Glossary of Sampling Terms

100% Review Stratum. A stratum of sample items that is selected based on auditor judgment rather than by random means. The purpose of this stratum is to ensure adequate coverage of high dollar and/or sensitive items. Unlike random strata, this stratum is not a subset of a portion of the frame and the audit results for this stratum are not projected.

Attribute Sampling. A type of statistical sampling used for compliance testing whereby sample items are evaluated for compliance or attributes. Items either are or are not (yes or no) in compliance. This type of sampling reaches a conclusion on the frequency of occurrence of a particular attribute in a universe.

Attribute Discovery Sampling. A special case of attribute sampling in which the occurrence of a single error constitutes a failure of the universe. This feature, which produces a sample size that is minimal in general, is achieved by ignoring any risk of erroneously rejecting an acceptable universe. This type of statistical sampling provides an objective method of indicating the risk or probability of locating at least one irregularity or characteristic in question.

Block Test. A nonstatistical method of selecting sample items (usually a judgmental or non-statistical sample) in which specific blocks of units are selected. The blocks may be periods of time or consecutive groupings, such as all expense vouchers in June or all invoices with vendor names beginning with the letters M through P.

Clerical Error. Human processing errors (e.g., transpositions, typo's, etc.). Internal controls should be designed to minimize and catch these (through training, supervision, monitoring, checking, etc.). Isolated clerical errors that slip through despite adequate internal controls designed to prevent and catch them would be nonsystemic, nonrecurring errors. Repetitive clerical errors would be considered to be recurring errors and may be indicative of internal control weaknesses (lack of controls or controls not being followed); in which case they would also be systemic errors.

Clusters. Sample items or units that are made up of clusters or groups of smaller items or units. For example, an ACS (Automated Commercial System) tariff line that is made up several invoice lines, or an invoice line that is made up of several part numbers.

Coefficient of Variation (CV). A measure of dollar dispersion or variability in a frame. It is standard deviation expressed as a percentage (i.e., standard deviation divided by the frame mean multiplied by 100). The higher the CV, the more variation in the frame. General rules of thumb: a CV < 50% indicates low variation and a CV ≥ 50% indicates moderate to high variation.

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<u>Confidence Interval (Precision Interval)</u>. The range within which the actual error/value in the frame should fall at a given confidence level or assurance. It is also known as tolerance.

<u>Confidence Level</u>. The probability that the true or actual value will be within the corresponding confidence interval. It is sometimes called reliability, assurance, or probability.

<u>Convenience Test</u>. A nonstatistical method of selecting sample items in which convenience is the prime consideration. The most readily available items are selected, without reason or randomness, simply because it is expedient. Records that are in storage, in the bottom of file drawers, not filed or at another location are excluded when this type of testing is used. This method rarely reflects good auditor judgment, can be manipulated by the auditee, and is not recommended.

<u>Critical Error Rate</u>. The maximum universe error rate considered acceptable by the auditor.

<u>Cross-Section Test</u>. A method of selecting sample items in which the auditor attempts to choose items from all parts of the area being tested. It is common under this type of testing to designate a fixed percentage, such as 5%, of items to be selected. Many times the selection is made using a fixed or uniform interval, such as every 10th item, for selection. If this method were used with a random start, the sample generally would meet the selection requirements of a statistical sample. However, it is not uncommon for the auditor, using the cross-section approach, to go through the records and haphazardly select items until the desired quantity is obtained.

<u>Desired Precision (Desired Sampling Error)</u>. The amount of sampling error that can be tolerated and still permit the results to be useful.

<u>Dollar Unit Sampling</u>. A type of variable sampling in which the sampling unit is defined as an individual dollar, with each dollar given an equal chance of selection.   The selected dollars are then tied to physical units (items or transactions) that are examined.

<u>Error</u>. A sample item in noncompliance with applicable testing criteria (i.e., laws and regulations).

<u>EZ-Quant</u>. A computer program containing statistical analysis audit tools with modules for statistical sampling, regression, and improvement curves. Auditors may use DOS-based Version 3.10 (which combines all modules) or Windows-based Version 1.0.1 (which separates the modules). The two versions do the same analyses, but have different user interfaces and menus for the same procedures.

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EZ-Quant ATTDISC Attribute Discovery Sample Size Procedure. A computer procedure that determines sample sizes for attribute discovery samples. In EZ-Quant DOS Version 3.10, it is call ATTDISC. In EZ-Quant Windows Version 1.0.1, the procedure is selected by choosing Discovery Acceptance in the Attribute Sample Size Development window.

EZ-Quant ATTEVAL1 Attribute Discovery Acceptance Sample Evaluation Procedure. A computer procedure that evaluates the results of an attribute discovery sample by estimating the total error rate in the universe. In EZ-Quant DOS Version 3.10, it is called ATTEVAL1. In EZ-Quant Windows Version 1.0.1, the procedure is selected by choosing Discovery Acceptance, One Step Acceptance, or Rate Estimation in the Attribute Sample Evaluation window.

EZ-Quant DUSAM Dollar Unit Sample Evaluation Procedure. A computer procedure that evaluates the results of a dollar unit sample (i.e., projects the sample results to the frame and provides reliability measures for evaluating that projection). In EZ-Quant DOS Version 3.10, the procedure is called DUSAM. In EZ-Quant Windows Version 1.0.1, the procedure is selected by choosing Variable Sampling and Dollar Unit Sample Evaluation in the initial EZ-Quant window.

EZ-Quant DUSSEL Dollar Unit Sample Selection. A computer procedure that statistically selects dollar unit samples. In EZ-Quant DOS Version 3.10, the procedure is call DUSSEL. In EZ-Quant Windows Version 1.0.1, the procedure is selected by choosing Variable Sampling and Dollar Unit Sample Selection in the initial EZ-Quant window.

EZ-Quant RANUM Random Numbers Generator. A computer procedure that generates random numbers that can then be used to randomly select sample items. In EZ-Quant DOS Version 3.10, the procedure is called RANUM. In EZ-Quant Windows Version 1.0.1, the procedure is selected by choosing Variable Sampling and Generate Random Number/Sets in the initial EZ-Quant window.

EZ-Quant RASEQ Random Number Sets Generator. A computer that generates sets of random numbers that can then be used to randomly select sample items. In EZ-Quant DOS Version 3.10, the procedure is called RASEQ. In EZ-Quant Windows Version 1.0.1, the procedure is selected by choosing Variable Sampling and Generate Random Number/Sets in the initial EZ-Quant window.

EZ-Quant SAMPL Physical Unit Sample Evaluation Procedure. A computer procedure that evaluates the results of a physical unit sample (i.e., projects the sample results to the frame and provides reliability measures for evaluating that projection). In EZ-Quant DOS Version 3.10, the procedure is called SAMPL. In EZ-Quant Windows Version 1.0.1, the procedure is selected by choosing Variable Sampling and Physical Unit Sample Evaluation in the initial EZ-Quant window.

EZ-Quant STRAT Physical Unit Sample Selection Procedure. A computer procedure that statistically selects physical unit samples and can automatically stratify a frame into equal dollar strata (the number of strata is specified by the auditor). In EZ-Quant DOS Version 3.10, the procedure is called STRAT. In EZ-Quant Windows Version 1.0.1, the procedure is selected by choosing Variable Sampling and Physical Unit Sample Selection in the initial EZ-Quant window.

Frame (Sampling Frame). A physical or electronic representation of the universe from which a sample will be taken. The sampling frame excludes sample items that are separated or stratified for 100% examination.

Frame Validation. The process of verifying that the chosen sampling frame is an adequate representation of that universe it is intended to represent. This typically involves reconciling the frame to the universe, analyzing any differences, and correcting, adjusting, or accepting those differences.

Frame Variability (Homogeneity). Refers to the degree of differences or similarities of items in a frame in terms of dollar amounts and characteristics. Dollar variability can be measured with indices of dispersion (e.g., standard deviation and coefficient of variation). The degree of variability in the frame will directly impact the sample size and need for stratification. The higher the variability, the larger the sample size should be and the greater the need for stratification.

Government Risk (Risk). The tolerable level of risk of accepting a faulty universe (a universe with an actual error rate exceeding the critical error rate). The government bears this risk of a failure to detect flawed conditions. Risk is the complement of confidence level (probability or assurance).

Horizontal Stratification. Stratifying or separating a frame into subgroups according to dollar values or amounts. The idea is that similar size items will have similar size errors. Horizontal stratification improves sample results (i.e. precision).

Judgmental (Non-statistical) Sampling. See Nonstatistical (Judgmental) Sampling.

Large Dollar Test. A nonstatistical method of selecting sample items in which the largest dollar items are selected. Emphasis is placed on the materiality of the items selected. No examination is made of lesser dollar value items. Conclusions based on the review of the high dollar items may not be applicable to the lesser dollar items. Also, a breakdown of internal controls is generally more pronounced in the lower dollar items.

Macro Analysis. Any high level analysis not involving the review of individual items or transactions (not sampling). Typically this could include analysis of totals, trends, file comparisons, etc. Macro analysis is a key part of assessing risk exposure but may also be used anytime it will satisfy the audit objectives. It is often more efficient and may be more precise than sampling (micro testing) and therefore should be considered first.

<u>Manual Systematic Interval</u>. The manual application of a statistical sample selection procedure using a random start and a fixed interval to select every nth item.

<u>Micro Testing</u>. Review of individual items or transactions (sampling), usually in order to make conclusions about the population from which they are drawn.

<u>Multistage Sampling</u>. A sampling process involving several stages, in which units at each subsequent stage are subsampled from previously selected larger units. For example: in the first stage, 100 ACS tariff lines are selected, and in the second stage, up to 5 invoice lines are selected for each ACS tariff line. This type of sampling is considerably more complex (in selection and evaluation) than simple or single stage sampling and therefore, is recommended only as a last resort.

<u>Nonrecurring Error</u>.   An error that would not be expected to recur in the frame from which the sample was taken. Typically these are nonsystemic, isolated clerical or human errors that occurred despite adequate internal controls (monitoring, checking, training, supervision, etc.).   They may also be errors found outside the sampling frame. The designation of recurring or nonrecurring is required for revenue projection. Only recurring errors are projected. Nonrecurring errors are not projected. However, nonrecurring errors should be added to the projected revenue loss when calculating total revenue loss.

<u>Nonstatistical Projection</u>. A nonstatistical extrapolation of the sample results to the universe, which cannot be evaluated statistically. Evaluating a sample for the purpose of reaching a conclusion about the universe without using the laws of probability.

<u>Nonstatistical (Judgmental) Sampling</u>. Any sampling process in which the sample items are selected subjectively rather than by a random process.

<u>Nonsystemic Error</u>. An error that is not caused by any apparent weakness in internal controls. Typically these are occasional clerical or human errors that happen despite adequate internal controls (monitoring, checking, training, supervision, etc.).   Repetitive clerical errors may be indicative of some sort of weakness in the internal controls, such as incompetent personnel, inadequate training, lack of supervision or monitoring, etc. The designation of systemic or nonsystemic is required for the determination of compliance. Only systemic errors are included in the computation of compliance rates. Nonsystemic errors are not used when calculating compliance rates.

<u>Physical Unit Sampling</u>. A type of variable sampling in which the sampling unit is defined as a physical unit (item or transaction), with each physical unit having an equal chance of selection (or determinable nonzero chance in the case of stratification).

<u>Point Estimate</u>. A single, specific estimate for a universe characteristic or value.

<u>Population (Universe)</u>. See Universe (Population).

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Post Audit Stratification. Stratifying the sample and frame after the review is complete and projecting "like to like" in order to produce more accurate projections.

Precision (Sampling Error). A measurement of the accuracy of the sample estimate compared to the universe value. It is the magnitude of error or variation in an estimate derived from a random sample. Because the units included in the sample are there by chance, the estimate is subject to chance variation or sampling error. It is a measure of the accuracy of the point estimate determined by how close it is likely to be to the true error or value in the universe. The point estimate plus and minus the precision provides the confidence interval.

Precision Dollars. Precision (sampling error) expressed in dollars (as in a variable sample).

Precision Percentage. Precision expressed as a percentage. For attribute samples, it is the difference between the upper or lower limit and the point estimate. For variable samples, it is the precision divided by the point estimate.

Projection. See Statistical Projection or Nonstatistical Projection.

Purposive Test. A nonstatistical method of selecting sample items in which items with known or suspected problems are selected. This method is not designed to give a cross section of the entire audit area.

Random Seed. An arbitrarily assigned number that activates the random number selection process in a program that generates random numbers or selects random sample items. Using the identical random seed with the same frame allows one to recreate the random numbers or random sample selection. It prevents duplications when additional sample items are needed from the same frame.

Random Stratum. A stratum of sample items that are selected randomly. This stratum is a subset of a portion of the frame and the audit results for this stratum are projected.

Recurring Error. An error that could recur in the frame from which the sample was taken. Typically these are systemic errors. They may also be nonsystemic errors that display a pattern or trend that they are likely to recur (e.g., repetitive clerical errors are recurring errors). The designation of recurring or nonrecurring is required for revenue projection. Only recurring errors are projected. Nonrecurring errors are not projected. However, nonrecurring errors should be added to the projected revenue loss when calculating total revenue loss.

Sample Frame or Sampling Frame. See Frame.

Sample Universe or Sampling Universe. See Universe (Population).

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Sampling Error. See Precision (Sampling Error).

Sampling Parameters. Commonly, refers to the basic sampling methodology facts (i.e., sampling approach, frame size, frame value, frame duty, sample size, sample value, and sample duty). Statistically, refers to the mathematical variables used to statistically calculate sample size and evaluate sample results (i.e., confidence level, desired precision percentage, critical error rate, government risk, precision dollars, achieved precision percentage).

Sampling Plan. A document that outlines the detailed sampling methodology to be used and results obtained. It typically contains elements of the sampling approach, universe and frame, sample size and selection, and projection results.

Sampling Unit. The elementary unit in the frame, which is sampled or selected for detailed examination. Valid statistical sampling requires that each sampling unit have an equal chance of selection (or determinable nonzero chance in the case of stratification) and be selected randomly.

Standard Deviation. A measure of the dollar dispersion or variability in a frame. It is the average distance of individual values or the extent to which the individual values depart from the average. In Microsoft Excel, it is the function STDEVP.

Statistical Projection. A statistical extrapolation of the sample results to the frame. It uses the laws of probability to evaluate a sample for the purpose of reaching a conclusion about the universe. A statistical projection gives a point estimate along with the confidence level (reliability, assurance, probability), precision (sampling error), and confidence interval (tolerance, precision interval).

Statistical Sampling (Probability Sampling). Sampling that uses the laws of probability for selecting and evaluating a sample for the purpose of reaching a conclusion about the universe. In statistical sampling each sampling unit is randomly selected and has an equal or known nonzero probability of selection.

Strata. Two or more mutually exclusive subgroups of a frame. The plural of stratum.

Stratum. One of the two or more mutually exclusive subgroups of a frame. The singular of strata.

Stratification. Separating a frame into different subgroups for separate selection, review, and projection of sample items. The goal is to group like items together (e.g. by dollar value, size, category, characteristic, or type), in order to improve sample results (precision).

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Stratified Sampling. A statistical sampling technique in which the frame is divided into distinct subgroups of similar items, called strata. Within each stratum, a separate sample is selected from all the sampling units in that stratum. From the sample obtained in each stratum, a separate stratum mean (or other statistic) is computed. These stratum values are properly weighted to form a combined estimate for the entire frame. The standard deviations are also computed separately within each stratum and then properly weighted and added into a combined estimate for the frame. In this way, sampling precision is improved.

Substantive Testing. Quantitative testing such as verifying account balances or cost elements and noting any differences. Variable sampling is appropriate for this type of testing whereby sample items are evaluated for error amounts or variables.

Survey (Probe) Sample. A limited preliminary sample of an area for the purpose of gaining additional information about the area in order to determine whether more extensive testing is needed.

Systematic Interval. A statistical sample selection procedure that uses a random start and a fixed interval to select every nth item.

Systemic Error. An error that could recur due to a system deficiency or a weakness in internal controls. If the system is corrected or internal controls strengthened, the error should not recur. Clerical or human error (especially if such errors are repetitive) that occurred because there were no internal controls in place to prevent or catch such errors (i.e., no monitoring or checking, no supervision, no training, etc.) would also be systemic. The designation of systemic or nonsystemic is required for the determination of compliance. Only systemic errors are included in the computation of compliance rates. Nonsystemic errors are not used when calculating compliance rates.

Universe (Population). An entire group of items/transactions/records to be tested. The items comprising the category or area of interest to the auditor.

Variable Sampling. A type of statistical sampling used for substantive testing whereby sample items are evaluated for error amounts or variables. This type of sampling reaches a conclusion on dollar amounts in a universe and answers the question – how much?

Variable Dollar Unit Sampling. See Dollar Unit Sampling.

Variable Physical Unit Sampling. See Physical Unit Sampling.

Vertical Stratification. Stratifying or separating a frame into subgroups according to category, type, or characteristics of the sampling units. The idea is that similar items will have similar types and frequency of errors. The purpose is to improve sample results (i.e. precision).

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