Ministry of Finance
Tax Bulletin

Statistical Sampling
Carbon Tax Act, Motor Fuel Tax Act, Provincial Sales Tax Act, Tobacco Tax Act

This bulletin explains statistical sampling and how it may be used during a consumer tax audit. For information on what to expect during a consumer tax audit, please also see **Bulletin CTB 003**, *Audits.*

The ministry is committed to the service standards and code of conduct outlined in the *Taxpayer Fairness and Service Code*.

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What is Statistical Sampling?

Statistical sampling involves an auditor randomly selecting one or more samples of a large number of sales and purchase transactions (population) in an effort to understand the characteristics of the overall population. This method is used to make conclusions about tax that may be owing without looking at all of the transactions over the entire audit period.

The ministry uses statistical sampling if a business has computerized records available for an electronic review. Computer-based statistical sampling allows an auditor to isolate the most important areas, to segregate specific accounts or to identify high dollar transactions.

Using statistical sampling, an auditor estimates and calculates the amount of tax that may be owing to the ministry for the audit period. This is done by determining the estimated average value of errors found in the sample (the point estimate) and projecting the errors to the population. The auditor also determines the precision of any estimate that is made, as well as the confidence that may be placed in the result. Both *precision* and *confidence* have specific statistical definitions and are explained below.

Precision
Precision refers to a percentage or dollar range that is above and below a particular estimated average. For example, an estimated average at a given confidence level might be $1,000 plus or minus $300.

Confidence
Confidence refers to the probability (expressed as a percentage) that the dollar range of tax that may be owing reflects the true amount of tax owing. This dollar amount ranges from the lower precision limit, say $700, to the upper precision limit, say $1,300, as determined from the sample results.

For example, an auditor states there was 90% confidence that the total, but unknown, additional tax was between $700 and $1,300. This would indicate that 90 samples out of 100, with similar characteristics, would be expected to contain the total tax value owing within this precision range of $700 and $1,300.

How Statistical Sampling is Applied to Your Audit

During an audit, the lead auditor will discuss statistical sampling with you. If you and the lead auditor decide that statistical sampling is the best method to use in conducting your audit, the auditor may arrange a Computer Audit Specialist (CAS auditor) to work with you and/or your staff to review the available data. The CAS auditor considers how your computer accounting information system relates to any other relevant subsystems and how they tie into supporting paper records.

The ministry applies statistical sampling as follows:
- samples are evaluated using a 90% confidence level (two-sided) and the point estimate (estimated average value) is used to project an assessment of tax owing,
- sample size is set to achieve a goal of relative precision level of 30% or less, and
- any stratum (sub-groups of the population) containing one or more errors are included in the overall evaluation.

The following briefly summarizes the seven steps the CAS auditor takes when applying statistical sampling.

1. Obtain and Import Electronic Standard Audit File Data

The CAS auditor obtains the standard audit file data from you and identifies the necessary data to download for review. Generally, the standard audit file data includes:

- financial statements,

- the trial balance,

- general ledger details,

- the sales transaction master file,

- the customer master file, and

- the inventory master file.

The CAS auditor requests that you download the identified electronic data for each of the data sets (e.g. sales, purchases and tax account).

2. Define the Population

The CAS auditor summarizes the data by account code and works with the lead auditor to identify the accounts that will be the focus of the audit. Accounts that have little or no sales tax implications are eliminated (e.g. payroll).

Some transactions from certain business units or locations may have little or no errors prior to sampling while other transactions may have known errors. These kinds of transactions can be reviewed prior to sampling. Both types of transactions can be removed from the population. However, if either you or the lead auditor have reasonable concerns as to whether or not certain types of items are likely to contain an error, it is suggested that these items remain in the population to be sampled. When items are removed prior to sampling, they are reviewed on an actual basis or separately sampled.

3. Refine the Population

You and the lead auditor discuss the sampling population, such as general ledger accounts, to be reviewed for audit, before selecting audit samples. Once you have reached an agreement, all transactions within the selected accounts are placed into a separate electronic file for sampling.

You and the lead auditor identify and agree on the basic sampling unit, which can be the invoice number, transaction number or the line numbers as shown on the invoices. If the sampling unit is the invoice line item, then only the selected line items are evaluated for possible tax error and not the entire invoice. However, if the entire

invoice is chosen as the sampling unit, then the invoice is evaluated for error. The samples are selected from the population that you and your auditor have agreed upon.

Removal of Negative Items
A negative item does not refer to a tax credit. A negative item is an invoice, invoice line item or other sampling unit that subtracts from the total. The negative item or transaction, for example, may represent a merchandise return. The positive transaction would be the original purchase. If the positive and negative items occur during the audit period, these items are removed from the population prior to sampling.

Removal of High Dollar Items
The auditor establishes a high dollar threshold value for the items of interest. Values equal to, or greater than, the threshold value are reviewed on an actual basis since these items are not statistically consistent with the invoices in the normal range. Any errors found on these items are assessed on an item by item basis and are not included in the sample.

4. Stratify the Population
After removing the items that are not included in the sample, the remaining population is divided into groups. This means the auditor divides the sample into groups with similar characteristics based on a quantity (e.g. invoice amount) or a quality (e.g. cost center). Grouping is done in such a way that units within a group are more alike than units compared across the groups. The primary reason to group items is to improve the accuracy of the sampling process or to reduce the sample size. Generally, the auditor groups the population based on quantity (invoice amount).

5. Sample Size and Sample Selection
The sample size is determined through setting a relative precision goal. The ministry has a relative precision goal of 30% or less when setting a sample size.

Sample sizes are typically between 250 and 1,000 units for a statistical sample divided amongst the groups. The auditor increases sample sizes if greater precision is required. At the end of your audit, an overall conclusion is reached for all the sampled groups.

Each group is sampled independently using random number sampling. The ministry does not select the same sample more than once.

6. Evaluate Sample

Once the sample size is determined and the sample items are selected, you are given the sample list by your lead auditor and asked to provide supporting documentation for those items. The lead auditor also discusses with you a reasonable period of time in which you are to provide the supporting documentation.

The lead auditor then reviews the documentation to determine if any errors exist in the sample. The lead auditor discusses with you any errors found and provides you with all the information you require to understand why they are errors.

Missing Supporting Documentation

Every sample unit selected in the sample must be evaluated. One exceptional evaluation unit is a missing item. A missing item is a source document that cannot be located. In these instances, your lead auditor must consider evidence, beyond the sample itself, to determine if the missing item contains errors and, if so, the amount of the error. The transaction, related documents and accounting entries are reviewed to arrive at a logical conclusion.

7. Project Sample Error

Statistical evaluation is used to project errors found in the sample. The auditor uses one of the following three estimation methods to project the sample errors and determine the overall amount of tax you may owe.

1. The **difference** method compares the errors on a unit basis and applies the average sample error per unit to the total number of units in the population.
2. The **ratio** method compares the sample error amount to the total sample amount and applies the error percentage to the population amount.
3. The **regression analysis** method uses the best linear relationship between the observed error values and the sampling unit values.

Each of the three estimation methods also provides an estimate of the sampling error for their error projections. Whichever method provides the smallest dollar estimate of sampling error (not the lowest or highest assessment amount) is considered the most accurate estimator and used to provide the assessment of tax you may owe.

Sampling errors computed from the sample are used to estimate the precision of the projected amount owing. The sampling error divided by the point estimate, expressed as a percentage, is the estimated relative precision. If the desired relative precision goal of 30% is not achieved, then you or the auditor may choose to select and evaluate additional sample items. However, not meeting the relative precision goal does not mean that your sample results are invalid and a projection may still be made.

If you have any questions or concerns about how statistical sampling is applied to your audit, please discuss them with your lead or CAS auditor.

ⓘ Need more info?

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Toll free in Canada: 1 877 388-4440
Email: **CTBTaxQuestions@gov.bc.ca**

Access our forms, publications, legislation and regulations online at **gov.bc.ca/consumertaxes**

Subscribe to receive email notifications when B.C. tax information is updated.

The information in this bulletin is for your convenience and guidance and is not a replacement for the legislation.

References: *Carbon Tax Act*, Sections 43-46; *Motor Fuel Tax Act*, Sections 41-45; *Provincial Sales Tax Act*, Sections 178 and 194-206.1; *Tobacco Tax Act*, Sections 21 and 22.