Risk Management and Statistical Sampling in Audit

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Statistics

- Variety of meanings to people e.g. form of mathematics, charts, table, and figures.
- Originally derived from the word “State” as the traditional function of government was to keep records of population, births, deaths, taxes, military strength, and kinds of things & activities.
- Latin word “status”, Italian – “state”, German word “statistik”.

- Statistics means (1) **aggregate of facts** (2) **affected** to marked extent by **multiplicity of causes** (3) **numerically expressed (4) enumerated** or estimated according to **reasonable standard of accuracy (5) collected in a systematic** manner (6) for a **pre-determined purpose** and (7) **placed** in relation to each other.

- Absence of these 7 characteristics numerical data can’t be called statistics.
- Hence we can say that **All Statistics are numerical statements of facts but all numerical statements of facts are not statistics.**

Methods of Enumeration of Data

Two Methods

1. Census Method
2. Sampling Method

Universe/Population and Sample

- **Universe/Population** used in statistics as aggregate from which the sample is to be taken.
- Universe may be either finite or infinite.
- **Finite**: Where number is determinable but sometimes it is very large for practical purpose then we call it infinite.
- **Infinite**: where number of item cannot be determined.

- **Sample** is a part of Universe/Population.
- It predicts and generalise the behavour of mass phenomena.
- **Basis of Sampling on Two Important Laws**

1. Law of Statistical Regularity

It lays down that a moderately large number of **items** chosen at random from a large group are almost sure on the average to possess the characteristics of the large group e.g.average Ht.

- This law points out that if a sample is taken at random from population, it is likely to possess almost the same characteristics as that of the population.

2. Law of Inertia of Large Numbers

- This law is corollary of the law of statistical regularity. If other things equal, larger the size of the sample, more accurate results are likely to e.g. Head or Tail of coin for more times.
- This is because large numbers are more stable as compared to small ones

Risk Management

- Risk occurs whenever we cannot predict an alternative's outcome with certainty, but we do have enough information to predict the probability it will lead to the desired state.
- Risk Management plan is that which identifies the key risks to a project's/audit success and prescribes ways to circumvent them.
- A good risk-management plan will quantify the risks and predict their impact on the project/audit work.

Risk Based Approach in Audit

- All the developed countries and international organizations adopt risk based approach in audit.
- Risk assessment is an analytical tool for audit planning and execution.
- It focuses on area which are likely to be more error prone (risky).
- It is cost effective.
- It uses the information already available.

- For each risk, the outcome is either acceptable or unacceptable, depending on the auditor's tolerance level for risk.
- A major responsibility of the auditor at the start of an audit work is to develop a **risk management plan.**
- Audit team members should have an opportunity to describe the key risks to the audit success and prescribe ways to circumvent them, either by redefining key activities or by developing contingency plans in the problems occur.

- A good risk management plan will quantify the risks and predict their impact on the audit work.
- For each risk, the outcome is either acceptable or unacceptable, depending on the auditor’s tolerance level for risk.

- The risk model can be expressed by the following equation:
- Overall Audit Risk (OAR)= IR x CR x DR
- **IR** is the Inherent Risk, i.e. the risk that an error in the first place.
- **CR** is the Control Risk, i.e. the risk that internal control will fail to detect the error.
- **DR** is the Detection Risk, i.e. the risk that the audit procedures will fail to detect the error.
- Assumption is that the individual risks viz., IR, CR, DR are independent of each other.

- The auditor is concerned only with material errors. Risk assessment will thus focus on the likelihood of material error.
- To use the risk model, the auditor has thus to specify the materiality level along with the overall assurance required from the audit.

- Optimizes the use of available resources and minimizes personal bias.
- Minimizes redundant audit.
- Maximizes acceptability of audit reports.

Assess Inherent Risk

- The IR factors would to a large extent is based on the knowledge and understanding of the business of the auditee based on our experience from previous audits and identification of events, transactions and practices which may have a significant impact on the audit area.

- Different audits will have a different set of risk parameters for assessment of inherent risk.
- IR has to be assessed for each assertion/opinion.
- IR factors impacting the audit assertion need to be documented.
- The risk associated with each individual factor is then assessed as high, moderate, low.

- The assessment is then consolidated for overall assessment of IR.
- It is possible to assign numerical values to the risk assessed, or the assessment can be done quantitatively in terms of high, moderate and low.

Assess Control Risk (CR)

- CR assesses the adequacy of the policies and procedures in the auditee organization for detecting material error for identified functions or activities.
- For assessing the CR the auditor considers both the control environment and control system, together.

- Techniques used to evaluate internal control are narrative descriptions, questionnaires, check lists, flow charts, inquiries, observation and re-performance of internal controls.
- Different kinds of audit will have a different set of control factors to be considered.

- The auditor evaluates the control environment and systems (both manual and IT) and place reliance on them.
- This evaluation is the preliminary system examinations and are designed to assess whether the activities undertaken by the audited body are in accordance with the statutory and other authorities?
- whether the audited body’s structure is likely to ensure adequate internal control, the adequacy of general financial controls?

- Whether the employees in areas critical to internal controls are competent and
- Whether there are adequate other general controls in areas relevant to audit?
- The CR is then assessed and expressed either in numerical (percentage terms) or qualitative (high, medium, low) terms.

Detection Risk

Detection risk is the risk that the auditor's procedures will not detect error that exists in the component and that could be material when aggregated with error in other components.

Statistical Sampling in Audit

- The purpose of audit is to verify accounts with the help of supporting evidence so as to certify the truthfulness and fairness of the financial results.
- In a large organisation the number of accounts/items and the entries therein are so enormous that a complete verification of all these is rather impossible.
- Test checking, therefore, is the usual method for verification of a large number of transactions on the basis of the examination of a small set of representative items.

- Audit sampling is the application of an audit procedure to less than 100% of the items within a class of transactions for the purpose of evaluating some characteristics of the class.
- It may be statistical or non-statistical.
- Sampling based on risk analysis or audit judgment is non-statistical. Here the audit conclusions are on direct observed evidence.
- The audit conclusions are only for the part of the population.

- **Statistical Sampling** is a tool for cost effective audit that is free from any personal bias of auditor.
- **Risk assessment** is another tool for cost effective audit and uses some available information about the population under study.
- Statistical sampling can **extrapolate** some characteristics of the population from the sample observation that is widely accepted & capable of estimating **sampling error**.
- Statistical sampling design take into account all the significant auditable units with due importance.

Risk Assessment & Statistical Sampling in Audit

- Auditor should follow a two stage approach:
- **1st Stage**

  1.Selection of auditable entities (Population) under consideration based on risk assessment e.g. give more importance to high probability of locating audit objections less importance to low probability of locating such objections

2. Define the audit objective
3. Define the population (auditable entities) and the coverage
4. Assessment of risks based on various well thought parameters from the audit risk point of view. Assign score in such a way that more risky is the unit greater value to be assigned.

4. Stratify (grouping) the population based of risk assessment. Arrange the entities (strata) from high-risk units, medium risk and low-risk units.
5. Allocation of number of units to be audited

   e.g. 60% units of total sample from high risk stratum, 30% from medium and 10% from low risk stratum.
6. Selection of auditable units from each stratum using simple random sampling or other suitable sampling techniques.

- **2nd State**

1. Define the margin of errors to be acceptable, as well as definition of an error.
2. Assess the expected error rate or standard deviation from the past data or by auditing a random sample of 30 cases from the population.

3. Specify the level of confidence

- It is the probability that an estimate made from the sample will fall within a stated interval of the true but unknown value for the population as a whole. It can be evaluated based on risk assessment.

4. Determine the optimum sample size using the formulae/table etc.

5. Selection of sample – select the sample as per sampling design and derived sample size.

6. Evaluation of observations as per sample plan adopted.
7. Draw conclusions as about the population from the results.

- Statistical sampling techniques can therefore, help in:

a) The choice of the method of selection,

b) Calculation of the size of the sample,

c) Ascertaining the appropriate size of the sample, and

d) Evaluation of the results

- Statistical sampling, based on probability laws, makes all these processes more refined.
- Objectivity in selection of sample the results are more reliable.

- Since accuracy does not increase with the size of the sample but a scientifically determined size of the sample save time and cost.
- The degree of reliance or the confidence which can be placed on the result is also known which would not be known in an ordinary test checking process

- On account of the above advantages the use of statistical sampling is made in advanced countries for test of physical inventory, to determine value of inventory, test of accounts receivables including the confirmation of accounts from the customers, examination of disbursement of vouchers, payment from pension and other funds, etc.

- When we use of Statistical Sampling in various situations in audit of accounts we have to work out the following:

1. Estimation of Population parameters
2. Test of Hypothesis
3. Determination of the size of sample
4. Determination of the level of accuracy in accounts

Hypothesis Testing

- Hypothesis testing begins with an assumption that we make about a population parameter.
- A hypothesis in statistics is simply a quantitative statement about a population.
- For example, a coin may be thrown 200 times and we may get heads 80 times and tails 120 times. We may now be interested in testing the hypothesis that the coin is unbiased.

- e.g. We may study the average weight of 100 students of a particular college and may get the result as 110 lbs. We may now be interested in testing the hypothesis that sample has been drawn from a population with average weight 115 lbs.

Procedure of Testing Hypothesis

The following procedure is used:

1. Set up Hypothesis
2. Set up a Suitable Significance Level
3. Setting a Test Criterion
4. Doing Computation
5. Making Decisions

1. Set up Hypothesis

- The 1st thing in hypothesis testing is to set up a hypothesis about the population parameter.
- Then we collect sample data, produce sample statistics, and use this information to decide how likely it is that our hypothesized population parameter is correct.

- Suppose we assume a certain value for a population mean. To test the validity of our assumption, we gather sample data and determine the difference between the hypothesized value and the actual value of sample mean.
- Then we judge whether the difference is significant. The smaller the difference, the greater the likelihood that our hypothesized value for the mean is correct. The larger the difference, the smaller the likelihood.

- Generally two different hypotheses are constructed so that if one hypothesis is accepted, the other is rejected and vice versa.
- Two Hypotheses are:

1) Null Hypothesis, and

2) Alternative Hypothesis

1. Null Hypothesis

- The null hypothesis is very useful tool in testing the significance of difference.
- This hypothesis asserts that **there is no true** difference in the sample and the population in the particular matter under consideration (hence the **word "null" which means invalid, void or amounting to nothing**) and that the difference found is accidental, unimportant arising out of fluctuations of sampling.

- e.g. If we want to find out whether extra coaching has benefited the student or not, we shall set up a null hypothesis that “extra coaching has not benefited the students.”
- Similarly, if we want to find out whether a particular drug is effective in curing malaria we will take the null hypothesis that “the drug is not effective in curing malaria”.

- The rejection of the null hypothesis indicates that the difference have statistical significance and the acceptance of the null hypothesis indicates that the differences are due to chance.

2. Alternative Hypothesis

It specifies those values that the researcher believes to hold true, and , of course, he hopes that the sample data lead to acceptance of this hypothesis as true.

- e.g. A machine produced 20 defective article in a batch of 400. After overhauling it produced 10 defectives in a batch of 300. Has the machine improved?

- Use of Different Symbols
- H_0 representing the null hypothesis
- H_a or H_1 the alternative hypothesis

2. Set up a Suitable Significance Level

- Having set up the Hy. the next step is to test the validity of H_o against that of H_a at certain level of significance.
- The significance level is customarily expressed as a percentage, such as 5%, 1%, and the like.
- e.g. 5% level of significance is the probability of rejecting the null Hy. means in 5 out of every 100 occasions.

3. Setting a test criterion (Confidence Level - e.g 90%, 95%, 99%)

- This involves selecting an appropriate probability distribution for the particular test that is applied.
- Some probability distributions commonly used in testing procedures are ‘z’, ‘t’, etc.
- ‘z’ – Test of significance of mean in large sample
- ‘t’ – Test of significance of mean in small sample

- 4. Doing Computation
- Make computation using formula based on random sample size necessary for the test.
- The calculations include the testing statistics and the standard error of the testing statistics.

5. Making Decisions

- If the difference between observed and expected means is **more than** 1.96 S.E., we say that the result of the experiment does not support the Hy. at 5% level or, in other words, the difference is regarded as significant, i.e it could not have arisen due to fluctuations of sampling.

Estimation of Parameters

- The statistical technique of estimating unknown population parameters from the corresponding sample statistic is referred to as estimation. An estimate of a parameter can be made in two ways:

1. Point Estimation

- It is a single value of a statistic that is used to approximate a population parameter is called a point estimate.

- The statistic that one uses to obtain a point estimate is called an estimator and the value of the statistics is the estimate.
- e.g. the sample mean ( ) which we use for estimating the population mean is an estimator of population mean. Similarly, the statistic S.D sample is an estimator of S.D population. Thus different samples will generally lead to different estimates. The expected value of statistics expressed symbolically as E.

- Since the mean of the sampling distribution of several mean is equal to population mean, a sample mean is an unbiased estimator.
- In other words

1. Mean of Sample is an unbiased estimate of population Mean.
2. Proportion of Sample is unbiased estimate of Proportion of Population.

Interval Estimation

- An interval estimate of a population parameter is an interval of finite width, centred at the point estimate of the parameter, that is expected to contain the true value of the parameter.
- In the theory of interval estimation, it is desired to find an interval which is expected to include the unknown parameter with a specified probability.

- The method of interval estimation consists in determination of two constants t_1 and t_2 also known as confidence limits i.e. a=0.05 (or 0.01) gives the 95% and 99%.

Compliance Testing

- Sampling is used in both compliance and substantive testing.
- The purpose of compliance testing is to determine to what extent the system's internal control(IC) are complying with the stated policies, plans, laws and regulations or key document (KD).
- ICs are a set of procedures that are designed to minimize the chance of errors in the operation of the accounting/financial system.

- Compliance tests are designed to establish to what extent the control can be relied on to detect material error and whether the ICs were operating effectively throughout the period being audited.
- It is typically concerned with qualitative characteristics or attributes and statistical sampling is used to estimate the proportion of violations associated with a particular set of controls.

- e.g. Purchase orders may need to be authorised and compliance testing might eliminate the proportion of times that they have not been authorised.
- Test of compliance have normally been designed so as to provide information as to the **rate** of error in terms of control failure.

Substantive Testing (ST)

- The purpose of substantive procedures is to **provide audit evidence as to the completeness, accuracy and validity of the information** contained in the accounting records or in the financial statements.
- It involves detailed examination of the monetary value of the account balances to determine their accuracy and to draw conclusions about materiality of the error amount in the accounts. The extent and nature of ST depends upon the decision taken about the effectiveness of the systems of internal control.

Selection for Substantive Testing

- For this purpose stratified sampling technique is used.
- The size of population is taken to be the total number of monetary units in all the accounts.
- The population is divided into groups (strata) according to their book values and a sample is selected independently from each stratum with equal probability i.e. each monetary unit has an equal chance of selection.

- The sample is selected at regular intervals after a random start.
- Normal distribution is used to estimate the total error amount

THANK YOU