Faculty Working Papers

CONTROLLING AUDIT RISK

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#549

College of Commerce and Business Administration
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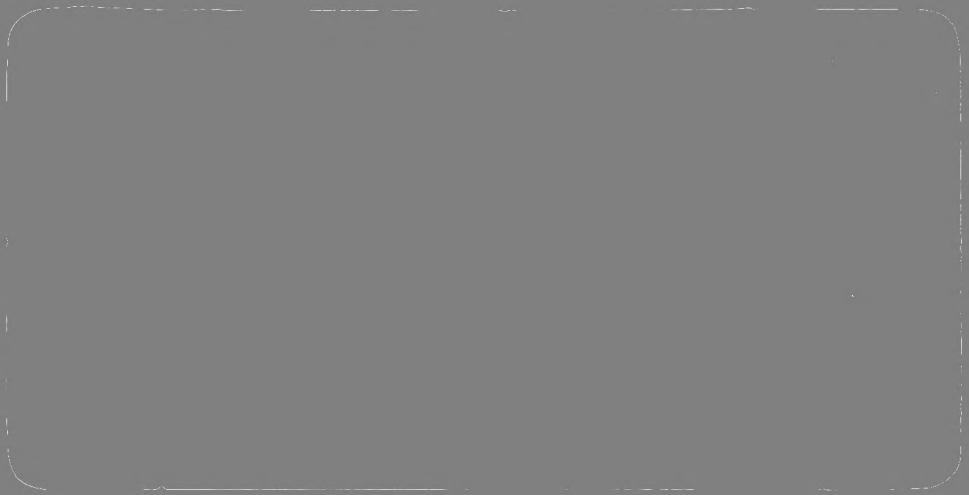

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Summary:

The objective of this paper is to illustrate how an auditor may use statistical sampling to help control the audit risk. The focus is on planning a significant area of audit interest such as the revenue cycle. Both statistical substantive tests of details and any required statistical tests of compliance may be designed so that the risk of failing to discover a material monetary error as well as the risk of overauditing may be limited to a tolerable level. In addition, by considering the extent of these tests at several levels of planned reliance on the system of internal accounting control, a least cost combination can be selected.

Controlling Audit Risk

Donald Roberts

Uncertainty is inherent in auditing. Indeed, the general purpose of auditing procedures is to reduce the auditor's uncertainty to a tolerable level. This is expressed in Statement on Auditing Standards, Number 1, section 330.10 which states:

> In the great majority of cases, the auditor finds it necessary to rely on evidence that is persuasive rather than convincing. Both the individual assertions in financial statements and the overall proposition that the financial statements as a whole present fairly, in conformity with generally accepted accounting principles, the financial position, results of operations, and changes in financial position are of such a nature that even an experienced auditor is seldom convinced beyond all doubt will respect to all aspects of the statements being examined.

The risk faced by the auditor is that material errors or irregularities, if they exist, will not be detected. The auditor is responsible for controlling this risk and exercises control by determining the nature, extent, and timing of the substantive audit procedures.

Sampling pertains only to one aspect of the total audit risk. This is the possibility that audit procedures restricted to a sample of details of transactions or balances might produce results that differ from those produced by applying the producers in the same way to all the details. This aspect, known as sampling risk, can be objectively measured and controlled when statistical sampling is used to determine the extent of the application of audit procedures. Thus, sampling risk is a function of how much evidential matter the auditor obtains during the audit.

The other aspect of audit risk is a function of the competence of the evidential matter. It involves the possibility that applying the

procedures to all details of the transactions or balances would fail to detect a material error that exists. This aspect is known as the non-sampling risk. It is attributable to the nature of the audit procedures, the timing of the procedures, the system being examined, and the skill and care of the auditor.

The distinction between these two aspects of risk is recognized in SAS 1, section 320A.17, which states:

> The competence of evidential matter as referred to in the third standard of field work is solely a matter of auditing judgment that is not comprehended in the statistical design and evaluation of an audit sample. In a strict sense, the statistical evaluation relates only to the probability that items having certain characteristics in terms of monetary amounts, quantities, errors, or other features of interest will be included in the sample--not the auditor's treatment of such items. Consequently, the use of statistical sampling does not directly affect the auditor's decisions as to the auditing procedures to be performed, the acceptability of the evidential matter obtained with respect to individual items in the sample, or the action which might be taken in the light of the nature and cause of particular errors.

Designing an audit program entails exercising control over each aspect of audit risk--both sampling risk and non-sampling risk. A feature that facilitates this is that, for a particular test of details, the audit risk is approximately equal to the sum of the sampling risk and the non-sampling risk.

To illustrate, suppose that a particular audit procedure had a probability of .85 of finding a material error, given it existed, when applied to all details. Further, suppose a statistical sample had a probability of .95 of producing the same result as applying the procedure to every detail. Then, the probability of failing to detect the material error is

$$1 - (.85)\ (.95) = .1925$$

which is approximately equal to .15 (the complement of .85) plus .05 (the complement of .95).

The objective of this paper is to illustrate how the auditor may use statistical sampling to help control his audit risk by maintaining the sapmling risk at a tolerable level. The focus is not on an individual test of details but on a significant area of audit interest, such as the revenue cycle. Proper planning allows the auditor to maintain the sampling risk for each significant area at a tolerable level. The following describes one way this can be done.

Some guidance for controlling audit risk is provided in Section 320B.35 where the following formula appears:

$$S = 1 - \frac{(1-R)}{(1-C)} \quad .$$

While this formula conceptually expresses the relationship between audit risk (1-R), reliance on internal control(C) and the risk level for substantive tests (1-S), it needs to be modified before it can serve as an operational tool for determining the appropriate extent of substantive tests of details.

The paper's objective can be restated in the following way: to make the above formula operational.

Audit Program Design

Conceptually, the auditor selects the nature, extent, and timing of the audit procedures to reduce the audit risk to a tolerable level. Following the formula presented in Section 320B.35, the auditor might calculate the overall audit risk corresponding to each account balance or class of transactions as follows:

Internal Accounting Control:				
Likelihood that a material monetary error could occur and remain undetected			.40	(1-C)
Tests of details:				
Likelihood of non-sampling risk	.10			
Sampling risk	.20			
		.30		
Analytic review:				
Likelihood of failing to detect a material monetary error		.50		
			.15	(1-S)
Combined risk level (.40 x .15)			.06	(1-R)

The present discussion is limited to controlling the sampling portion of this risk when statistical tests of details are used. Notice that in the above illustration, the combined risk level of .06 is composed of a portion attributable to sampling error (.04 = .40 x .20 x .50) and a portion attributable to non-sampling error (.02 = .40 x .10 x .50). The question this paper addresses is how the auditor might select the extent of the statistical tests of details to maintain the sampling portion at a tolerable level.

The following steps constitute a way of determining the extent of the statistical substantive tests of details pertaining to a particular balance or class of transactions. The method outlined represents a way to make operational the conceptual formula presented in Section 320B.35.

1. Determine monetary error materiality.
2. Determine the tolerable overall sampling risk.
3. Determine the overall risk of overauditing.
4. Determine the monetary error materiality, sampling risk, and risk of overauditing for each statistical test.
5. Design each statistical sample.

Materiality. Elliott [1] has discussed the problem of designating a measure of materiality for each account balance or class of transactions. In his discussion, Elliott distinguishes between accounting materiality and auditing materiality. Auditing materiality is related to the sensitivity of the audit procedures to discovering monetary errors of various magnitudes and, therefore, should not exceed the amount of monetary error the auditor deems material for the financial statements taken as a whole.

The auditing materiality designated for each account balance or class of transactions represents the standard the auditor employs in designing the audit tests. The key question is: what is the maximum dollar amount of errors that would be acceptable in the circumstances?

After determining a material amount for each account balance or class of transactions, the auditor needs to allocate this amount between the statistical and nonstatistical tests. One way to accomplish this is to answer the question: what is the outside limit on the amount of monetary error that could remain undetected by the nonstatistical tests?

For example, the following tests of details might be selected to determine whether accounts receivable are materially overstated with respect to existence, recorded amount, collectibility, and period cutoffs:

1. Request confirmation of recorded amounts.
2. Analyze and test the account from the data of confirmation to the closing date.
3. Test aging.
4. Test subsequent collections.
5. Test period cutoffs.

If only the confirmation requests is to be done statistically, the auditor should not use the entire materiality amount to determine the number of requests to send. Rather, he should recognize that the other tests of details may fail to detect monetary errors below some magnitude. What is the outside limit? A precise answer is probably not possible, but with careful thought the auditor can select a reasonable amount.

Sampling risk. To determine a tolerable level for the overall sampling risk (β), the auditor must consider (1) the tolerable combined risk level attributed to sampling (1-RS), the degree of reliance on internal accounting controls (C), and the results of any planned analytical review procedures. If the results of analytical review procedures may be expressed as the likelihood that such procedures would detect a material misstatement if such existed (SP), then the following relationship holds

$$\beta = \frac{(1-RS)}{(1-C)(1-SP)} .$$

This formula is similar to the formula presented in section 320B.35 with the following provisions:

1. (1-RS) represents the combined risk attributed to sampling a particular account balance or class of transactions. This may be added to the nonsampling risk to obtain the audit risk.

2. The product $\beta(1-SP)$ represents the sampling portion of the risk that the substantive tests (tests of details and analytical review) would fail to detect a material error if it existed.

3. C expresses the degree of reliance on the pertinent internal accounting controls expressed on a scale between zero and less than one. In this case the pertinent controls are those designed to prevent or detect monetary errors of the types the statistical tests of details are capable of detecting.

Using this formula, the auditor first selects the magnitude of the tolerable combined risk level attributed to sampling (1-RS).

Second, the auditor specifies a value for C. This value is based on the system review and represents a conditional evaluation that assumes satisfactory compliance. Ideally, the maximum value for C would be equal to the likelihood that the set of pertinent accounting controls would prevent or detect a material amount of monetary error of specified types given satisfactory compliance. Of course, the auditor can always elect to use a lesser value for C than the maximum possible.

Instead of attempting to express C as a precise number, the auditor might use a range of values. For example, a range from 0 to .3 could correspond to no reliance, from .3 to .5 to low reliance, from .5 to .7 to moderate reliance, from .7 to .85 to high reliance, and from .85 to 1.0, very high reliance. In each case, the lower value of the range could be used in the formula to calculate β.

As a third step, the auditor needs to assign a value to the risk that any analytical review procedures would fail to detect a material monetary error. This risk (1-SP) is based on the auditor's judgment about the likelihood that the analytical review procedures would detect a material monetary error of the types tested for by the tests of details. Little research has been done to give guidance to the auditor in setting this amount, but many well-informed auditors would set this risk no lower than .6 to .7. More experience in this area might result in significantly lowering this. (See Kinney [2], [3])

As an illustration, consider again the tests of details pertaining to the accounts receivable balance. Suppose that the auditor decides

that the tolerable combined risk level attributed to requesting confirmation from a sample of the accounts receivable balances should be .05.

To ascertain the maximum level of reliance, the auditor needs to identify the pertinent controls. These are those controls that are designed to prevent or detect the following types of errors or irregularities.

- Sales invoice is inaccurate
- Sales invoive is improperly recorded
- Cash receipts are not recorded
- Cash receipts are recorded incorrectly

The auditor's evaluation of the sets of internal accounting controls that should prevent or detect these types of errors might be expressed either on a numerical scale from 0 to 1 or on a qualitative scale. In either case, the resulting evaluation should express the auditor's judgment concerning the effectiveness of the controls in preventing or detecting a material amount of monetary error subject to the condition that compliance with the controls is satisfactory.

For illustrative purposes, suppose that the auditor decides that the controls are very good and that the maximum reliance is high (corresponding to, say, .7 on a numerical scale). To use this degree of reliance, the auditor would require confirming evidence from tests of compliance. Deciding what degrere of reliance to use in planning involves a cost/benefit analysis which will be illustrated later.

The remaining judgment concerns the usefulness of the planned analytical review procedures. As previously suggested, the auditor currently can only make a rough determination of the likelihood that

the analytical review procedures pertaining to the revenue cycle would detect a material monetary error in the accounts receivable balance. Suppose in this illustration that the auditor assigned a value of .33 to this likelihood.

Combining this information to solve for the required level of sampling risk when the maximum degree of reliance is employed gives the following result

$$\beta = \frac{.05}{(.3)(.67)} = .25$$

If the auditor should decide to place no reliance on the pertinent internal accounting controls, the resulting value of b equals .07. Of course, he may vary the degree of planned reliance anywhere within this range. For illustrative purposes, consideration is confined here to two intermediate choices--.10 corresponding to a low degree of reliance and .15 corresponding to a moderate degree.

Risk of overauditing. In addition to the overall sampling risk, the auditor may elect to control the risk that his statistical tests of details indicate that there may be a material monetary error when, in fact, there is none. This risk is termed the risk of overauditing because the consequences of the potential presence of a material error leads the auditor to increase the audit scope.

How can the auditor select an appropriate level for this risk? A suggested answer is to consider the types of errors or irregularities that can be discovered by the tests and determine, in advance, the additional audit procedures that would be necessary to resolve the question of potential material error. The additional work entails additional

cost—the auditor might adopt a strategy of selecting the risk of over-auditing to maintain the expected cost at a specified low level. The expected cost is found by multiplying the risk times the added cost.

In the illustration, the auditor might determine that should the sample evaluation of the confirmation requests suggest the presence of a material monetary error, he would conduct an expanded test of subsequent payments. If the cost of this additional work were about $2,000, the auditor might select a value of .05 so that the resulting expected cost would be $100 ($2000 x .05 = $100).

Sample design. Step 4 is only required when there is more than one statistical substantive test of details for a particular account balance or class of transactions. The present discussion is limited to the case where a single statistical substantive test is being planned.

Sample design encompasses specifying an appropriate audit objective, identifying the sampling unit and frame, determining the sample size, and deciding on the selection method.

Audit objective--Each statistical substantive test has both general and specific objectives. The general objective may be either deciding whether the amount of monetary error could be material (decision objective), or estimating the amount of monetary error (estimation objective). The choice of a general objective depends upon (1) the extent of monetary error the auditor anticipates finding and (2) the costs and quality of alternative sources of additional evidence when that is required.

The specific objective states in operational terms the types of monetary error to be examined in the test. For example, the requests

for conformation of accounts receivable would provide evidence relative to existence and accuracy of the recorded amounts--especially errors of overstatement.

Sampling unit and frame--The frame represents the listing of the sampling units. Most applications of statistical tests of balances involve using a computer-based listing of the sampling units.

Determining sample size--Most of the time the auditor has the following information available for help in determining the appropriate sample size: (1) the recorded amounts, and (2) the anticipated proportion of sampling units with monetary error.

Based on this limited information, the auditor needs to determine a sample size that will achieve the specified tolerable sampling risk (β) for a specified material amount (M) and the tolerable risk of overauditing (α).

When one of the standard statistical estimators is used (mean, difference, ratio, or regression estimator), the auditor may translate the risk requirements (α, β) and the materiality amount (M) into a desired standard error of the estimate. This relationship is expressed as:

$$SE(\hat{D}) = \frac{M}{z_{\beta} + z_{\alpha/2}}$$

where $SE(\hat{D})$ represents the standard error of the estimated total difference between the audited amount and the recorded amount, $z_{\alpha/2}$ represents the normal factor corresponding to a risk of overauditing equal to α, and z_{β} represents the normal factor corresponding to a

sampling risk of β. In turn, the desired standard error can be used directly in calculation of the appropriate sample size.

When the auditor elects to use a pps sample to obtain a useful upper bound for the monetary error, the specified risks (α, β) and the material amount (M) may be used directly in a table look-up to obtain the appropriate sample size.

Continuing the example, the auditor would determine the number of confirmations to request. He might consider the sample size corresponding to several values of the tolerable sampling risk (β)—each choice reflecting a different degree of planned reliance on the pertinent internal accounting controls. The resulting sample sizes might look as follows:

Tolerable sampling risk	.07	.10	.15	.25
sample size	478	374	342	239

The decision concerning which of these to use is made after the required compliance tests are tentatively planned.

Compliance Tests

The auditor's compliance tests of pertinent procedures are designed to ascertain whether the preliminary evaluation is warranted. Such tests are required only when the auditor plans to rely on the accounting controls. Each substantive test of details can be used to determine whether certain types of monetary errors have occurred. The pertinent procedures are those that are in use to prevent or detect these types of monetary error. Corresponding to each type of monetary error, the auditor has identified the pertinent procedure or set of pertinent procedures. For those procedures that leave an audit trail of evidence, the auditor may use a statistical sample to test compliance.

The following steps represent a method of determining the extent of the statistical compliance tests.

1. Determine the audit objectives.
2. Determine the overall risk of unwarranted reliance corresponding to each planned substantive test.
3. Determine the overall risk of overauditing corresponding to each planned substantive test.
4. Determine the risks of unwarranted reliance and overauditing for each individual compliance test.
5. Design each statistical compliance test.

Audit objectives. The audit objective of a statistical compliance test is to decide whether the deviation from pertinent procedures are too great to justify the planned reliance. The rate of compliance deviation determines the potential for monetary error. Of course, not all instances of procedural deviations will result in monetary errors, but the opportunity for such error increases as the number of procedural deviations increase. The range of satisfactory compliance might correspond to those rates of compliance deviation for which the expected potential monetary error is less than a material amount. Equivalently, the auditor might define a threshold rate for unsatisfactory compliance as that rate at which the expected potential monetary error equals a material amount.

As suggested here, the threshold rate in dollar terms would equal the material amount M divided by the total recorded amount of the transactions Y. For example, if $20,000 is a material amount for 10,000 purchase transactions totalling $2,000,000, the threshold rate in dollar terms would be .01 $(\frac{20,000}{2,000,000})$. What would the threshold rate be in terms of the number of transactions? The same .01 applied to the 10,000

transactions would suggest that 100 transactions at an average value of $200 could constitute the expected potential monetary error provided all transactions were equally likely to contain a monetary error and provided that the type of error under consideration could lead to the transaction being overstated by the recorded amount. A higher rate would be used when the auditor can determine that when a monetary error occurs, the average magnitude of such an error is less than the total transaction amount.

The statistical objectives, then, of a statistical compliance test is to decide whether the rate of compliance deviations from a prescribed procedure or set of procedures could be as large as the determined threshold rate (P_o).

Some modification of this is appropriate when not all the pertinent procedures comprising a set are to be tested statistically. This may occur, for example, when some procedures within the set are designed to prevent the error from occurring (prevention controls) while others are designed to detect any errors that occur (detection controls). In cases where the prevention controls are tested through inquiry and observation and the detection controls are tested statistically, the threshold rate (P_o) for the statistical tests may be adjusted upwards to reflect the auditor's judgment concerning the likelihood that the prevention controls allow a monetary error. For example, if the threshold rate for the controls considered together is .05, and the auditor's likelihood that the prevention controls would allow a monetary error to occur is .25, then P_o may be set at .20 (.25 x .20 = .05).

Overall risk of unwarranted reliance. The most important risk the auditor faces is the risk of unwarranted reliance. This means that the auditor decides that compliance is satisfactory when in fact it is less than satisfactory. The consequence of this mistake is that the substantive tests of details are conducted at a greater degree of reliance than they should be. In particular, if the auditor planned a moderate degree of reliance, using a sampling risk of .15, when in fact, had he known that compliance was not satisfactory, he would have used a sampling risk of .07, he incurs additional risk of not finding a material error when it exists. Thus, unwarranted reliance leads to increased risk of not finding a material error.

The auditor can limit the expected amount of this increased sampling risk by making an appropriate selection of the risk of unwarranted reliance. The expected increase in sampling risk equals the product of the risk of unwarranted reliance times the difference between the sampling risk at the planned degree of reliance and the sampling risk corresponding to minimal reliance. For example, in the above illustration, if the auditor uses a risk of unwarranted reliance equal to .10, then the expected increase is somewhat less than .01 (.10 x (.15 - .07)).

The auditor can decide to limit the expected increase in sampling risk to any desired level. To illustrate, suppose the level is set at .01 and that the auditor, as previously described, is considering the following levels of sampling risk for requesting confirmation from a sample of the accounts receivable balances:

Degree of Reliance on Internal Control	Tolerable Sampling Risk	Risk of Unwarranted Reliance
None	.07	
Low	.10	.33
Moderate	.15	.12
High	.25	.05

Corresponding to each planned degree of reliance, the risk of unwarranted reliance is selected so that the difference between the sampling risk at that level and the sampling risk at no reliance multiplied times the risk of unwarranted reliance does not exceed .01 ((.10 - .7) x .33 = 01, (.15 - .07) x .12 = .01, (.25 - .07) x .05 = .01).

The suggested way to select the risk of unwarranted reliance may result in values much higher than the examples cited in section 320B.24. Nevertheless, the suggested method does not contradict the spirit of SAS no. 1. In SAS no. 1, the auditor is advised to maintain the risk of unwarranted reliance at a high level and adjust the threshold rate according to the degree of planned reliance on pertinent internal accounting controls. The suggested method described here allows the risk to vary with the degree of planned reliance and maintains the threshold rate at a fixed value.

Overall risk of overauditing. Compliance tests may lead to overauditing. When the auditor decides that compliance with some pertinent accounting control procedure may not be satisfactory, there must be a change in the substantive audit program. Incorrectly deciding that compliance is unsatisfactory adds unnecessarily to the audit expense. The auditor may elect to control this risk by specifying the chance that the fraction of compliance deviations in his sample should exceed the

threshold level when the actual rate of compliance deviations is at some low satisfactory amount (P_1).

To illustrate, suppose the threshold rate P_o = .05. Then the auditor might select P_1 = .01 to represent a low rate corresponding to satisfactory compliance. When the actual rate equals .01, he would like the sample to indicate satisfactory compliance. How can a tolerable risk level be determined? One way would be to balance the expected increase in audit expense caused by changing the audit program and the cost of additional observations in the compliance test. For example, suppose the tolerable sampling risk is .12 at a threshold rate of .05. If the auditor anticipates no compliance deviations, a sample of 41 would meet the sampling risk objective, but such a sample size would entail a risk of overauditing of .34 when the rate of compliance deviation is .01. Increasing the sample size to 72 maintains the sampling risk at .12, but decreases the risk of overauditing to .16 by allowing the auditor to conclude that compliance is satisfactory when either 0 or 1 occurrences is observed.

Is the increased sample size justified? The decrease in risk is .18 (.34 - .16) and hence the expected cost difference is .18 times the cost of changing the audit program. This must be compared to the cost of the 31 additional observations. For example, in the accounts receivable example, a sample of 342 was judged adequate for a moderate degree of reliance while a sample of 478 was required for no reliance. Suppose the cost of auditing a confirmation request that was returned is $2, the cost of auditing a request that was not returned is $5, and the auditor anticipates that about 30 percent of the requests will not

be returned. Then the expected cost of 478 requests is $1386, the expected cost of 342 requests is $992, and the difference is $394. This difference multiplied by .18 equals $71, the expected cost of overauditing. If this cost exceeds the cost of 31 additional observations in the compliance test, the larger sample size should be used. The next sample size to consider is 100 which allows 0, 1, or 2 occurrences to conclude that compliance is satisfactory at a .12 sampling risk. The risk of overauditing reduces to .08 from 16. The expected cost difference is then .08 x $71 = $6. If the 28 additional observations cost more than $6, this increase in sample size is not justified.

Individual tests. Having decided on a tolerable risk of unwarranted reliance pertaining to the statistical tests of details of a particular account balance or class of transactions, the auditor needs to plan each individual compliance test. Each individual test consists of examining evidence of compliance with a procedure or set of procedures designed to prevent or detect a particular type of monetary error.

A useful decision rule for the auditor is to decide compliance is satisfactory when each statistical test of compliance indicates that the rate of compliance deviation is below the threshold rate. Following this decision procedure, the auditor would set the tolerable risk level of unwarranted reliance for each test equal to the tolerable overall risk. The combined risk of unwarranted reliance would then equal the common value when the rate of compliance deviation of one of the sets equals the threshold rate. It would, of course, be much less when the rates of two or more sets equal the threshold rates.

The auditor may choose to control the risk of overauditing for each individual test to maintain the overall risk at a prescribed level. The overall risk of overauditing is the sum of the individual risks when the auditor decides that compliance is satisfactory only when each rate of compliance deviation is below its threshold rate.

When there is a set of several accounting control procedures that together contribute to the prevention and detection of a particular type of monetary error, the auditor needs to examine the set as a whole. In such cases, it is convenient to separate the set into two subsets, one subset consisting of those control procedures that are expected to prevent the error and the other consisting of those procedures that are expected to detect any error made.

When a statistical sample is used to test compliance with both subsets, the auditor may define an occurrence as a lack of evidence of compliance with both subsets of procedures--in other words, test the whole set as a single procedure. Frequently, the prevention controls cannot be tested statistically because, for example, they depend on separation of duties or using prenumbered forms that are independently checked. In such cases, the threshold rate for the statistical test of the detection procedures can be adjusted upward provided the auditor can judgmentally determine the likelihood that the prevention controls alone would allow a monetary error to occur. For example, a threshold rate of .05 could be raised to .20 if the likelihood that the prevention controls permit a monetary error on any transaction is judged to be about .25.

When there are several pertinent procedures that constitute the set of prevention controls or the set of detection controls, the requirement to evaluate each set as a single procedure means that an occurrence should be defined as evidence of non-compliance with any of the procedures belonging to the set.

Sample design. The sample design consists of (1) defining the attribute to be tested, (2) specifying the sampling unit and frame, (3) determining the appropriate sample size and (4) specifying the selection method. While the test of pertinent control or set of controls is planned separately, the field work may be arranged to accomplish several compliance tests with the same sample. Moreover, combining the compliance tests with substantive tests of transactions (known as a dual-purpose test) may be considered.

The auditor may determine the required sample size corresponding to each considered degree of reliance. For example, if the considered risks of unwarranted reliance are .05, .12, and .33, the required sample size might equal 150, 105 or 55 respectively.

Trade-off analysis. When the auditor has information pertaining to the costs of his observations, he can evaluate the alternative combinations to determine the one that has the least total cost.

In the example, the following represents the alternative combinations:

	Degree of Reliance			
	None	Low	Moderate	High
Confirmation requests	478	374	342	239
Compliance test	0	55	105	150

Suppose, as before, that the cost of auditing a returned confirmation is $2 while the cost of a request not returned is $5. Anticipating from past experience that 30 percent of the requests will not be returned, the auditor can calculate the expected cost of each of the alternative sample sizes as follows:

Confirmation requests	478	374	342	239
Expected cost	$1386	$1085	$992	$693

The following then represents the incremental costs, and incremental sample size for the compliance test.

Incremental Cost	Compliance Test Incremental Sample Size
$301	55
$394	105
$693	150

As long as the cost of the compliance test is less than $4.62 per observation, the least cost alternative is to use the high degree of reliance. For example, if the cost of each observation in the compliance test is $1, the total cost of that alternative is only $843 compared to $1097 for moderate reliance, $1140 for low reliance and $1386 for no reliance.

Summary

The analysis of risk described in this paper permits the auditor to design his preliminary audit program from the inside out. He begins by considering a particular area such as the revenue cycle and selects the extent of each statistical substantive test of details in order to achieve an overall tolerable risk level. Similarly, he selects the extent of each statistical compliance test so that the overall risk of

unwarranted reliance maintains the expected increase in sampling risk at a tolerable level. For both types of tests the auditor may also consider the risk of overauditing in selecting the extent of the statistical tests. Finally, by considering the extent of the tests--both substantive and compliance--at several possible levels of planned reliance on the system of internal accounting control, the auditor can select a combination that has the least cost.

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