response to the first request or to the second request. This

information was not gathered for incorporation as a part of this study but only for general information.

Confirmation results for each of the six samples are presented below, and in tables III, IV, V, and VI, presented on pages 46 - 49.

Sample k_1 - A sample of seventy unadjusted accounts were circularized using the standard positive confirmation form. These requests resulted in fifty-seven proper responses, no improper responses, and thirteen nonresponses.

Sample k_2 - A sample of seventy accounts, for which the data concerning the accounts were not furnished to the recipients, were circularized using blank confirmation forms. These requests resulted in thirty-eight proper responses, eight improper responses, and twenty-three nonresponses. One recipient returned the form but failed to provide a balance of his account.

Sample k_3 - A sample of sixty-eight accounts whose amounts were positively adjusted were circularized on positive confirmation forms. Thirty-four accounts were adjusted by five percent, and thirty-four accounts were adjusted by twenty percent. These requests resulted in thirty-three proper responses, eighteen improper responses, and seventeen nonresponses.

Sample k_4 - A sample of sixty-eight accounts whose amounts were negatively adjusted were circularized on positive confirmation forms. Thirty-three accounts were adjusted by five percent and thirty-five accounts were adjusted by twenty percent. These requests resulted in thirty proper responses, twenty-four improper responses, and fourteen nonresponses.

Sample k_5 - A sample of sixty-eight accounts whose amounts were positively adjusted were circularized on negative confirmation forms. Thirty-five accounts were adjusted by five percent, and thirty-three were adjusted by twenty percent. These requests resulted in thirteen proper responses, no improper responses and fifty-five nonresponses.

Sample k_6 - A sample of sixty-eight accounts whose amounts were negatively adjusted were circularized on negative confirmation forms. Thirty-three accounts were

TABLE III

SUMMARY OF RESULTS OF CONFIRMATION REQUESTS

	SAMPLE					
	k_1	k_2	k_3	k_4	k_5 neg +	k_6 neg −
	Control	Blank				
Sample Size	70	70	68	68	68	68
Proper Responses	57	38	33	30	13	13
Improper Responses		8	18	24		1
Nonresponses	13	23	17	14	55	54
Incomplete Response		1				

TABLE IV

SUMMARY OF RESULTS OF CONFIRMATION REQUESTS
(Percentages)

	SAMPLE					
	k_1	k_2	k_3	k_4	k_5	k_6
Sample Size	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Proper Responses	81.43	54.28	48.53	44.12	19.12	19.12
Improper Responses		11.43	26.47	35.29		1.47
Nonresponses	18.57	32.86	25.00	20.59	80.88	79.41
Incomplete Responses		1.43				

TABLE V

SUMMARY OF RESULTS OF MISSTATED CONFIRMATION REQUESTS--BY SUB-SAMPLES

	....k_3....		....k_4....		....k_5....		....k_6....	
Direction of Misstatement	overstated		understated		overstated		understated	
Percentage of Misstatement	5%	20%	5%	20%	5%	20%	5%	20%
Sub-Sample Size	34	34	33	35	35	33	33	35
Proper Responses	13	20	13	17	6	7	6	7
Improper Responses	13	5	14	10				1
Nonresponses	8	9	6	8	29	26	27	27

TABLE VI

SUMMARY OF RESULTS OF CONFIRMATION REQUESTS--
BY FIRST AND SECOND REQUEST

	SAMPLE					
	k_1	k_2	k_3	k_4	k_5	k_6
Proper Responses						
First Request	39	27	23	27	13	13
Second Request	18	11	10	3		
Total	57	38	33	30	13	13
Improper Responses						
First Request		5	9	11		1
Second Request		3	9	13		
Total		8	18	24		1
Nonresponses	13	23	17	14	55	54
Incomplete Response		1				
	70	70	68	68	68	68

adjusted by five percent, and thirty-five accounts were adjusted by twenty percent. These requests resulted in thirteen proper responses, one improper response, and fifty-four non-responses.

Analyses of Results

The proportions for proper responses, improper responses, and non-responses were the input data for the statistical model chosen to test the hypotheses. The purpose of this section is to present the selected statistical test and its related statistical model, and to describe the tests of the hypotheses.[1]

Statistical Test and Model

The normal probability distribution, which approximates the binomial distribution, was selected for testing the hypotheses. The sampling distribution of the Z statistic has been shown to approach a normal distribution providing the sample is large. A sample size of at least twenty-five to thirty is considered to be a large sample;[2] sample sizes in this study ranged from thirty-three to seventy. Therefore, for the purposes of this experiment the use of the normal distribution may be considered reasonably justified.

The Z-scores were computed by use of the following formula:[3]

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[1] A detailed presentation of tests of the hypotheses appears in Appendix C.

[2] Taro Yamane, Statistics, An Introductory Analysis (New York, 1967), p. 146 and p. 165. Also see, Henry L Alder and Edward B. Roessler, Introduction to Probability and Statistics, 4th ed. (San Francisco, 1968), p. 136.

[3] Leonard A. Marascuilo, Statistical Methods for Behavioral Science (New York, 1971), p. 323.

$$Z = \frac{p_1 - p_2}{\sqrt{p_o q_o / n_1 + p_o q_o / n_2}\ \sqrt{\frac{N - (n_1 + n_2)}{N - 1}}}$$

where

$$p_o = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2}$$

$$q_o = 1 - p_o$$

p = proportion of sample which responded properly, responded improperly, or did not respond. Subscripts are used to distinguish between samples.

n = sample

N = population size

The computational procedure for the Z-score was modified to delete the finite correction factor for hypotheses five and six, since the finite correction factor has little effect upon the resulting Z-scores with samples of such relatively small sizes.[4]

A customary step in testing hypotheses is the determination in advance of a level of significance at which the tests will be made. Given the predetermined significance level, the null hypotheses are then either rejected or not rejected, depending upon whether the calculated significance level is less than or greater than the predetermined significance level. The selected significance level specifies the level of risk the user is willing to accept of rejecting a null hypothesis when in fact the null hypothesis is true. In the social

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[4] Ibid, p. 226.

sciences a significance level of five percent is commonly used, although not exclusively.

The use of a predetermined level of significance was omitted for this study, and instead, the level of significance at which the various hypotheses would be rejected was prepared. The reasons for this approach are many: (1) selection of a predetermined level of significance is, for the most part, arbitrary and often unsupported; (2) the level of risk which one is willing to accept varies from one case to another, and (3) the reject-not-reject decision based on a predetermined level of significance may be misleading to a user whose use may allow for a greater or smaller level of risk than that selected by the researcher.

By presenting the significance level, a reader can reject or not reject each hypothesis based upon his intended use of the data and upon the level of risk appropriate for the user. Given the same research data, one reader may reject a given null hypothesis, whereas another reader may not reject because of a different level of acceptable risk.

In the absence of a predetermined significance level, however, a problem arose of how to formulate a decision rule for rejecting of not rejecting the null hypotheses being tested. It was felt reject-not-reject decisions should be made, at least for the more obvious cases, even though the determination of a rigid significance level was omitted. A possible solution was to reject those null hypotheses for which the level of significance would clearly indicate a rejection of the null hypothesis, based on commonly selected significance levels and not reject in those cases where the opposite occurs. For example, a

a significance level of thirty percent is clearly in the acceptance region (no reject) for the more commonly selected levels of significance. Similarly, a level of significance of approximately zero is clearly in the rejection region. This procedure was used in analyzing the results of this study and appeared to be satisfactory except for hypothesis number five. The computed alpha value for this hypothesis was not clearly in either region so a slightly different decision approach was employed in this case. Further explanation is presented as the results of hypothesis five are analyzed.

Test of Hypothesis 1.

H_o: $P_1 = P_2$

H_a: $P_1 > P_2$

where P_1 = the proportion of proper responses to positive confirmation requests which reflect unadjusted amounts (sample k_1)

P_2 = the proportion of proper responses to blank confirmation requests (sample k_2)

The purpose of hypothesis one was to test for a statistical significance of difference in the proportions of proper responses for positive and blank confirmations. Balances shown on the positive confirmations were stated as shown on the books of Bates Bros. without adjustment. The blank confirmations did not contain account balances, and the recipients were asked to provide the balances according to the customers' records. Support advanced for the use of blank confirmations is that they offer a potential advantage of forcing recipients

to consult their records in replying to the request, but a higher non-response rate may possibly offset this advantage.

If a significant difference were found for the two proportions, one would expect the proper response rate for the positive confirmations to be greater than the rate for blank confirmations. Blank confirmations require more effort by the recipients (i.e., determining the balance), whereas a recipient of a positive confirmation may sign and return the form without verifying the accuracy of the account balance.

Proper responses of fifty-seven and thirty-eight for positive and blank confirmations, respectively, provided the following proportions:

$P_1 = .8142857$

$p_2 = .5428571$

$p_o = .6785714$

The computed Z level is 3.74 which is significant at the .009 level. This alpha value is clearly in the rejection region, signifying a significant difference, therefore the null hypothesis is rejected. These results are consistent with the priors and with the findings by Sauls.[5]

Before a conclusion will be drawn of the relative effectiveness of the two confirmation forms, comparisons of the improper responses and nonresponses would be appropriate. Comparison of these test results is the objective of the next two hypotheses. However, the present significant difference between the rates of proper responses

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[5]Sauls, dissertation, p. 103.

offers a tentative conclusion that blank confirmations are less effective than positive confirmations. The auditor prefers a high proper response rate, but at the same time a returned confirmation request is of benefit to the auditor only if the recipient has followed the instructions contained in the request. The disadvantage inherent in the use of positive confirmation requests is that recipients may sign and return the form without verifying the balances. Since all account balances shown on the positive forms of sample k_1 were correct balances, the number of recipients who may have "confirmed" the balance without verifying the accuracy of the balance cannot be ascertained. Results of samples k_3 and k_4 provide an indication of the extent to which recipients acted in this manner.

Test of Hypothesis 2

$H_o: P_1 = P_2$

$H_a: P_1 \neq P_2$

where P_1 = the proportion of improper responses to positive confirmation requests which reflect unadjusted amounts (sample k_1)

P_2 = the proportion of improper responses to blank confirmation requests (sample k_2)

The purpose of hypothesis two was to determine whether the difference, if any, in the rates of improper responses for positive and blank confirmations was statistically significant. Improper responses represent errors made by the recipients and obviously the auditor would prefer to use the form which offers the least occurrence of improper responses, all other factors being equal.

Priors as to the direction of difference, should a difference be found, in the proportions of improper responses did not clearly specify one direction or the other, so a two-tail test was performed. Ideally, there should be no improper responses for either confirmation form, but realistically, improper responses to positive confirmations occur when recipients fail to detect errors in their account balances or take improper exception to correct balances. Improper responses to blank confirmations arise when recipients specify incorrect account balances.

Results of the experiment show no improper responses for the positive confirmations and eight improper responses to the request for confirmation using the blank form. Conversion of the results to proportions reveals the following:

$p_1 = 0.0$

$p_2 = 0.1142857$

$p_o = 0.0571428$

The computed Z value is 3.17 which yields a significance level of .152 percent. The null hypothesis is therefore rejected as the alpha value is clearly in the rejection region for the more commonly selected levels of significance.

Results of this test are not consistent with the results reported by Sauls.[6] In neither the bank nor the credit union experiment did Sauls experience any improper responses to positive confirmations reflecting unadjusted balances or for blank confirmations.

Further discussion of the implications of these results is presented following the analysis of hypothesis three.

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[6]Ibid., p. 67 and p. 71.

Test of Hypothesis 3

H_o: $P_1 = P_2$

H_a: $P_1 < P_2$

where P_1 = the proportion of nonresponses to positive confirmation requests which reflect unadjusted amounts (sample k_1)

P_2 = the proportion of nonresponses to blank confirmation requests (sample k_2)

The equality of the rates of nonresponses to positive confirmations and blank confirmations was the proposition tested under hypothesis three. The alternative hypothesis states that the rate of nonresponses to positive confirmations is less than the rate on nonresponses for blank confirmations. Because the positive confirmations may be completed with less effort than the blank confirmation, it was expected fewer recipients would ignore the positive requests.

Nonresponses for samples k_1 and k_2 were thirteen and twenty-three, respectively, which convert to the following proportions:

$p_1 = .1857142$

$p_2 = .3285714$

$p_o = .2571428$

The computed $\bar{z}$ value is 2.10 which yields a significance level of 1.786 percent. This null hypothesis is rejected since the alpha value is less than the significance levels most commonly used. The calculated alpha value is less clearly in the rejection region as in the preceeding two cases, however, and would not be rejected if a signficance level as low as 1.7 percent had been selected.

Results of this test are consistent with the priors; nonresponses to positive confirmations were found to be significantly less than the nonresponses to blank confirmations. The difference can likely be attributed to the difference in the minimum effort required for the two forms, as discussed previously. Sauls experienced a nonresponse rate of .31 in confirming bank loan accounts which did not differ significantly from the rate of nonresponses to positive confirmations.[7]

With the results of hypotheses one, two, and three, all testing the positive and blank forms of confirmation requests, a more complete analysis of the results and the implications for the auditor can be stated. Each of the three null hypotheses was rejected, and the direction of the difference in proportions were consistent with the priors in the two instances where priors were expressed.

Due to its higher rate of proper responses and its lower rates of improper responses and nonresponses, the positive confirmation appears to provide the more favorable results, although use of the blank confirmation form may be advantageous under certain conditions. In those cases where the auditor has determined that internal control over sales and cash receipts is satisfactory, the use of positive confirmations would seem to be preferable to the use of blank confirmations. In cases where internal control is less than satisfactory or if the auditor has other reason to doubt the accuracy of a significant number of account balances, the confirmation of the accounts using blank forms would be justified. Under either of these latter conditions the auditor should use any available means to assure himself the recipients

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[7]Ibid., p. 71.

did consult their records. Positive confirmations do not offer this assurance, but less external evidence (assurance) of the accuracy and validity of the accounts is necessary under the condition of satisfactory internal control.

Based upon the foregoing three tests, the positive form of confirmation has yielded superior results in all three categories: proper responses, improper responses, and nonresponses. As expressed in the preceding paragraph the continued use of positive confirmations under conditions of satisfactory internal control is shown to provide a more effective and efficient source of audit evidence. An indication of the effectiveness of positive confirmations where errors are contained in the accounts balances will be presented in a subsequent section as the results of samples k_3 and k_4 are analyzed.

Test of Hypothesis 4

H_o: $P_1 = P_2$

H_a: $P_1 > P_2$

where P_1 = the proportion of proper responses to positive confirmations requests which reflect overstated amounts (sample k_3)

P_2 = the proportion of proper responses to positive confirmation requests which reflect understated amounts (sample k_4)

The proposition tested was that the rates of proper responses do not differ significantly for overstated and for understated account balances. Stated more precisely, the null hypothesis is that the direction of errors introduced into the account balances do not

influence the rates of proper responses. The alternative hypothesis is that recipients will respond properly at a higher rate when the direction of error is unfavorable to the recipients. This hypothesis should not be viewed as a test of the honesty of the customers of Bates Bros., for it was the action of the recipients which is the subject of the test, not the motive behind the action.

Thirty-three recipients responded properly to the confirmation requests containing overstated balances, and thirty recipients responded properly to the understated requests. Proportions computed were as follows:

$p_1 = .4852941$

$p_2 = .4411764$

$p_o = .4632352$

The computed ~~Z~~ value is .56 which yields a significance level of 28.774 percent. As this alpha value is clearly in the acceptance region, the null hypothesis is not rejected. Results of this test are non consistent with the priors expressed.

Reported results of this test should be welcomed by the auditor, as it supports the conclusion that recipients will respond as readily to an understated balance as to an overstated balance. If the results had been consistent with the priors--that recipients respond at a less favorable rate when errors are favorable to the recipients--the effectiveness of confirming accounts would be restricted. Confirmations, in this case, might give the auditor reason to believe that the accounts were not overstated significantly but would give him little assurance that accounts were not understated. Material errors in the accounts in either direction are equally serious. The audit opinion

states the financial statements "present fairly" the financial condition and results of operations of the firm, and the auditor has no influence, and most often no knowledge, of how the financial statements will be used. Should the audited statements be the basis for a stock or asset purchase or for a stock-for-stock exchange, understated asset balances are no less important to the seller than overstated asset balances are to the buyer.

Test of Hypothesis 5

H_o: $P_1 = P_2$

H_a: $P_1 < P_2$

where P_1 = the proportion of proper responses to positive confirmation requests which reflect amounts overstated by a relatively minor amount (sub-sample of k_3)

P_2 = the proportion of proper responses to positive confirmation requests which reflect amounts overstated by a significant amount (sub-sample of k_3)

The proposition tested was that the proper response rates do not differ significantly whether account balances are overstated by a relatively minor or overstated by a significant amount. One-half of the customers selected in sample k_3 received confirmations containing balances increased by five percent of the account balances for the minor adjustments. The remaining one-half of the customers were mailed confirmations reflecting balances increased by twenty percent for the significant adjustments.

The expectation was that a higher response rate would be experienced for the requests overstated by a significant amount. It was felt recipients would detect a material or significant error in their account balances more readily than minor errors. This expectation is consistent with the findings of Davis, Neter, and Palmer, who found a positive correlation for error detection rates and error sizes.[8]

Tabulation of the confirmation results show thirteen proper responses to the requests containing the 5 percent adjustment and twenty proper responses to those requests containing balances adjusted by 20 percent. In proportions, the results are as follows:

$p_1 = .3823529$

$p_2 = .5882352$

$p_o = .4852941$

The computed ~~Z~~ value is 1.70 which yields a significance level of 4.457 percent. Inasmuch as the alpha value does not lie in the acceptance region, based upon the more usual levels of significance, the null hypothesis is rejected. Rejection of the null hypothesis should not be construed to mean statistical data has been offered which proves the one proportion is unequal to the other proportion. Rejection in this case is properly interpreted as meaning the equality is not altogether clear based upon the sample results.

The sample results are consistent with the priors, a significantly higher proportion of the recipients responded properly to the requests reflecting the material adjustments. While the auditor would ideally prefer a 100 percent proper response rate for confirmation requests, he

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[8]Davis, Neter, and Palmer, p. 41.

should welcome findings which show a significantly higher detection rate for accounts materially misstated. This is certainly preferable to findings to the opposite. This is not, however, to imply that minor errors are not of interest to auditors, for the cumulative effect of a series of relatively minor errors in the accounts may constitute a significant misstatement in the financial statements. Such errors may also indicate a weakness in the internal control over the receivables.

Test of Hypothesis 6

H_o: $P_1 = P_2$

H_a: $P_1 \neq P_2$

where P_1 = the proportion of proper responses to positive confirmation requests which reflect amounts understated by a relatively minor amount (sub-sample of k_4)

P_2 = the proportion of proper responses to positive confirmation requests which reflect amounts understated by a significant amount (sub-sample of k_4)

Hypothesis six is similar to hypothesis five except the account balances were understated rather than overstated. Some of the account balances were negatively adjusted by five percent, and others were negatively adjusted by twenty percent. The null hypothesis is that there is no difference in the rates of proper responses for the two sub-samples and the alternative hypothesis is that the two proportions differ significantly.

Priors did not clearly indicate which of the proportions were expected to be greater. Temporarily ignoring the direction of the errors, the expectation would be that those recipients of confirmations showing materially misstated account balances would detect and report the errors at a higher rate than those customers receiving confirmations containing minor errors. Consideration of only the direction of the errors, however, which are favorable to the recipients, produced expectations of fewer responses as the balances shown on the confirmations became more favorable to the recipient. Thus, expectations were inconsistent and a two-tail test of the significance was felt to be appropriate because of the uncertainty.

Proper responses of thirteen and seventeen for the accounts adjusted by five percent and the accounts adjusted by twenty percent, respectively, yielded the following proportions:

$p_1 = .3939393$

$p_2 = .4857142$

$p_o = .4411764$

The resulting $\not{Z}$ value is .76 which yields a significance level of 44.726 percent, which is a strong showing of no significant difference. Therefore, the null hypothesis is not rejected.

Implications of the results of this test are difficult to assess. It appears that the factors, direction of error and error size, may be interacting. The higher number of proper responses, although not significantly higher, may be partially explained by generalizing the results of hypothesis five--material errors are more likely to be detected and reported than are minor errors. But, misstating the

balances negatively, favorable to the recipients, may have had a counteracting effect on the response rate.

Considering only the results of the test of this hypothesis and ignoring the conclusions drawn from testing hypothesis five, points to the conclusion that the degree of error, when the errors are negative, had no effect on the response rate. Such a conclusion is felt to be tenable since in a previous test (hypothesis four), it was found the direction of error had no statistically significant effect on response rates. Also, in a similar study, Warren reported no interaction for the variables of error size and direction of error.[9]

Test of Hypothesis 7

H_o: $P_1 = P_2$

H_a: $P_1 > P_2$

where P_1 = the proportion of proper responses to negative confirmation requests which reflect amounts overstated by both minor and significant adjustments (sample k_5)

P_2 = the proportion of proper responses to negative confirmation requests which reflect amounts understated by both minor and significant adjustments (sample k_6)

The null hypothesis tested was that the rate of proper responses to negative confirmations was not dependent upon the direction of

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[9]Warren, pp. 72-3.

error. A similar proposition was tested for positive confirmations under hypothesis four and the null hypothesis was not rejected.

A priori, it was expected the recipients would respond properly at a higher rate when the account balances were overstated, favorable to the recipients. The discussion under hypothesis four is equally applicable to hypothesis seven and is not repeated here.

Interestingly, thirteen recipients in each of the two samples responded properly. Proportion of proper responses in each sample and the pooled proportion is .1911764. The Z value is 0.0 and the resulting significance level is 100 percent which clearly supports not rejecting the null hypothesis.

Generally, the implications of this test are the same as for hypothesis four and these implications are not repeated.

Confirmation results from samples k_5 and k_6 were the most surprising results of the experiment, not because the numbers of proper responses were the same for the two samples but due to the extremely low rate of proper responses. Approximately 80 percent of the recipients of misstated negative confirmations failed to detect and report the error. These results raise considerable doubt as to the effectiveness of negative confirmations. Given that negative confirmations are not generally recommended for use except when internal control over receivables is satisfactory, their use under any condition is of dubious value. Apparently recipients of negative requests attach only limited significance to the requests.

Test of Hypothesis 8

H_o: $P_1 = P_2$

H_a: $P_1 < P_2$

where P_1 = the proportion of proper responses to negative confirmation requests, some of which are misstated by positive adjustments and others are misstated by negative adjustments (samples k_5 and k_6 combined)

P_2 = the proportion of proper responses to positive confirmation requests, some of which are misstated by positive adjustments and other are misstated by negative adjustments (samples k_3 and k_4 combined)

Input data for testing hypothesis eight was derived by combining results of samples k_3 and k_4, both of which were circularized by positive forms, and by combining samples k_5 and k_6, both circularized on negative forms. The two sets of combined results were then tested to determine whether the difference in proper responses was significant. Prior studies experienced higher proper response rates for positive confirmations and similar results were expected for the present experiment. Nonrejection of the null hypothesis would imply the effectiveness of negative confirmations in discovering errors in the account balances is no less than the effectiveness of positive confirmations.

Proper responses to positive confirmations totaled sixty-three, and proper responses to negative confirmations were twenty-six. Proportions of proper responses were calculated as follows:

$p_1 = .1911764$

$p_2 = .4632352$

$p_o = .3272058$

The foregoing proportions yields a computed Z value of 5.73 with a resulting significance level of approximately zero. Therefore, the null hypothesis is rejected and the alternative hypothesis is not rejected.

A greater proper response rate for positive confirmations was not unexpected, but the relatively low response rate for the negative confirmations was highly surprising. Conclusions to be drawn from the results are clear and significant; positive confirmations offer a more reliable source of external audit evidence. While the detection of errors by recipients of positive confirmations was lower than had been anticipated, approximately 80 percent of the errors went undetected by recipients of negative confirmations. The continued use of the negative forms in connection with the examination of financial statements is of highly questionable value.

Table VII presents a summarization of the results of the tests of hypotheses.

Summary of Findings

Based upon the analyses of the results, the relevant implications of each of the individual hypotheses have been examined, but without sufficient consideration of the separate but related hypotheses. The purpose of this summary is to bring together the separate implications and conclusions into a comprehensive summation of the findings.

As stated in Chapter I, the objective of this study was to submit quantitative evidence of the relative response rates for alternative confirmation forms and to examine the effect on the response rates when errors are introduced into the account balances being confirmed. With

TABLE VII

SUMMARY OF TESTS OF HYPOTHESES

Hypothesis Number	Reaction	Null Hypothesis	Significance Level	Decision
1	Proper Responses; blank versus positive	$\frac{X_1}{n_1} = \frac{X_2}{n_2}$	.009%	Reject
2	Improper Responses; blank versus positive	$\frac{Y_1}{n_1} = \frac{Y_2}{n_2}$	.152%	Reject
3	Nonresponses; blank versus positive	$\frac{Z_1}{n_2} = \frac{Z_2}{n_2}$	1.786%	Reject
4	Proper Responses; overstated and understated	$\frac{X_3}{n_3} = \frac{X_4}{n_4}$	28.774%	Not Reject
5	Proper Responses; overstated 5% and 20%	$\frac{X_{31}}{n_{31}} = \frac{X_{32}}{n_{32}}$	4.457%	Reject
6	Proper Responses; understated 5% and 20%	$\frac{X_{41}}{n_{41}} = \frac{X_{42}}{n_{42}}$	44.726%	Not Reject

TABLE VII (CONTINUED)

Hypothesis Number	Reaction	Null Hypothesis	Significance Level	Decision
7	Proper Responses; negative requests; over-and understated	$\frac{X_5}{n_5} = \frac{X_6}{n_6}$	100.00%	Not Reject
8	Proper Responses; negative and positive requests	$\frac{X_5 + X_6}{n_5 + n_6} = \frac{X_3 + X_4}{n_3 + n_4}$	0.00%	Reject

X = proper responses

Y = improper responses

Z = nonresponses

n = number in sample

1st subscript indicates sample number: 1 = K_1, 2 = K_2...6 = K_6

2nd subscript indicates percentage of misstatement: 1 = 5%, 2 = 20%

respect to errors, the objective was to examine the effect of both the degree of error and the direction of error. This summary is partitioned into similar topical areas.

Alternative Confirmation Forms

In comparing the relative effectiveness of the positive and blank confirmation forms, neither of the forms was found to be the optimal form unconditionally recommended for usage. The positive form yielded superior results when the balances shown on the confirmation forms were unadjusted. Significant differences for proper responses, improper responses, and nonresponses were noted in the analysis of the samples utilizing the two forms, and in each case the direction of the differences was favorable to the positive form.

The expression of a conclusion relying only upon the foregoing results would be premature, however, as errors were not introduced into the balances contained in the positive forms. The effect on the response rate resulting from errors is a meaningful consideration in determing the relative effectiveness of the two forms.

Customers selected in two of the six samples received positive confirmations containing errors. Results for the latter samples were not as impressive as for the unadjusted balances.

The proportion of proper responses for the misstated balances declined from .81 to .46, improper responses increased from .00 to .31, and nonresponses increased at a lesser rate, from .186 to .228. Clearly these results reveal that recipients do not verify the balances to the extent implied by the results of the unadjusted balances. As errors are introduced into the account balances, the proportion of

proper responses decrease materially and the proportion of improper responses increase. Thus, one can safely conclude that recipients of positive confirmations do not always verify the amount being confirmed, and in many cases, the recipients do not know their proper balances.

Positive forms appear to provide sufficiently effective results where the auditor has satisfied himself that the internal control over receivables is satisfactory, and secondly, when the auditor has no reason to believe the accounts contain significant errors. Under conditions of either suspected significant differences in the accounts or less than satisfactory internal control, the utilization of blank forms are preferable over the positive form. Given either of the foregoing conditions, auditors should choose to employ the confirmation form that provides the higher degree of assurance that recipients did verify the account balances. Blank forms yield a lower proper response rate but this problem may be solved by more extensive follow-up procedures or increasing the sample sizes, or both.

Requests for confirmation via the negative form produced unsatisfactory results; approximately 80 percent of the recipients of negative confirmations failed to detect and acknowledge errors in their account balances. The conclusion is that negative confirmations are ineffective. The assumption by an auditor that no response signifies the debtors' acceptances of the balances is therefore a false assumption and continued use of negative confirmations may give the auditor unwarranted assurances of effectiveness.

In view of the results, an ordering of the alternative confirmation forms with respect to relative effectiveness would rank the negative form as the least effective of the three. Both positive and blank

forms rank well above negative forms, but their relative positions are dependent upon the auditor's appraisal of internal control.

Effect of Degree of Error

Priors expressed with respect to the effect on response rates due to the degree of errors in the accounts specified an expectant higher response rate where material errors were introduced into the balances. Experimental results were inconclusive, however, as one null hypothesis was rejected and the other was accepted.

Consolidation of the proper and improper responses for each of the sub-samples within samples k_3 and k_4 reveals little difference in total responses. Total responses for the accounts in k_3 overstated by 5 percent were 26 and total responses for those accounts overstated by 20 percent were 25. In sample k_4, each of the two understated sub-samples resulted in 27 total responses. Thus, approximately the same proportion of recipients in each of the four sub-samples responded, but a greater number of recipients responded improperly when the errors were insignificant. For negative confirmations, sample results show only negligible differences between material and minor errors.

It was suggested in a previous section of this chapter that the conflicting results of the two hypotheses testing the effect of the degree of error may be due to interaction between the variables, degree of error and direction of error. This assumption has not been tested in this study, but based upon Warren's reported results, the assumption may be untenable.[10] Warren applied analysis of variance procedures in

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[10]Warren, pp. 72-3.

a similar study and found no statistically significant interaction for the independent variables, direction of discrepancy and error size.

The results substantially support the previously reported research. With respect to the understated balances, the difference in proper responses was marked even though not statistically significant. Thus, implications for the auditing profession are favorable in that the larger the error in the account balance, the more likely the recipient is to respond properly.

Direction of Error

The rate of proper responses to confirmations was found not to be influenced by the direction of errors introduced into the account balances. Similar findings were reported by Hubbard and Bullington.[11]

Tests were made on both positive and negative forms with consistent results. In respect to the positive form, recipients responded properly at an insignificantly higher rate where the account balances were overstated. For negative confirmations, the sample results were the same for both the overstated and the understated balances.

This lack of independence on direction of error tends to refute the assumption that understated accounts are less likely to elicit responses. Hence, the auditor can safely expect to receive responses to incorrect balances in approximately the same proportions as positive and negative errors may be distributed in the accounts.

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[11]Hubbard and Bullington, p. 54.

CHAPTER V

A SUMMARIZATION

The primary objective of this chapter is to summarize and evaluate the findings of this study. In doing so, this chapter is divided into the following areas:

I. A General Review
   A. Objective of the Study
   B. Plan of the Thesis
II. Findings and Limitations
   A. Summary of Findings
   B. Limitations of Findings
III. Recommendations for Further Research

A General Review

Objective of the Study

Confirmation of accounts by direct correspondence is a firmly established audit procedure. The objectives of doing so are to obtain external evidence of the correctness and validity of the accounts and to test the compliance with the established accounting controls.

Circularization of the accounts may be made by one of three forms; positive, blank, and negative. Positive confirmations request the recipients to respond whether or not the recipients agree with the

balances shown on the forms. Blank forms request that the recipients insert the amounts owed. Negative forms are similar to the positive form except the negative forms request recipients to respond only if the recipients disagree with the amounts shown on the forms. In practice, the form selected for use depends upon such factors as number of accounts, size of the accounts, and the auditor's evaluation of internal control.

Circularization of the accounts is most often accomplished on a sampling basis, with the sample sizes determined by statistical sampling or judgement sampling methods. In either case, two types of errors may occur: sampling errors and nonsampling errors. Nonsampling errors arise from nonresponse or improper response by recipients, or they may result from clerical errors made by the auditor in processing the confirmation. This thesis has focused on the effects of nonsampling errors of the former type.

More specifically, the objective of this study was to examine the effects of nonsampling errors by conducting a field experiment in which different confirmation forms were used, and by the misstatement of some of the amounts being confirmed. Misstatement of the accounts provided a means of studying the effects on the response rates due to the direction of the error and to the size of the error. The use of different forms - positive, blank, and negative - permitted a comparison and ranking of the relative effectiveness of the forms.

Plan of Thesis

The stated objective of this thesis could best be met by conducting an empirical experiment. Confirmation requests were mailed to

customers of a cooperating business as if a routine audit were being conducted. The manager of Bates Bros. agreed to participate in the study even though it was suspected the mailing of misstated confirmations would have an adverse effect on their customers.

Requests were prepared as of March 23, 1974 and were mailed to customers selected randomly in six sample groups. Customers in sample k_1 were sent the standard positive confirmation form. The amounts shown on the forms were unadjusted. Customers in sample k_2 were mailed the blank form of confirmation. The purpose of these two samples was to provide response data by which the relative effectiveness of the two forms could be examined. A priori, it was expected that the positive requests would yield a higher rate of proper responses and a lower rate of nonresponses. These anticipated results were based upon the extra effort required of the recipient to complete the blank form, and thus, it was felt more recipients of the blank forms would ignore the requests.

To examine the effect of errors in account balances on the response rates, customers selected in samples k_3 and k_4 were sent requests on positive forms but containing misstated amounts. One sample contained amounts overstated and the other contained understated balances. It was felt that customers would respond more readily when the errors were unfavorable to the customers (i.e., overstated).

Adjustments to the account balances in samples k_3 and k_4 were divided between significant and minor adjustments.[1] One-half of the accounts in each sample was adjusted by 5 percent and one-half by 20

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[1]These terms are discussed in Chapter III, pp. 36-37.

percent. By dividing the positive errors and negative errors into two relative sizes, the ensuing responses allowed an examination of the results by sub-sample with which to test for statistically significant differences in the responses. Expectations were that the proper response rates would be greater for the material errors.

Customers in samples k_5 and k_6 received negative requests containing misstated amounts with the misstatements determined in the same manner as for samples k_3 and k_4. The objective of these requests was to again test for significant differences in the response rates for the overstated and understated amounts, and to compare the combined results of the two samples with the two samples utilizing positive forms. Priors indicated the proper response rate for negative forms would be significantly lower than for the positive forms.

A Stillwater CPA firm participated in the study by allowing the use of the firm's name and address. Responses were mailed to the CPA firm and picked up unopened by the researcher. Nonresponding customers were mailed second requests ten days after the mailing of the first requests, except second requests were not mailed to nonresponding recipients of negative confirmations.

Two weeks following the mailing of the second requests, letters explaining the purpose of the confirmations were mailed to all customers who had been mailed a confirmation request.

Proportions of proper responses, improper responses, and nonresponses for each of the samples and sub-samples were computed after a reasonable period had lapsed following the mailing of the second requests. The normal probability distribution was chosen to test for significance of differences between the selected proportions. A

predetermined level of significance was not selected, but instead, the significance level for each of the hypotheses was presented. The computed values reflect the levels of significance at which the null hypotheses would be rejected.

Reaction by the customers was less adverse than had been anticipated. Several of the customers made comments on the confirmation forms expressing displeasure with the incorrect balances, however, only two customers contacted Bates Bros. directly voicing more than mild displeasure. Accounts for these two customers along with the accounts of four Oklahoma State University personnel were deleted from the samples.

Findings and Limitations

Before summarizing the findings, the limitations of the study should be emphasized. The major shortcoming of this study was the inability to generalize the findings. The findings, therefore should be viewed in light of the limitations that are contained in a subsequent section of this chapter.

Summary of Findings

Results of this study indicate that the use of confirmations as a source of audit evidence has serious shortcomings. An appreciable number of the recipients either did not bother to verify the amounts shown on the requests or did not know their balances. At least two factors appeared to significantly influence the action taken by recipients: the form of confirmation utilized and error size.

With respect to confirmation forms, negative requests were found to elicit proper responses at a rate of approximately 20 percent. A surprising 80 percent of the recipients failed to detect and report the misstatement of their account balances. Certainly, this invalidates the assumption that nonresponses to negative requests signify the correctness of the balances. An audit procedure which can be expected to result in the detection of one error in five is of limited usefulness to the auditor.

Recipients responded more favorably to either the positive or blank confirmations than to the negative confirmations. Proper responses to these forms, however, were less than reassuring. Slightly less than one-half of the recipients took exception to the positive requests containing misstated balances, and only 54 percent of the recipients of blank confirmations furnished correct account balances.

Negative requests do not appear to be an effective source of evidence, in fact, they may give the auditor false assurances of the propriety of the accounts. Positive confirmations appear to be acceptable for use under circumstances of satisfactory internal control in which case less external assurance is required by the auditor. Under conditions of less than satisfactory internal control the utilization of blank requests appears warranted. Blank requests give the auditor a better indication of the extent to which the responding recipients do, in fact, consult their records. Consequently, where internal control has been evaluated by the auditor to be less than satisfactory, the auditor requires the greater degree of assurance of the propriety of the accounts that the blank forms yield.

The effect on the proportion of proper responses due to the direction of errors introduced into the balances was found to be negligible which indicates that recipients do not respond more favorably when errors are of possible benefit to the recipients. Therefore, the auditor has some justification for assuming that the likelihood of detecting positive errors does not differ significantly from the likelihood of his detection of negative errors. Also, the results support the implicit assumption that the population of responding recipients is representative of the nonresponding population, at least as to direction of errors in the accounts.

The rate at which recipients of positive confirmations detect and respond to errors was found to be influenced by the relative size of the errors. This effect was less pronounced, however, as only one of the two hypotheses tested revealed a statistically significant difference between the material and minor errors. Total responses (proper and improper) to misstated positive requests were found to be approximately the same whether the misstatement was due to a material or a minor error; however, those recipients of the larger errors responded properly more often than the recipients with the relatively minor errors regardless of the direction of the errors.

The foregoing findings imply that in cases where the accounts are in error, an auditor has a greater likelihood of discovering those accounts that are grossly in error. This implication is not altogether favorable, however, as multiple accounts with relatively small errors may in the aggregate constitute a material misstatement.

The findings presented in this study are generally consistent with findings reported by previous researchers. The only notable exception

is the finding by Hubbard and Bullington of no significant difference in error detection rates between positive and negative requests.[2]

Limitations

Since the findings of this study were the results of one experiment, generalization of the findings to include other firms, industries, or classes of customers would be inappropriate. It is not known how customers of other firms would react in a similar experiment, and there is no intent to imply that the results of this experiment would be typical of other experiments.

This limitation is also important because it is not known to what extent the customers of Bates Bros. were accustomed to receiving confirmation requests. Familiarity with confirmations could be one of the factors influencing recipients' reactions. Still a further reason for the limitation is due to the composition of the customers involved in the experiment. A priori, the charge customers of Bates Bros. would be expected to be a more sophisticated group than customers of a comparable firm located in a non-university town.

Recommendations for Further Research

Other studies similar to the present one should benefit the accounting profession. In view of the rather limited number of studies of this nature, the findings are not irrefutable. Hopefully, repeated replications of this or similar studies will provide additional evidence, either affirming or refuting the findings of the present study.

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[2]Hubbard and Bullington, p. 54.

If further studies demonstrate the confirmation process as being grossly ineffective, other research may then be directed toward discovery and testing of alternative audit procedures. While alternative procedures are commonly employed along with confirming of the accounts, it is felt that the alternative procedures are considered to be of secondary importance in situations where a "good" response to confirmation requests is obtained. Perhaps future research will show that the confirmation process should be given less emphasis (secondary importance) with the greater emphasis placed on the present alternative procedures or even some new procedures.

In respect to replications of this study, two recommendations may be made. First, future research will be more beneficial and the findings enhanced if the replications are conducted with the cooperation of other types of businesses. Participation of a good cross section of industry groups should be the goal of other researchers.

A second recommendation for subsequent research concerns adjustments made to the account balances. Accounts of Bates Bros. had a mean balance of less than $80 and the adjustments of 5 percent and 20 percent were perhaps smaller than would be desired. Studies utilizing a greater absolute difference between material and immaterial adjustments may produce more conclusive findings relative to the effect of size and direction of the errors.

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APPENDIXES

APPENDIX A

CONFIRMATION FORMS

Positive Confirmation Form

MEN'S WEAR

Bates Bros.

704 SOUTH MAIN STREET • STILLWATER, OKLAHOMA 74074

April 5, 1974

Dear Sir:

This form is being sent to you to enable our independent auditors to confirm the correctness of our records. It is not a request for payment or a statement of your account.

Our records on March 23, 1974, showed an amount of $_____ receivable from you. Please confirm whether this agrees with your records on that date by signing and returning this form directly to our auditors, Heath and Riley, Certified Public Accountants, Box 368, Stillwater, OK 74074. A stamped addressed envelope is enclosed for this purpose. If you find any differences, please report details directly to the auditors.

Yours very truly,

BATES BROS.

By Jane W. Bates

CONFIRMATION

The above amount is correct except as noted below.

_____

_____

_____

_____
(Signature)

ALSO STORES AT . . .
OKLAHOMA STATE UNIVERSITY, 242 S. KNOBLOCK
PONCA CITY, 3rd and GRAND

Blank Confirmation Form

MEN'S WEAR

Bates Bros.

704 SOUTH MAIN STREET • STILLWATER, OKLAHOMA 74074

April 5, 1974

Dear Sir:

This form is being sent to you to enable our auditors to check the correctness of our records. It is not a request for payment.

Please furnish in the space provided below, the balance of your account as of March 23, 1974, and return this form directly to our auditors, Heath and Riley, Certified Public Accountants, Box 368, Stillwater, OK 74074. A stamped addressed envelope is enclosed for your convenience.

Your assistance will be appreciated.

Yours very truly,

BATES BROS.

By Jann W. Bates

CONFIRMATION

Balance of account as of March 23, 1974, $_____

_____
(Signature)

ALSO STORES AT . . .
OKLAHOMA STATE UNIVERSITY, 242 S. KNOBLOCK
PONCA CITY, 3rd and GRAND

Negative Confirmation Form

MEN'S WEAR

Bates Bros.

704 SOUTH MAIN STREET • STILLWATER, OKLAHOMA 74074

April 5, 1974

Dear Sir:

This form is being sent to you to enable our auditors to check the correctness of our records. It is not a request for payment or a statement of your account.

Our records on March 23, 1974, showed an amount of $_____ receivable from you. No reply is necessary if you find this amount in agreement with your records, since the auditors will assume the amount is correct if they do not hear from you. If the amount is not correct, please report details of difference directly to Heath and Riley, Certified Public Accountants, Box 368, Stillwater, OK 74074, using the space below.

Yours very truly,

BATES BROS.

By Sam W. Bates

DIFFERENCES (IF ANY)

_____

_____

_____

_____
(Signature)

ALSO STORES AT . . .
OKLAHOMA STATE UNIVERSITY, 242 S. KNOBLOCK
PONCA CITY, 3rd and GRAND

APPENDIX B

EXPLANATORY LETTER TO CONFIRMATION RECIPIENTS

Oklahoma State University

COLLEGE OF BUSINESS ADMINISTRATION

STILLWATER, OKLAHOMA 74074
(405) 372-6211, EXT. 258

May 6, 1974

Dear Sir:

Early in April you were sent a request for confirmation of your account balance with Bates Bros. Confirmation of receivables by direct correspondence with the customers is a standard procedure in the course of an audit, but in this instance, an experiment was being conducted to study the effectiveness of the confirmation process.

We appreciate your assistance with this study and trust that you were not inconvenienced. To adequately test the effectiveness of confirming accounts receivable, it was necessary to mail some confirmations with misstated account balances. Please be assured that the difference in your account balance was not the result of an error by Bates Bros.

This experiment was possible only because of the generous cooperation and assistance by Sam Bates and his employees, and the accounting firm of Heath and Riley. Support by the Stillwater business firms of research efforts here at O.S.U. is commendable.

Sincerely,

Dr. Lanny G. Chasteen
Associate Professor of
Accounting

James D. Yeary
Ph.D. Candidate in Accounting

APPENDIX C

BRIEF DESCRIPTION OF HYPOTHESES

Hypothesis 1

1. H_o: $P_1 = P_2$

2. H_a: $P_1 > P_2$

   where P_1 = the proportion of proper responses to positive confirmation requests which reflect unadjusted amounts (sample k_1)

   P_2 = the proportion of proper responses to blank confirmation requests (sample k_2)

3. Sample sizes: $n_1 = 70$, $n_2 = 70$

4. Test statistic: Z

$$Z = \frac{P_1 - P_2}{\sqrt{p_o q_o / n_1 + p_o q_o / n_2}\ \sqrt{\frac{N - (n_1 + n_2)}{N - 1}}}$$

   where $p_o = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2}$

   $q_o = 1 - p_o$

   The test statistic Z is distributed normally

5. Results: $p_1 = .8142857$

   $p_2 = .5428571$

   $p_o = .6785714$

   $Z = 3.74$

6. $P(Z \geq 3.74 \mid H_o) = .00009$

7. Conclusion: Reject H_o

Hypothesis 2

1. H_o: $P_1 = P_2$

2. H_a: $P_1 \neq P_2$

   where P_1 = the proportion of improper responses to positive confirmation requests which reflect unadjusted amounts (sample k_1)

   P_2 = the proportion of improper responses to blank confirmation requests (sample k_2)

3. Sample sizes: $n_1 = 70$, $n_2 = 70$

4. Test statistic: Z

$$Z = \frac{P_1 - P_2}{\sqrt{p_o q_o / n_1 + p_o q_o / n_2}\sqrt{\frac{N - (n_1 + n_2)}{N - 1}}}$$

   where $p_o = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2}$

   $q_o = 1 - p_o$

   The test statistic Z is distributed normally

5. Results: $p_1 = 0.0$

   $p_2 = 0.1142857$

   $p_o = 0.0571428$

   $Z = 3.17$

6. $P(Z \geq 3.17 \mid H_o) = .00152$

7. Conclusion: Reject H_o

Hypothesis 3

1. H_o: $P_1 = P_2$

2. H_a: $P_1 < P_2$

   where P_1 = the proportion of nonresponses to positive confirmation requests which reflect unadjusted amounts (sample k_1)

   P_2 = the proportion of nonresponses to blank confirmation requests (sample k_2)

3. Sample sizes: $n_1 = 70$, $n_2 = 70$

4. Test statistic: Z

$$Z = \frac{P_1 - P_2}{\sqrt{p_o q_o / n_1 + p_o q_o / n_2}\sqrt{\frac{N - (n_1 + n_2)}{N - 1}}}$$

   where $p_o = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2}$

   $q_o = 1 - p_o$

   The test statistic Z is distributed normally

5. Results: $p_1 = .1857142$

   $p_2 = .3285714$

   $p_o = .2571428$

   $Z = 2.10$

6. $P(Z \geq 2.10 \mid H_o) = .01786$

7. Conclusion: Reject H_o

Hypothesis 4

1. H_o: $P_1 = P_2$

2. H_a: $P_1 > P_2$

   where P_1 = the proportion of proper responses to positive confirmation requests which reflect overstated amounts (sample k_3)

   P_2 = the proportion of proper responses to positive confirmation requests which reflect understated amounts (sample k_4)

3. Sample sizes: $n_1 = 68$, $n_2 = 68$

4. Test statistic: Z

$$Z = \frac{P_1 - P_2}{\sqrt{p_o q_o / n_1 + p_o q_o / n_2}\ \sqrt{\frac{N - (n_1 + n_2)}{N - 1}}}$$

$$\text{where } p_o = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2}$$

$$q_o = 1 - p_o$$

   The test statistic Z is distributed normally

5. Results: $p_1 = .4852941$

   $p_2 = .4411764$

   $p_o = .4632352$

   $Z = .56$

6. $P(Z \geq .56 \quad H_o) = .28774$

7. Conclusion: Do not reject H_o

Hypothesis 5

1. H_o: $P_1 = P_2$

2. H_a: $P_1 < P_2$

   where P_1 = the proportion of proper responses to positive confirmation requests which reflect amounts overstated by a relatively minor amount (sub-sample of k_3)

   P_2 = the proportion of proper responses to positive confirmation requests which reflect amounts overstated by a significant amount (sub-sample of k_3)

3. Sample sizes: $n_1 = 34$, $n_2 = 34$

4. Test statistic: Z

$$Z = \frac{P_1 - P_2}{\sqrt{p_o q_o / n_1 + p_o q_o / n_2}}$$

where $p_o = \dfrac{n_1 p_1 + n_2 p_2}{n_1 + n_2}$

$q_o = 1 - p_o$

The test statistic Z is distributed normally

5. Results: $p_1 = .3823529$

   $p_2 = .5882352$

   $p_o = .4852941$

   $Z = 1.70$

6. $P(Z \geq 1.70 \mid H_o) = .04457$

7. Conclusion: Reject H_o

Hypothesis 6

1. H_o: $P_1 = P_2$

2. H_a: $P_1 \neq P_2$

   where P_1 = the proportion of proper responses to positive confirmation requests which reflect amounts understated by a relatively minor amount (sub-sample of k_4)

   P_2 = the proportion of proper responses to positive confirmation requests which reflect amounts understated by a significant amount (sub-sample of k_4)

3. Sample sizes: $n_1 = 33$, $n_2 = 35$

4. Test statistic: Z

$$Z = \frac{P_1 - P_2}{\sqrt{p_o q_o / n_1 + p_o q_o / n_2}}$$

where $p_o = \dfrac{n_1 p_1 + n_2 p_2}{n_1 + n_2}$

$q_o = 1 - p_o$

The test statistic Z is distributed normally

5. Results: $p_1 = .3939393$

   $p_2 = .4857142$

   $p_o = .4411764$

   $Z = .76$

6. $P(Z \geq .76 \mid H_o) = .44726$

7. Conclusion: Do not reject H_o

Hypothesis 7

1. H_o: $P_1 = P_2$

2. H_a: $P_1 > P_2$

   where P_1 = the proportion of proper responses to negative confirmation requests which reflect amounts overstated by both minor and significant adjustments (sample k_5)

   P_2 = the proportion of proper responses to negative confirmation requests which reflect amounts understated by both minor and significant adjustments (sample k_6)

3. Sample sizes: $n_1 = 68$, $n_2 = 68$

4. Test statistic: Z

$$Z = \frac{P_1 - P_2}{\sqrt{p_o q_o / n_1 + p_o q_o / n_2}\ \sqrt{\frac{N - (n_1 + n_2)}{N - 1}}}$$

   where $p_o = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2}$

   $q_o = 1 - p_o$

   The test statistic Z is distributed normally

5. Results: $p_1 = .1911764$

   $p_2 = .1911764$

   $p_o = .1911764$

   $Z = 0.0$

6. $P(Z \geq 0.0 \mid H_o) = 1.00$

7. Conclusion: Do not reject H_o

Hypothesis 8

1. H_o: $P_1 = P_2$

2. H_a: $P_1 < P_2$

   where P_1 = the proportion of proper responses to negative confirmation requests, some of which are misstated by positive adjustments and others are misstated by negative adjustments (samples k_5 and k_6 combined)

   P_2 = the proportion of proper responses to positive confirmation requests, some of which are misstated by positive adjustments and others are misstated by negative adjustments (samples k_3 and k_4 combined)

3. Sample sizes: $n_1 = 136$, $n_2 = 136$

4. Test statistic: Z

$$Z = \frac{P_1 - P_2}{\sqrt{p_o q_o / n_1 + p_o q_o / n_2}\ \sqrt{\frac{N - (n_1 + n_2)}{N - 1}}}$$

   where $p_o = \dfrac{n_1 p_1 + n_2 p_2}{n_1 + n_2}$

   $q_o = 1 - p_o$

   The test statistic Z is distributed normally

5. Results: $p_1 = .1911764$

   $p_2 = .4632352$

   $p_o = .3272058$

   $Z = .0573$

6. $P(Z \geq 5.73 \mid H_o) = 0.0$

7. Conclusion: Do not reject H_o

VITA[2]

James D. Yeary

Candidate for the Degree of

Doctor of Philosophy

Thesis: AN EMPIRICAL STUDY OF NONSAMPLING ERRORS IN THE CONFIRMATION OF ACCOUNTS RECEIVABLE

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