# *AUDIT SAMPLING – A TOOL TO BALANCE AUDIT PRECISION AND COST*

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**Abstract:** The ongoing global economic crisis presents new challenges for the auditing profession, as audit clients are increasingly exposed to financial instability and a heightened risk of bankruptcy. In response, auditors must enhance their application of professional scepticism and ensure the collection of sufficient and appropriate audit evidence. A key approach to achieving this is using audit sampling – employing both statistical and non-statistical methods. When applied in a complementary manner, these techniques can significantly improve audit quality, reduce subjectivity in auditor judgment, and contribute to the formulation of more reliable and objective audit opinions.

**Keywords:** independent financial audit, audit sampling, professional skepticism, audit evidence, audit quality.
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## Introduction

The audit profession is currently under continuous regulatory scrutiny. Company management is required to establish effective internal control systems, while auditors must design their audit procedures in a way that takes these internal control systems into account. However, despite these efforts, users of financial statements often find it difficult to assess the quality of the audit performed. In most cases, the effectiveness of the audit becomes evident only after a company declares bankruptcy. The failure of public companies is frequently followed by legal proceedings, and audit firms often become involved in such litigation as a consequence of the corporation's failure.

In the early days of auditing, it was not uncommon for an independent auditor to examine all accounting records of the audited entity. But with the increasing size and complexity of corporate transactions, it became economically unjustifiable and excessively time-consuming to verify every transaction and its accompanying documentation. Auditors recognize the need to express an opinion on the fairness of financial statements based on the examination of a subset (sample) of transactions. Therefore, applicable auditing standards permit the use of both statistical and non-statistical sampling techniques during independent financial audits to obtain sufficient and appropriate evidence (ISA 530, 2009). As a result, the audit provides reasonable, rather than absolute, assurance regarding the fair presentation of the information in the financial statements.

Currently, both statistical and non-statistical samples are used in nearly every audit of financial statements. Audit sampling inherently increases uncertainty, since auditors do not examine the full population, and therefore, conclusions based on sample results may differ from conclusions that would have been reached had the entire population been tested. Sampling allows auditors to form an opinion on transactions or balances without significantly increasing the time and costs required for data verification. The logic behind "audit sampling" is that certain samples can be sufficiently representative to ensure the validity and reliability of conclusions about the entire population under review. However, for audit sampling to be effectively used as a tool, auditors must possess in-depth knowledge of the sampling process.

**The purpose** of this paper is to present a critical review of how audit samples are formed and used, to gain insight into the differences between statistical and non-statistical samples and the level of assurance they provide. In Bulgarian literature, there is very limited information (Lambova, M. 2003; Radeva, K. 2010; Vaisel, A. 2015) that provides sufficient knowledge on the application of statistical and non-statistical samples in audit practice. Only when auditors properly form and evaluate sample results can they conclude that they have reduced audit risk to a sufficiently low level and gathered persuasive evidence to support their opinion. This explains the relevance of the research problem and the motivation behind its selection.

**The object** of the research is the level of precision provided by statistical and non-statistical sampling. The choice of this object is mainly motivated by:

- The need to reduce subjectivity on the part of the auditor when selecting items for testing;
- The necessity of improving the reliability of results by increasing the use of statistical methods in forming samples, which would lead to more reliable and representative audit evidence.

The author believes that the **complementary use of both non-statistical and statistical samples** would enhance the quality of audit work and increase the degree of confidence in the audit findings.

The ***subject*** of the research is the quality of independent financial audits conducted through sampling techniques.

The ***tasks***, to achieve the formulated purpose are:

1. To present the advantages and disadvantages of using samples;
2. To clarify core audit concepts – materiality, audit risk, and audit evidence;
3. To present approaches to forming audit samples;
4. To explain the qualitative characteristics that a population must possess to form a representative sample.

Conducting audits primarily using non-statistical samples formed based on the auditor's subjective judgment inevitably leads to issues related to:

- Whether the size of the non-statistical sample, determined based on auditor judgment, is sufficient to reduce sampling risk to an acceptably low level;
- Whether qualitative evaluation of non-statistical sample results overstates the auditor's confidence in the conclusions drawn from the sample;
- Whether the failure to project errors found in non-statistical samples and integrate them into an overall misstatement at the financial statement level sometimes leads to a lack of corrections in the financial statements and undesirable audit outcomes.

**The main research thesis** supported in this paper is that the complementary use of statistical and non-statistical sampling in auditing would reduce audit risk to an acceptably low level.

To achieve the research purpose, the following approaches were used:

- A review of the Bulgarian and international literature in the field of independent financial auditing;
- Results from prior empirical studies;
- Analysis of the regulatory framework on the problem.

Audit evidence must relate to *assertions about economic actions and events*.

The financial statements prepared by management contain assertions about their truthfulness – existence, completeness, valuation, accuracy, period cut-off, classification and understandability, rights and obligations. The auditor compares the audit evidence gathered to support these assertions with the applicable criteria. These criteria may be a generally accepted accounting framework or a specific accounting basis.

The auditor gathers evidence both about the business transactions that have occurred (economic actions and events) and about management (which prepares and bears the responsibility for the financial statements). This evidence is used to compare the assertions in the financial statements against the chosen criteria. The audit report communicates to users the level of conformity between the assertions and the criteria. *Reporting the results to intended users* is linked to the type of report issued by the auditor.

Therefore, *the subject matter of the audit* is the financial statements of the company, for which sufficient and appropriate evidence is collected to provide a reasonable basis for forming an opinion in the assurance report. The object of the audit is the assertions made about balances, groups of transactions, and operations.

The objective of a financial statement audit is to enable the auditor to express an opinion on whether the financial statements are prepared, in all material respects, in accordance with the applicable financial reporting framework (ISA 200, 2009). A common misconception is that auditors are responsible for detecting all errors, fraud, and illegal acts. However, according to the International Standards on Auditing, the auditor's responsibility is to plan and perform the audit in order to obtain reasonable assurance that the financial statements as a whole are free from material misstatement, whether caused by error, fraud, or illegal acts (ISA 200, 2009). Due to the nature of audit evidence and the inherent characteristics of fraud, the auditor can only obtain reasonable – not absolute – assurance. As a result, it is possible for an auditor to issue an unqualified opinion even when material misstatements are present in the financial statements. An audit is an assurance engagement in which a professional accountant expresses an designed to enhance the confidence of the intended users in the financial statements. To do so, the auditor must obtain sufficient and appropriate audit evidence by selecting suitable items for testing. The auditor has the following options: to test all items within a population; to test specific items based on judgment; or to apply audit sampling techniques.

In small enterprises, the auditor may afford to test all items. However, in companies with a large volume of business transactions, it is neither effective nor economically justified to audit every transaction that occurred during the period. Therefore, in today’s audit environment, audit sampling serves as an efficient approach for conducting audit procedures.

## 1. Three fundamental audit concepts and their impact on audit sampling – materiality, audit risk and audit evidence

There are three fundamental concepts in auditing: *materiality, audit risk,* and *audit evidence*. The auditor's assessment of materiality and audit risk influences the nature and extent of the work to be performed, which in turn determines the scope of the audit. When determining the scope, the auditor must make decisions regarding the nature, timing, and extent of audit evidence to be gathered.

The determination of ***materiality*** is a matter of professional judgment. According to the *Framework for the Preparation and Presentation of Financial Statements*, issued by the International Accounting Standards Committee, materiality is defined as follows: "Information is material if its omission or misstatement could influence the economic decisions of users taken on the basis of the financial report. Materiality depends on the size of the item or error judged in the particular circumstances of its omission or misstatement". This definition focuses on the perspective of the users of the financial statements. During the planning stage of the audit engagement, the auditor evaluates the degree of misstatements that could affect users' decisions. The auditor uses reporting materiality as a reference point for determining planning materiality. In other words, materiality at the financial statement level refers to "the maximum amount of misstatement that could exist in the financial statements as a whole without affecting the economic decisions of users".

Current International Standards on Auditing do not provide specific guidance on determining the amount of materiality, for several reasons. First, it is difficult – if not impossible – to determine what is material to various groups of users such as investors, creditors, employees, government bodies, and other organizations that rely on financial statements as a primary source of information. Second, auditors themselves often fail to agree on how materiality should be defined or quantified. Finally, some auditors are reluctant to define a threshold of materiality that could later become critical in legal proceedings. By establishing a materiality threshold during the audit, the auditor focuses on material misstatements, where the amount of misstatement is defined as the difference between management's assertions in the financial statements and the auditor's findings. The auditor's report includes the phrase: "the financial statements present fairly, in all *material* respects…" This is the way the auditor communicates their view of materiality to the users of the audit report. It is also important to note that there is no guarantee the auditor will identify and disclose all material misstatements. Therefore, the audit

provides reasonable, but not absolute, assurance that all material misstatements have been detected.

Materiality has both quantitative and qualitative aspects. Its determination is a matter of professional judgment. The materiality threshold is used to quantitatively assess the impact of misstatements, deviations, and inconsistencies. Materiality may be increased based on favourable qualitative factors such as prior audit experience (few errors in previous years, low risk of fraud or illegal acts, no breach of contractual obligations), sound financial position, and favorable economic conditions within the industry. Conversely, adverse factors such as significant prior-year misstatements, deteriorating industry conditions, or a high risk of covenant breaches may lead to a reduction in planned materiality.

Qualitative factors also influence the auditor's judgment about materiality. Materiality is not determined solely based on the amounts in the items, but also on their nature. For instance, illegal payments of relatively small amounts may still be considered material to the financial statements. According to the author, examples of items that may be qualitatively material include: a reversal of profitability trends across reporting periods; a shift from net loss to net income or vice versa; a significant amount of cash on hand; negative cash balances during or at the end of the reporting period, offset by owner contributions; large amounts received from owners; significant volume of equity transactions, especially in non-public companies; extensive dealings with offshore entities; substantial inventory balances that are not typical for the size or nature of the business, and others.

There is also an inverse relationship between the level of materiality and audit risk –that is, the higher the materiality threshold, the lower the audit risk, and vice versa. The auditor takes this inverse relationship into account when determining the nature, timing, and extent of audit procedures. For example, if, after performing the planned audit procedures, it is determined that the acceptable level of materiality is lower, the audit risk increases. In such cases, the auditor should reduce detection risk by modifying the nature, timing, or extent of audit procedures, which often involves increasing sample sizes. This ensures more transactions are tested, leading to a more reliable audit opinion.

The concept of reasonable assurance leads us to the second key concept in auditing –audit risk.

***Audit risk*** is the risk that the auditor expresses an inappropriate audit opinion when the financial statements are materially misstated. The auditing standards do not provide specific guidance on what constitutes an acceptable level of audit risk. Audit risk arises when the auditor issues an unqualified opinion on materially misstated financial statements. The fundamental premise

of the *audit risk* model is that it represents a combined risk of material misstatements going undetected, and it is composed of the following four independent risk components:

- Inherent risk (IR);
- Control risk (CR);
- The risk that other non-statistical procedures (e.g., analytical review and other substantive procedures) will fail to detect misstatements (AR);
- The risk that other statistical procedures will fail to detect misstatements (or Test of Details risk) (TD).

The combined audit risk should be kept relatively low, typically ranging between 5% and 10% in quantitative terms. The equation presenting audit risk model is:

| *AR* = | *IR* | *x* | *CR* | *x* | *DR* |
|---|---|---|---|---|---|
| *(audit risk)* | *(inherent risk)* | *(control risk)* | | | *(detection risk)* |

In American auditing literature (Messier, William F., Jr., 2021), **detection risk (DR)** is defined as the risk that the audit procedures will lead to the conclusion that no material misstatements exist in account balances or classes of transactions, when in fact such misstatements are present. This risk is represented as comprising *two components*: AP – the risk that non-statistical procedures will fail to detect misstatements TD – the risk that statistical procedures will fail to detect misstatements (Test of Details risk).

***DR = AP x TD***

As a result, the audit risk model is expressed as follows (Messier, William F., 2021):

***AR = IR x CR x AP x TD***

**Detection risk consists of two types of risk**:

The first risk is the ***sampling risk***, which arises from the fact that in many cases the auditor does not examine all account balances or transaction groups. Since only a subset (sample) of the population is examined, the selected sample may not be representative, leading the auditor to form an inappropriate conclusion about the fairness of the financial statements.

The second risk, referred to as the ***non-sampling risk***, may occur when the auditor applies inappropriate audit procedures or fails to detect misstatements even when appropriate procedures are applied, or misinterprets the results of audit tests. Non-sampling risk can exist even when 100% of the population is tested. This type of risk can be minimized through proper training, planning, and supervision.

The mere fact that the auditor uses sampling methods implies a conscious acceptance of certain risks. While these risks are inherent in the audit process, clearly defined and scientifically based sampling techniques can assist the auditor in identifying errors and forming an appropriate audit opinion (Eliseeva, I.I., Terekhov, A.A., 2007).

Errors can be random (e.g., omissions in documentation, arithmetic mistakes), and as such, they do not typically exhibit a systematic tendency to overstate or understate values. However, the more significant threat comes from intentional distortions, such as fraud, theft, and poor management. Also, sometimes an auditor may fail to detect either random or intentional misstatements in the documentation or reporting, may overlook important information, and as a result, may issue an inappropriate audit opinion based on the obtained evidence. Auditors themselves are not immune to error.

The concept of reasonable assurance acknowledges that there is a risk the auditor's opinion may be incorrect. It is the risk that the auditor expresses an incorrect audit opinion when the financial statements are materially misstated that is referred to as "audit risk" (Chetyrkin, E.M., Vasilieva, N.E., 2013).

The determination of audit risk and its components is a matter of professional judgment. At the conclusion of the audit, the auditor does not know the actual level of audit risk with certainty. If the auditor concludes that the achieved audit risk is less than or equal to the planned audit risk, an unmodified opinion may be issued. However, if the achieved audit risk exceeds the planned level, the auditor must perform additional audit procedures or issue a modified audit report. The auditor reduces audit risk by designing and performing audit procedures to obtain sufficient and appropriate audit evidence, enabling the auditor to draw reasonable conclusions on which to base the audit opinion. An increase in the auditor's assessment of the risk of material misstatement leads to an increase in the extent of audit procedures, which in turn requires larger sample sizes within the relevant populations. The auditor's assessment of the risk of material misstatement is influenced by inherent risk and control risk. To reduce audit risk to an acceptably low level, the auditor must achieve a low detection risk, which requires more substantive procedures and a greater quantity of audit evidence. The more audit evidence is required to be obtained from substantive tests – meaning the lower the acceptable level of detection risk – the larger the sample sizes need to be, in order to select more items for testing.

Most of the auditor's work in forming an opinion on the financial statements consists of obtaining and evaluating ***evidence***. The evidence supporting the financial statements consists of the underlying accounting data and all corroborating information available to the auditor.

When designing an audit program to obtain evidence regarding management's assertions, the auditor develops specific audit objects that correspond to each assertion. These objects, in relation to the established levels of materiality and audit risk, are used to determine the nature, timing, and extent of evidence to be collected. Since the audit objects stem from management's assertions, if the auditor obtains sufficient and appropriate evidence regarding these objects, it is considered that reasonable assurance has been obtained that the financial statements are presented fairly, in all material respects. In obtaining and evaluating audit evidence, the auditor relies on its relevance and reliability. Relevance refers to whether the evidence relates to the specific audit object being tested. For example, if the auditor wants to verify that the client owns property, plant, and equipment, physically inspecting the assets may not be relevant if the assets are leased or rented under an operating lease.

Reliability relates to the source and nature of the evidence - whether it comes from internal or independent external sources, whether it is written or oral, and whether it is an original document or a photocopy. Auditors rarely obtain conclusive evidence for audit objects. In most cases, only sufficient evidence is obtained to reasonably support that management's assertions are fairly stated. The nature of audit evidence rarely provides absolute assurance, as the various types of evidence differ in their reliability. Furthermore, auditors frequently test only samples of transactions occurring during the period. Thus, auditors reach conclusions based on a subset of the evidence available.

Why does the auditor use the concepts of materiality and audit risk to define the scope of the audit? Why not test all transactions during the period?

The primary reason is the cost and practical use of such an audit. In small businesses, the auditor may be able to examine all transactions from the audited period and issue a report within a reasonable period after the financial year ends. However, it is unlikely that the business owner can afford such an extensive audit. In large companies, the volume and complexity of transactions make it impractical to examine each one. **Therefore, there is a trade-off between the accuracy and precision of the audit and its cost.** To address this, auditors rely on their knowledge of the business and use sampling techniques to examine selected transactions from the audit period. Often, auditors are familiar with the accounts and transactions that are more likely to contain misstatements, based on previous audits or industry knowledge. They can use this knowledge to target specific transactions for testing. When such knowledge is unavailable, sampling methods are applied to increase the probability of obtaining representative results from a population of

transactions. In such cases, auditors use probability theory to identify transactions likely to contain misstatements.

The sample size is a function of materiality and acceptable audit risk. There is an inverse relationship between the sample size and the level of materiality, as well as between the sample size and the acceptable audit risk. For example, if the auditor sets a low materiality threshold for a given level of audit risk, a larger sample size will be required compared to a scenario where materiality is set at a higher level. This is because the auditor must obtain more audit evidence to support a lower materiality level. Similarly, if the level of audit risk that the auditor is willing to accept decreases while materiality remains constant, the sample size is to increase. This arises from the need to gather more evidence to reduce the level of uncertainty and risk associated with sampling. Audit standards do not provide specific regulations on how sampling methods should be applied to particular audit procedures. In practice, the application of sampling is left to the professional judgment of the individual auditor or the audit firm. In reality, if an auditor applies a high level of materiality without reasonable justification, the number of misstatements, deviations, and inconsistencies that fall below this threshold may still influence the economic decisions of users of the financial statements. However, the use of a high materiality level may not be understood by the users of the audited financial statements.

## 2. Sampling as a means of optimizing the audit process and a way to balance audit precision with audit cost

In the process of collecting audit evidence, auditors must decide how much information needs to be obtained and analyzed in order to achieve their objective. The issue of optimizing the scope of the audit and finding the most appropriate approach for forming an audit sample constantly arises. To address these challenges, auditors rely on their knowledge of the enterprise, its environment, and its internal control system, as well as on sampling approaches, in order to test the transactions that occurred in the enterprise.

A historical perspective is essential for understanding auditing as a profession. The objectives and techniques of auditors have evolved over the years. A review of audit history provides a foundation for analyzing and interpreting the changes that have occurred in audit objectives and methods. Even more importantly, such a review reveals a recent trend toward increased reliance on clients' internal controls and a reduction in detailed testing. The audit of the future is likely to consist primarily of procedural (or systems-based) reviews with an emphasis on evaluating the effectiveness of internal

controls, thus forming the basis for procedural judgments. Several arguments support this statement: rising costs in public companies and the emphasis on cost-efficiency and effectiveness; demands from owners and other users for additional information; growing complexity and scale of business operations; advances in information systems.

To discuss the importance of sampling in auditing, it is better to analyze *the evolution of auditing*, which is presented in the following table:

*Table 1*

***Evolution of auditing***

| **Period** | **Audit objective** | **Degree of testing** |
|---|---|---|
| Antiquity – 1500 | Detection of fraud | Detailed |
| 1500-1850 | Detection of fraud | Detailed |
| 1850-1905 | Detection of fraud and clerical errors | Mainly detailed testing and some sampling |
| 1905-1933 | Establishing the accuracy of financial statement positions and detecting fraud and errors | Low reliance on control |
| 1933-1940 | Establishing the accuracy of financial statement positions and detecting fraud and errors | Sampling |
| From 1940 to present | Establishing the accuracy of financial statements | Sampling |

From the table, we can conclude that audit testing has increasingly tended toward sampling audits rather than detailed audits. The adoption of sampling procedures represents the most important development in auditing in the early 19th century. This does not mean the elimination of detailed testing, but only the replacement of the volume of work previously performed.

An audit sample is a list of items selected in a specific way for the purposes of audit testing from a given population, in order to draw conclusions about the entire population. The International Standard on Auditing 530, "Audit Sampling and Other Means of Testing" (ISA 530, 2009), provides the following definition for audit sampling:

„Audit sampling" involves the application of audit procedures to less than 100% of items within an account balance or class of transactions such that all

sampling units have a chance of selection. This will enable the auditor to obtain and evaluate audit evidence about some characteristic of the items selected in order to form or assist in forming a conclusion concerning the population from which the sample is drawn. Audit sampling can use either a statistical or a non-statistical approach".

The use of samples in auditing has undeniable advantages compared to full testing. Among these advantages are:

- Greater efficiency, significantly shortening the time needed to perform the audit. This is especially important in urgent cases, such as when the audit must be completed shortly after the balance sheet date;
- Applicability in conditions that exclude full observation and testing;
- Possibility to significantly expand the audit scope: time savings from testing certain items make it possible to expand the audit in other areas. For example, for routine operations, only samples may be applied, while for others – a combination of sampling and full testing;
- Improved quality of audit evidence: the proper application of sampling methods according to their organization and technique ensures higher-quality audit evidence and improves the performance of junior auditors during the audit process;
- Ability to project sample results to the entire population – of course, there is a risk associated with sampling here;
- Reduced audit costs, allowing the lowering of prices from a technical standpoint in conducting the audit.

Six commonly used approaches in audit practice are available when forming a sample. These are: random number table; computer generator; systematic selection; random systematic selection; probability-proportional-to-size selection (PPS) also known as dollar unit sampling; and stratified selection.

The random number table is a technique that helps achieve randomness. This table is composed of randomly gathered digits from zero to nine. Each digit appears approximately the same number of times in the table, and the order in which it appears is random. The columns in the table are purely arbitrary – otherwise, the table would lose its purpose. They help make the table easier to read.

In systematic selection, the auditor calculates the sampling interval and then selects the sampling units. For example, if the population size N consists of 1,000 units and the desired sample size n is 100 units, then the sampling interval is equal to 10 – N/n. A random starting point is selected between 1 and 10 as the first sample element. After that, every tenth element is selected. The main advantage of systematic sampling is its ease of use. However, the primary problem is that it can produce a biased sample. When

systematic sampling is used, the sample will generally not be evenly distributed across the population – that is, the sampling interval is not always a whole number. Therefore, in these cases, the interval step must be rounded down to the nearest whole number. For example, if the population contains 10,089 units and the auditor wants to select 100 units with 5 starting points, the adjusted skip interval is 500 (10 089: 100 = 100 rounded X 5 = 500).

Computer-based random number generator is a more efficient technique than using a table of random numbers, because when selecting using a table, more numbers are dismissed (unusable) and there is a higher risk of human error. The Microsoft Excel random number generator can be used. Many auditing firms have integrated random number generators into their audit software.

According to the stratified selection approach, the population is initially divided into layers (groups, strata). The goal of stratification is to reduce the variation of elements within each stratum and to reduce the sample size without a proportional increase in the risk associated with the sampling method used. The strata must be defined in such a way that each sample element can only be included in one stratum. For example, when auditing accounts payable, the auditor may decide to stratify the population and apply different sampling techniques to select items for testing in each separate stratum. For better understanding, we provide an illustrative example of stratification:

| Stratum | Number of units in the stratum | Composition of the stratum | Selection method/sample formation |
|---|---|---|---|
| 1 | 22 | All payables over 5,000 BGN | 100 % examination |
| 2 | 121 | All payables between 1,000 and 5,000 BGN | Random number table |
| 3 | 85 | All payables under 1,000 BGN | Systematic selection |
| 4 | 14 | All payables with debit balances | 100 % examination |

Probability-proportional-to-size (PPS) selection is a statistical method with variable probability. It originates from Anglo-American audit practice, where the units of observation are not the individual items in the population but rather the monetary units encompassed by these items. With this selection method, the probability of selecting an individual item is proportional to its monetary value. A unique feature of PPS sampling is that it defines the

population in terms of monetary units (levs, dollars, euros) within balances or transactions, rather than by the number of transactions or account balances. For example, if receivables from 160 customers amount to 400,000 BGN, the population is considered to consist of 400,000 monetary units (BGN). The auditor randomly selects monetary units for testing. Under this method, not every transaction or amount has an equal chance of selection; each recorded monetary unit does. When a particular lev (or dollar/euro) is selected in this manner, the entire balance or transaction it belongs to is selected for audit. This characteristic makes PPS sampling efficient because a small number of transactions may be selected, yet they can represent large monetary amounts.

These techniques are used when the goal is to create a random sample, typically regardless of whether the sample is meant for testing qualitative or quantitative characteristics. In fact, the above-mentioned methods can be used for forming both statistical and non-statistical samples. If the auditor intends to assess sampling risk, when less than 100% of the population is tested, a random sample must be used. A statistical sample is a random sample.

Non-statistical samples are those in which the inclusion or exclusion of specific sampling units is based on professional judgment. Judgment-based sampling can often result in reasonable assessments or correct decisions, but with this technique, the auditor lacks an objective method for evaluating the adequacy of the sample. Judgmental (non-statistical) sampling typically involves haphazard selection.

Of course, due to sampling risk, the auditor may decide that a full examination is desirable. Often, the auditor determines that at least part of the population should be tested 100 percent. Because of the costs and time involved in a full examination, it is usually decided to form a sample from the population, which inherently involves accepting a certain degree of sampling risk. In such situations, the exact design of the sample is very important.

The American auditing standard for audit sampling, “Audit Sampling” (SAS 39, 2021), clarifies the following:

„When planning a sample for a substantive test of details, the auditor uses his judgment to determine which items, if any, in an account balance or class of transactions should be individually examined and which items, if any, should be subject to sampling. The auditor should examine those items for which, in his judgment, acceptance of some sampling risk is not justified”. The items that the auditor has decided to examine 100% are not considered part of the items subject to sampling. Other items that the auditor deems necessary to test to fulfil the audit objective, but which do not require full testing, would be subject to sampling.

The auditor should pay attention to whether all items in the population have had a chance of being selected in the sample. For example, it would be

incorrect to conclude that all sales have been accurately reflected in the accounting records if the sample is formed only from sales received via bank transfer and excludes cash sales. A random sample can be defined as a sample selected in such a way that each element in the population has a chance of being chosen. It should be noted that a certain form of trade-off or equilibrium arises between audit precision and audit cost when samples are used.

Two concepts that are very important in the application of audit sampling are *sampling error* and *non-sampling error*. A sampling error arises when the auditor reaches an incorrect conclusion because not the entire population has been examined. Sampling risk creates the possibility of a sampling error. If the entire population were examined instead of using a sample, there would be no sampling error. When a sample exhibits characteristics or traits that are not representative of the population as a whole, a sampling error occurs. Accordingly, sampling errors reflect the difference between a conclusion based on the sample and a conclusion based on examining the entire population. These sampling errors are entirely due to chance. They are inherent in statistical sampling. This type of error can be accurately measured and still controlled when statistical sampling is used. Controlling sampling errors is achieved by establishing appropriate relationships between the sample size, the characteristics of the population from which the sample is drawn, and the level of assurance to be achieved.

There is also a non-sampling risk, which arises from errors in auditor judgment. A non-sampling error occurs when the auditor draws an incorrect conclusion for reasons unrelated to the size of the sample. Examples of non-sampling errors include: selecting a population that is not suitable for the purpose of the test; incorrectly defining a deviation or misstatement, leading to the auditor's inability to recognize it in the sample; failure to detect properly defined and existing misstatements or deviations in the sample; failure to select a truly random sample or one expected to be representative; failure to correctly evaluate the results.

Non-sampling errors are human errors and can be reduced, eliminated, or prevented. Non-sampling risk can be reduced to a very low level through appropriate planning, supervision, and review. In addition, there is another type of inherent non-sampling error in the audit process: the audit procedure itself may not be appropriate for detecting deviations in tests of internal control or monetary misstatements. For example, the auditor may examine expense invoices to determine whether they were properly approved prior to being incurred.

### 3. The population – a source for sample formation

The population is the main "field" from which the auditor seeks to obtain specific information. According to Buchne (Buchne, R., Freichel, C., 2015), the audit population consists of subsets of the audited entity, clearly defined based on material, temporal, and spatial criteria. The audit population, being a finite group of items under review, represents a collective whole. Thus, it corresponds to a statistical population. However, the content of these two concepts does not allow them to be considered synonymous, because not every finite set of elements qualifies as a statistical population. Not every audit population is a statistical population, while every statistical population formed for audit purposes inherently constitutes an audit population.

A given set is considered statistical when[1] (Lambova, M., Rusev, Ch., Koseva, D., Stoyanova, V. 2008):

- it complies with the law of large numbers, meaning it has a sufficiently large size;
- it is homogeneous, i.e., composed of units formed under the influence of the same set of causes. Therefore, the units must be of the same type with respect to at least three identification criteria – substantive, temporal, and spatial.

The population must be defined in advance. When defining it, the auditor must adhere to two requirements:

- The population must be relevant (applicable) to the objectives of the audit;
- The defined population must allow anyone to determine whether a given unit belongs to that population.

The following examples illustrate the definition of a population:

*Table 2*

***Examples illustrating an audit population***

| Specifying the population | Included items |
|---|---|
| All receivables at year-end | Accounts with zero balances, positive (debit) and negative (credit) balances |
| All receivables arising during the year | Accounts with debit and credit turnovers |
| All sales invoices issued during the year | All issued sales invoices, including cancelled ones |

Additionally, when carefully defining the population, the auditor should pre-identify the sampling base (or selection base). The selection base is a list or other physical representation of the individual items in the population.

For example: When testing inventory, there are three possible sampling frames: ending balances of inventory items; infinite chronological inventory records; physical inventory items.

The main requirement when defining the selection base is to ensure it is a full (complete) representation of all items in the population from which the sample will be drawn. Sometimes, sampling frames may include items that do not belong to the population. For example, the accounts receivable listing may include zero or credit balances, even if the auditor is only interested in debit balances. If zero or credit balances are selected, they are excluded from the sample and replaced with other items.

Auditors must not substitute one sample unit for another — substitution is not permitted. However, if the sample unit is determined not to belong to the population (e.g., cancelled invoices), it may be replaced by another unit selected at random. Of course, the auditor must distinguish between a legally cancelled invoice or unused document and a document lacking supporting documentation (i.e., incorrectly cancelled).

Sample size depends on many factors (J. Christopher Westland, 2020):

- Judgment regarding audit costs (maximum budget, desire to minimize costs);
- Minimum acceptable level of precision (materiality);
- Increase in the total error the auditor is willing to accept (tolerable error);
- Desired level of assurance to be achieved;
- Increase in the use of other substantive procedures targeting the same management assertion;
- Variability (non-homogeneity) of the population or subpopulation, as well as its size;
- Increase in the amount of error the auditor expects to find in the population;
- Sampling method, including stratification of the population.

These factors interact in a complex way. Every auditor asks themselves the question:

How to form a sample of the smallest possible size that still provides the desired assurance?

## 4. Evaluation of sample results

It is well known that sampling risk is controlled by:

- Designing an adequate sample size;
- Projecting the sample results to estimate the error level in the entire population.

At the end of the audit process, auditors assess risk by determining whether the total misstatement in the financial statements exceeds materiality. This assessment is challenging because it requires consideration of the identified misstatements, projected errors, and the sampling risk associated with various audit segments. Audit risk is the risk that the auditor fails to appropriately modify their opinion on financial statements that are materially misstated. At the conclusion of the audit, to assess whether the achieved audit risk is acceptably low, the auditor must summarize the misstatements identified and evaluated during substantive testing. Here, the term "misstatements" refers to both intentional and unintentional errors.

When sampling procedures are used, the evaluation of the total misstatement depends on the projection of errors identified in the sample to the population, as well as on the uncertainties surrounding this projection (i.e., sampling risk). When the combination of a high projected misstatement and/or high uncertainty leads to an unacceptably high audit risk, the auditor may require the client to correct the financial statements for the identified misstatements in order to reduce audit risk to an acceptable level.

Research in auditing (Durney, M., Elder, R. J., Glover, S., 2014; Kachelmeier, S., and Messier, W. Jr., 2021) suggests that auditors may face difficulties in evaluating sample results when such evaluation is based primarily on professional judgment. This is an important area for study, as the failure to properly assess and integrate the results of non-statistical sampling into the overall (aggregate) misstatement may lead to undesirable audit outcomes.

The objective of an independent auditor’s work is to express an opinion on the fairness of the financial statements. In assessing whether the financial statements are fairly presented in accordance with the applicable accounting principles, the auditor should accumulate uncorrected misstatements in a way that allows them to determine whether individual amounts, subtotals, or totals in the financial statements are materially misstated. This summary of misstatements should include not only those errors the auditor has identified but also their estimate of likely misstatements. Clearly, the proper evaluation of audit sampling results is a necessary and critical step in determining the total (aggregate) misstatement of the financial statements as a whole.

For a sample to be representative, it must be free from bias. In the evaluation of sampling results, such biases may emerge, as auditors form conclusions about account balances or aggregate misstatements based on the detected misstatements, which are more specific than the projected ones.

Assessing audit quality is a complex issue. The outcome of audit quality is neither immediately visible nor directly observable. Audit quality control procedures aim to uphold high standards in the audit process; however, failures in audit firms often come to light only in the context of corporate bankruptcies. It is impossible to know how many audits are performed with poor quality and remain undetected. An audit firm may perform a low-quality audit, and there may be no indication of this—even if the financial statements are materially misstated. If an audit is poorly conducted and misstatements in the financial statements are overlooked, the audit report may not reflect any negative consequences. Since audit quality is difficult to observe, external parties tend to rely on potential indicators such as expert opinions, ongoing litigation against the firm, complaints filed, the type of audit opinions issued, the level of audit fees agreed upon, and the number of personnel involved in engagements. It is also important to emphasize the need to improve the quality of the accounting software being used. In this regard, there is a growing consensus among professionals that it is time to expand the use of ERP systems and to introduce a registration regime for accounting software (Manoilov, I., 2023).

## Conclusion

Among the reasons for using sampling in independent financial audits are the optimization of audit work, the reduction of time required for completion, and cost savings. However, to achieve these benefits in audit practice, the samples must:

1. be properly designed;
2. be selected using unbiased sampling techniques;
3. avoid subjective auditor judgment in selecting items for testing;
4. include a quantitative evaluation of sample results.

Sampling is used to strike a balance between audit precision and audit cost. This balance often leans toward accepting a higher audit risk—the risk of expressing an inappropriate audit opinion. This is particularly evident in non-statistical sampling, which is characterized by:

1. Sample selection based on the auditor’s intuition;
2. The possibility of subjectively selecting items for testing;
3. A tendency to include mostly large items in the sample;

4. Selection of items based on characteristics that draw the auditor's attention;
5. A typically smaller sample size than that used in statistical sampling;
6. A primarily qualitative evaluation of sample results;
7. A non-statistical sample cannot ensure representativeness.

Statistical sampling does not share these limitations and, additionally, is a scientifically based method. With the advent of modern computing, the previously burdensome aspects of statistical procedures have been significantly reduced. Any statistical sample can be replicated, provided the same criteria are used, whereas non-statistical sampling is inherently "individualized" for each auditor and each engagement, making replication difficult. Statistical sampling is generally a more reliable audit tool – especially in large populations - because:

1. Sampling risk is controlled through determining an appropriate sample size and evaluating results accordingly;
2. The sample size is determined using statistical method;
3. Units are selected randomly, without human bias;
4. Statistical methods allow for consistent use by multiple auditors on the same test, yielding identical results if the same criteria are applied;
5. It allows for objective, quantitative evaluation of test results – leading auditors to consistent conclusions about identified misstatement.

International auditing standards allow the use of both statistical and non-statistical sampling methods at the auditor's discretion. However, we believe this flexibility introduces substantial variation in audit quality.

Therefore, we suggest that the use of non-statistical sampling should be subject to clearly defined limits – such as for small populations of up to 2,000 records, small enterprises, or populations with consistently low audit risk over several years. For large populations, a combined use of statistical and non-statistical methods would likely lead to higher-quality audit outcomes. Today's business environment is facing a financial crisis and can even be described as aggressive. Assessing business risk has become more difficult, which increases the likelihood of over-reliance and audit failure, particularly when auditors primarily use non-statistical sampling methods. This is because such methods do not guarantee the collection of sufficient and appropriate audit evidence through an unbiased process.

Given the challenges auditors face in correctly applying both statistical and non-statistical sampling techniques, economic universities should devote

more instructional time in audit and statistical courses to cover the limitations and strengths of these techniques, their applicability to specific circumstances, and the risks and benefits they entail. As a result, such education will undoubtedly prepare more competent auditors for practical work.

The body responsible for developing auditing standards should create a detailed standard on audit sampling tailored to the needs of auditors. This standard should provide more comprehensive guidance on both statistical and non-statistical methods applicable in financial audits. Additionally, we believe that the number of accounting software systems used in Bulgarian practice should be reduced and strictly regulated by the state or another independent organization. This would significantly ease auditors' work and contribute to greater reliability in the audit opinions issued.

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