CHAPTER 11
AUDIT SAMPLING
Illustrative Solutions

Review Questions

1. Audit sampling is the application of an audit procedure to less than 100 percent of the items in a population for the purpose of drawing an inference about the entire population.
2. The two general types of audit sampling are statistical sampling and nonstatistical sampling.
3. Sampling risk is the risk that the internal auditor's conclusion based on sample testing may be different than the conclusion reached if the audit procedure was applied to all items in the population. In performing tests of controls, the internal auditor is concerned with two aspects of sampling risk: the risk of assessing control risk too low (type II risk, beta risk) and the risk of assessing control risk too high (type I risk, alpha risk).
4. Nonsampling risk, unlike sampling risk, is not associated with testing less than 100 percent of the items in a population. Instead, nonsampling risk occurs when an internal auditor fails to perform his or her work correctly. For example, performing inappropriate auditing procedures, misapplying an appropriate procedure (such as failure on the part of the internal auditor to recognize a control deviation or a dollar error), or misinterpreting sampling results may cause a nonsampling error. Nonsampling risk refers to the possibility of making such errors.
5. Attribute sampling is a statistical sampling approach, based on binomial distribution theory, that enables the user to reach a conclusion about a population in terms of a rate of occurrence. The three variations of attribute sampling described in the chapter are stratified attribute sampling, stop-or-go sampling, and discovery sampling.
6. Attribute sampling involves the following nine steps:
   - Identify a specific internal control objective and the prescribed control(s) aimed at achieving that objective.
   - Define what is meant by a control deviation.
   - Define the population and sampling unit.
   - Determine the appropriate values of the parameters affecting sample size.
   - Determine the appropriate sample size.
   - Randomly select the sample.
   - Audit the sample items selected and count the number of deviations from the prescribed control.
   - Determine the achieved upper deviation limit.
   - Evaluate the sample results.
7. There are three factors that affect the size of an attribute sample:
   - The acceptable risk of assessing control risk too low. The risk that the internal auditor will incorrectly conclude that a specified control is more effective than it really is.
   - The tolerable deviation rate. The maximum rate of deviations the internal auditor is willing to accept and still conclude that the control is acceptably effective.
   - The expected population deviation rate. The internal auditor's best estimate of the actual deviation rate in the population of items being examined.
8. Evaluating the results of an attribute sampling application involves:
   - Formulating a statistical conclusion.
   - Making an audit decision based on the quantitative sample results.

- Considering qualitative aspects of the sample results.

9. What an internal auditor should do if documents pertinent to tests of control activities are missing will depend on the specific circumstances.

   - If the auditor cannot find a document supporting a selected sample item, the missing support document should be considered a control deviation.
   - If the auditor determines that a selected sample item has been voided and follow-up indicates that nothing is amiss, it would be appropriate to select another item for testing purposes.
   - Opinions are mixed as to what an internal auditor should do if a selected sample item is missing and the auditor is unable to obtain a reasonable explanation for why it is missing. Some internal auditors believe this situation represents a control deviation. Others believe that another item should be selected for testing purposes. Regardless of whether the missing sample item is considered a deviation from the prescribed control or a different problem that warrants separate consideration, the internal auditor should document the missing item in the working papers and decide whether it is significant enough to be written up as an audit observation.

10. Haphazard *sampling* is a nonrandom selection technique that is used by internal auditors to select a sample that is expected to be representative of the population. Haphazard, in this context, does not mean careless or reckless. It means that the internal auditor selects the sample without deliberately deciding to include or exclude certain items.

11. The key advantage of statistical sampling over nonstatistical sampling is that it allows the internal auditor to quantify, measure, and control sampling risk.

12. Nonstatistical sampling allows the internal auditor more latitude regarding sample selection and evaluation.

13. The purpose of statistical sampling in tests of monetary values is to obtain direct evidence about the correctness of monetary values such as a recorded account balance. The purpose of statistical sampling in tests of control activities is to obtain direct evidence about the operating effectiveness of control activities.

14. Four factors affect PPS sample sizes:

    - Monetary book value of the population.
    - Risk of incorrect acceptance.
    - Tolerable misstatement.
    - Anticipated misstatement.

15. **Key advantages** of PPS sampling over classical variables sampling:

    - Simpler calculations make PPS sampling easier to use.
    - The sample size calculation does not involve any measure of estimated population variation.
    - PPS sampling automatically results in a stratified sample because sample items are selected in proportion to their size.
    - PPS sample selection automatically identifies any individually significant population items, that is, population items exceeding a predetermined cutoff dollar amount.
    - PPS sampling generally is more efficient (that is, requires a smaller sample size) when the population contains zero or very few misstatements.

Key disadvantages of PPS sampling over classical variables sampling:

- Special design considerations are required when understatements or audit values of less than zero are expected.
- Identification of understatements in the sample requires special evaluation considerations.
- PPS sampling produces overly conservative results when errors are detected. This increases the risk of incorrect rejection.
- The appropriate sample size increases quickly as the number of expected misstatements increases. When more than a few misstatements are expected, PPS sampling may be less efficient.

Multiple-choice Questions

1. **A** is the best answer. The primary benefit of statistical sampling is that it allows the internal auditor to quantify, measure, and control sampling risk. Sampling risk is the risk that the internal auditor's conclusion based on sample testing may be different than the conclusion reached if the audit procedure were applied to all items in the population. A secondary benefit of statistical sampling, because it requires random sampling, is that it provides greater assurance than nonstatistical sampling that the internal auditor will obtain a sample that is representative of the population. An internal auditor using nonstatistical sampling must, however, select a sample that is thought to be representative of the population, taking into consideration the factors that affect sample size. An internal auditor must obtain competent evidence regardless of whether he or she uses statistical or nonstatistical sampling.
2. **A** is the best answer. Statistical sampling allows the internal auditor to quantify, measure, and control sampling risk.
3. **D** is the best answer. Attribute sampling enables the user to reach a conclusion about a population in terms of a rate of occurrence. The most common use of attribute sampling in auditing is to evaluate the effectiveness of a particular control. The internal auditor tests the rate of deviation from a prescribed control to determine whether the occurrence rate is "acceptable" and, accordingly, whether reliance on that control is appropriate.
4. **A** is the best answer. Whereas the expected population deviation rate has a direct effect on sample size, the tolerable deviation rate has an inverse effect. Therefore, increasing the expected population deviation rate and decreasing the tolerable deviation rate will cause the sample size to increase.
5. **B** is the best answer. Selecting a sample of sales invoices and matching them with shipping documents involves vouching, the purpose of which is to test validity. In this case, the auditor is testing the validity of billed sales. Customers should not be billed if goods were not shipped to them.
6. **A** is the best answer. Selecting a sample of check copies and matching them with approved vouchers involves vouching, the purpose of which is to test validity. In this case, the auditor is testing the validity of cash disbursements. Checks should not be issued without proper documentary support.
7. **C** is the best answer. Saying there is a 5% risk that the deviation rate in the population exceeds 7% is equivalent to saying, with 95% confidence, that the deviation rate in the population is less than or equal to 7%.

8. **D** is the best answer. The possibility that the deviations might be a result of fraud is of particular importance to the internal auditor. Evidence that deviations from the control found in the sample were caused by fraud might very well offset the quantitative results and prompt the internal auditor to conclude that the control is not effective (that is, it cannot be relied upon to reduce residual risk to an acceptably low level). The internal auditor also must consider what, if any, impact the discovery of fraud might have on other aspects of the engagement.

9. **D** is the best answer. Using PPS sampling, or any other statistical sampling approach, does not eliminate the need for professional judgment in determining the appropriate sample size and evaluating the sample results.

Discussion Questions

1. a. In statistical sampling, the internal auditor must specify, using audit judgment, appropriate quantitative values affecting sample size. The sample size is determined mathematically based on these factors. In nonstatistical sampling, the sample size is based strictly on the internal auditor's judgment. The internal auditor using nonstatistical sampling should, however, consider the factors that affect sample size.

   b. In statistical sampling, the sample must be selected randomly. In nonstatistical sampling, the sample need not be selected randomly. An internal auditor using nonstatistical sampling must, however, select a sample that is thought to be representative of the population.

   c. In statistical sampling, the sampling results must be evaluated mathematically based on probability theory. In nonstatistical sampling, the conclusion about the population from which the sample is drawn is strictly judgmental instead of being based on probability theory.

2. a. *Audit risk* is the risk of reaching invalid audit conclusions and/or providing faulty advice based on the audit work conducted.

   Inherent risk is the combination of internal and external risk factors in their pure, uncontrolled state, or, the gross risk that exists, assuming there are no internal controls in place.

   Control risk is the potential that controls will fail to reduce controllable risk to an acceptable level.

   Controllable risk is the portion of inherent risk that management can reduce through day-to-day operations and management activities.

   Residual risk is the portion of inherent risk that remains after management executes its risk responses (sometimes referred to as net risk).

   b. *Sampling risk* is the risk that the internal auditor's conclusion based on sample testing may be different than the conclusion reached if the audit procedure was applied to all items in the population. Sampling risk varies inversely with sample size and, accordingly, is controlled by the size of the sample selected.

   c. The two aspects of sampling risk that an internal auditor is concerned with when testing controls are the risk of assessing control risk too low and the risk of assessing control risk too high.

   The risk of assessing control risk too low (type II risk, beta risk), also known as the risk of over-reliance, is the risk that the assessed level of control risk based on the sample results is lower than

the internal auditor would have found it to be if the population had been tested 100 percent. In other words, it is the risk that the internal auditor will incorrectly conclude that a specified control is more effective than it really is. Stated another way, it is the risk that the internal auditor will overstate the reliance that management can place on the control to reduce residual risk to an acceptably low level.

The risk of assessing control risk too high (type I risk, alpha risk), also known as the risk of under-reliance, is the risk that the assessed level of control risk based on the sample results is higher than the internal auditor would have found if the population had been tested 100 percent. In other words, it is the risk that the internal auditor will incorrectly conclude that a specified control is less effective than it really is. Stated another way, it is the risk that the internal auditor will understate the reliance that management can place on the control to reduce residual risk to an acceptably low level.

3. a.

	Attribute 1	**Attribute 2**
Risk of assessing control risk too low	5%	5%
Tolerable deviation rate	7%	6%
Expected population deviation rate	2%	1%
Sample size per table	88	78
Sample size used	90	80
Number of deviations uncovered	2	2
Sample deviation rate	2.2%	2.5%
Achieved upper deviation limit	6.9%	7.7%

b. Attribute 1:

Statistical conclusion: The internal auditor is 95% confident that the true, but unknown, population deviation rate is less than or equal to 6.9%.

Audit decision based on the quantitative sample results: Since the upper deviation limit (6.9%) is less than the tolerable deviation rate (7%), the internal auditor should decide that the control is acceptably effective, that is, the control can be relied upon to reduce residual risk to an acceptably low level.

Attribute 2:

Statistical conclusion: The internal auditor is 95% confident that the true, but unknown, population deviation rate is less than or equal to 7.7%.

Audit decision based on the quantitative sample results: Since the upper deviation limit (7.7%) is greater than the tolerable deviation rate (6%), the internal auditor should decide that the control is not acceptably effective, that is, the control cannot be relied upon to reduce residual risk to an acceptably low level.

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Cases

Case 1

Deficiencies in the attribute sampling application:

- The specific internal control objective(s) and the prescribed controls aimed at achieving the objective(s) have not been identified.
- Deviation(s) from prescribed controls have not been defined.
- The population and sampling unit have not been clearly defined.
- Factors influencing sample size, which are based on judgment, have not been justified. No basis for these values has been established. Setting the expected deviation rate low is not conservative.
- Based on the sample-size factors specified, the sample size is not correct.
- The sample is not representative of the entire year. Valid conclusions would be limited to the two-month period tested. It is important in tests of controls to cover the entire period being audited.
- Stratification is inappropriate unless different controls are involved, which is possible. If this were the case, stratification would be based on the need to test two different sets of controls.
- The definition and treatment of deviations are not applied correctly. Deviations from prescribed control procedures are intermingled with dollar errors. If dollar errors is the factor of interest, a different sampling plan should be used. Deviations should not be lumped together for evaluation purposes. They should be defined individually and evaluated separately.
- The internal auditor appears to be missing the point that deviations from prescribed control procedures increase the risk of misstatements in the financial statements. A deviation is a deviation even if there is nothing wrong with the transaction, in other words, the appropriate control has not been applied. No evidence of a control being applied is a deviation. Evidence of a control being misapplied also is a deviation.
- There is no basis for the conclusion reached. The internal auditor's statistical conclusion is inappropriate. Based on the information in the case, it is impossible to state an appropriate statistical conclusion. The auditor's deviation/error analysis was superficial.
- Overall, there was a general lack of appropriate planning and supervision. There were numerous failures with respect to sampling design and evaluation. Neither sampling risk nor nonsampling risk was properly controlled.

Case 2

A. 1. Attribute sampling is defined in IDEA Help as "the examination of a subset of a population (a sample) in order to assess how frequently a particular event, or attribute, occurs in the population as a whole. An attribute has only two possible values: true or false. In auditing, typical attributes are whether an item is in error or not, whether a particular control has been exercised or not when it should have been, or whether the entity complied with a particular law or not."

2. The two attribute sampling planning options described in IDEA Help are "Beta Risk Control and Beta and Alpha Risk Control." The two planning options allow the auditor "to control the risks of one or two types of incorrect decision. Some auditors do not set the risk of not relying on controls when they are effective (Alpha Risk). They set only the risk of relying on controls when they are not effective (Beta Risk) and the tolerable deviation rate. They set an expected deviation rate to partially control for Alpha Risk."

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B. 1. Beta risk is defined in IDEA Help as "the risk of deciding that the population deviation rate does not exceed a specified tolerable deviation rate, when in fact it does." Per IDEA Help, synonyms for Beta risk include "Risk of Assessing Control Risk Too Low" and "Risk of Incorrect Acceptance."

2. The five steps used to determine the minimum sample size and critical number of deviations, as described in IDEA Help, are:
   - "Enter the population size. This is the number of sampling units in the population from which the samples are drawn."
   - "Enter the % tolerable deviation rate. This is the maximum acceptable rate of critical deviations or errors in the population, expressed as a percentage (must be greater than the expected deviation rate and less than 100%)."
   - "Enter the % expected deviation rate. This [is the] rate of deviations or errors that may reasonably be expected to occur in the population, expressed as a percentage (must be less than the tolerable deviation rate)."
   - "Enter the desired confidence level (to control Beta Risk)." IDEA Help states that "This is the level of assurance, expressed as a percentage, that [the auditor detects] a population deviation rate that is higher than the tolerable deviation rate." This statement is not correct. IDEA Help should state that the confidence level is the level of assurance, expressed as a percentage, that [the auditor detects] a population deviation rate that is *lower than or equal to* the tolerable deviation rate. IDEA Help goes on to state that "The confidence level . . . is 100% - Beta Risk, where Beta Risk is the risk that [the auditor fails] to detect a population deviation rate higher than the tolerable deviation rate." This statement is correct.
   - "Click **Compute**."

C. 1. "If a sample size equal to that returned by the **Planning (Beta Risk Control)** dialog box is used, and the number of deviations found in the sample is equal to the critical number of deviations returned by **Planning (Beta Risk Control)**, and the same confidence levels are used in both **Evaluation** and **Planning (Beta Risk Control)** dialog boxes, then the 1-sided upper limit returned by the evaluation limit is equal to or slightly less than the tolerable deviation rate specified in the **Planning (Beta Risk Control)** dialog box."

2. The seven steps used to make inferences about the true rate of deviations in a population from which a sample has been selected and tested, as described in IDEA Help, are:
   - "Select **Sampling > Attribute Planning and Evaluation** . . ."
   - "Click the **Sample Evaluation** tab.
   - "Enter the population size. This is the number of sampling units in the population from which the sample [was] drawn."
   - "Enter the sample size. Enter the number of items that were selected for inspection using **Random Record Sampling**."
   - "Enter the number of deviations in the sample. Enter the number of deviations (or other events for which estimates of frequencies in the overall population are desired) found in the sample."
   - "Enter the confidence level. This is the confidence that the true population deviation rate is less than the 1-sided upper limit . . ."
   - Click **Compute**.