Monetary unit sampling

Monetary unit sampling is a commonly used sampling procedure to estimate an account balance (or other) based upon a random sample taken. This sampling method is also known as probability proportion to size or dollar unit sampling. Each dollar in the population being sampled is the sampling unit.

The most common use for monetary unit sampling is tests for over-statement. Thus, examples of common usage include tests of inventory, accounts receivable, loans receivable, etc. – in other words, any account normally having a debit balance where there is an audit risk that the account balance is overstated.

There is an excellent explanation of the details of monetary unit sampling in the online CPA Journal. The purpose of this paper is not to repeat the information contained there, but to show how this sampling method can be applied, using a form and web based approach which is hopefully easy to use and is efficient and effective. The underlying approach of this web based approach is no different from that described in the article.

Selecting a sample size

An excellent article on the procedures for determining an appropriate sample size can be found at in the online CPA Journal.

In order to determine an appropriate sample size there are four pieces of information needed:

1. Population dollar value
2. Tolerable misstatement amount (expressed in dollars)
3. Expected population exception rate (expressed as a percentage)
4. Acceptable risk of incorrect acceptance

This information can be input into a form, click the process button and the system will compute an appropriate sample size to be selected. There are screen shots of the process later in this document.

Selecting the sample

Selecting a statistically valid random sample to be tested can also be done using a form. Besides the sample size which was obtained using the procedure above, the only additional piece of information needed is (optionally) a random number seed value. Although the samples are selected automatically by the system, the process used is described as follows.

All of the amounts being tested are then examined with samples being taken using the following approach.
Monetary unit sampling

1. The total population size is determined (this is the book value or amount being audited).
2. The population size is divided by the required sample size in order to determine an interval amount.
3. A random starting point between 0 and the interval amount is selected based upon a random number generator which may optionally use a “seed” value.
4. A running total number is initiated using the random starting point determined in step 3.
5. Each transaction amount is considered individually for sample. The amount of the transaction is added to the running total and compared with the interval amount. If the running total exceeds the interval amount, then that transaction is selected for sampling. In addition, the running total is reduced by the interval amount until the running total is less than the interval.
6. This process is repeated for every transaction in the population.

There are screen shots of the process later in this document.

Obtaining sample results

For each sample selected, the amount is examined and an “audited value” is determined, based upon tests performed by the auditor. This audited value may be equal to, less than or greater than the examined value. The assessment should segregate the amounts which are overstated from the amounts which are understated. Once this is done, there are specific procedures which can be applied in order to determine if the sample errors are within expected limits. For a complete description see the online CPA journal article mentioned above.

Assessing the sample results

Once all the samples have been obtained and the amounts audited, it is then possible to make a determination if there is a potential for overstatement. The process used is the same process described in the article mentioned above. Because the process is automated, all the details are not necessarily obvious, so they are explained here. These procedures are the same as those described in the article. The key difference is that there is less data handling involved.

The starting point is to focus on the sample exceptions. Some of these sample exceptions will be overstatements and some will be understatements. Each are handled separately, but in the same manner.

The results are accumulated using “tiers”. The first tier is for a case where there are no exceptions. (Even if your sample does not identify any exceptions, there is still a chance that there are exceptions out there that have not been identified). For this tier, the assumed error rate is 100%. The system calculates this amount automatically.
Monetary unit sampling

If there were one or more exceptions, the system sorts them in descending order based upon the extent of the error identified as a percentage. These exceptions are then taken one at a time and assigned an error extrapolation amount.

Finally, if there were also understatements found, then the system will extrapolate these amounts and net them from the total extrapolation for the overstatements.

The system will also perform similar type calculations for understatements, if such errors were identified.

There are a series of screen shots at the end of this article which illustrate the process.

The procedure for MUS sample size determination

For this exercise it is assumed that the population is $300,000 and that a tolerable misstatement amount of $27,000 has been determined based on the auditors judgment. In addition, the expected population error exception rate is 4% (i.e. $12,000) and in the auditor’s opinion, an acceptable risk of incorrect acceptance has been established at 5%.

To determine the sample size, all that is necessary is to complete an input form and click the “Process” button as illustrated below.
Monetary unit sampling

The menu item is “Functions | Audit functions | Monetary unit sample size determination”.

<table>
<thead>
<tr>
<th>Audits</th>
<th>Functions</th>
<th>Processes</th>
<th>Web CAAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selections</td>
<td>Commonly Used</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Date Functions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Numeric Functions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Table</td>
<td>Airlines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main form</td>
<td>Select table and proceed to main form</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe</td>
<td>Obtain a description of the table contents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ShortList</td>
<td>Obtain a list of twenty rows of the table</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Process</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To process ad-hoc queries, please select a table name to enable the use of the following menu items (shown on the list):

- Commonly used
- Date functions
- Numeric functions
- Other functions

The remaining menu items do not require that a table name first be selected. However, a table name can be selected at any time. To change table selections, use the menu item ‘Table Selection’.

<table>
<thead>
<tr>
<th>ID</th>
<th>Table</th>
<th>Database</th>
<th>Auditor</th>
<th>Folder</th>
<th>Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>audit1</td>
<td>musdata</td>
<td>test</td>
<td>Im N Auditor</td>
<td>Work</td>
<td>1,056,920</td>
</tr>
</tbody>
</table>
Monetary unit sampling

The four required elements of information are then entered – 1) acceptable risk of incorrect acceptance, 2) population amount, 3) expected error amount, and 4) tolerable misstatement amount.
Monetary unit sampling

Once the information has been entered, the “Process” button is clicked.
Monetary unit sampling

The system displays the required sample size, in this example it is 91.

The procedure for MUS sample selection

Selection of a monetary unit sample using Web CAAT is a fairly simple and straightforward process. The process will be illustrated with the fixed asset data which comes with Web CAAT and is named “fa”. This information consists of approximately 4,000 rows of data with a dollar value of about $18 million. A MUS sample of 20 items will be selected.
Monetary unit sampling

The starting point is to start the Web CAAT system and sign-in to the opening form. In this example, the default user id of “audit1” is being used (password is “audit1”).

For some forms, the mouse over will provide a description or purpose of the data element input form shown in the ‘Help’ box just above the Process button. In particular, the information in the text boxes above should be completed as follows:

To begin with Web CAAT, please enter the following information:
- Assigned user id to access the database
- Password for the user id
- Database name (default value is test)
- Host name (default value is localhost)
- The auditor name that should be used on work papers
- The audit folder where work papers should be stored on the server

Once this information has been entered, click the ‘Sign-in’ button in order to take the next step.
Monetary unit sampling

Next the table to be used to make the sample selections is selected from the drop down list of available information (the data had been previously loaded using the data import facility).
Monetary unit sampling

The menu item “Functions | Audit Functions | Monetary Unit Sampling” is selected. The menu item is clicked to bring up the data input form.
Monetary unit sampling

The name of the column containing the numeric information to be sampled is selected from the drop down list. For this example, the value to be tested is named “cost”.

![Monetary unit sampling screenshot](image-url)
Monetary unit sampling

The remaining information required is entered on the form:

- The number of samples to be taken (20 in this example)
- A random seed number (65747323 in this example)
Monetary unit sampling

Once all the information has been entered, the “Process” button is clicked and the sample will be selected and the report produced.
Monetary unit sampling

The top portion of the report shows information as to what was tested, date performed, etc. Immediately below this report is a list of the samples selected, with sample numbering starting at 1.

<table>
<thead>
<tr>
<th>Selection number</th>
<th>Cost</th>
<th>TagNo</th>
<th>Cost</th>
<th>AD</th>
<th>ReplaceCost</th>
<th>Bookval</th>
<th>Salvage</th>
<th>Depr</th>
<th>Life</th>
<th>Location</th>
<th>Acq</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4,592.00</td>
<td>2666</td>
<td>4,592.00</td>
<td>1941.71</td>
<td>1375</td>
<td>2,740.29</td>
<td>916</td>
<td>368.34</td>
<td>3</td>
<td>ABC</td>
<td>2006-</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4,400.00</td>
<td>4162</td>
<td>4,400.00</td>
<td>1,791.80</td>
<td>1320</td>
<td>2,608.20</td>
<td>880</td>
<td>358.36</td>
<td>10</td>
<td>ABC</td>
<td>2007-</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9,152.00</td>
<td>1742</td>
<td>9,152.00</td>
<td>3,734.70</td>
<td>2,746</td>
<td>5,417.30</td>
<td>1,850</td>
<td>745.94</td>
<td>9</td>
<td>ABC</td>
<td>2006-</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3,099.00</td>
<td>1,359</td>
<td>3,099.00</td>
<td>1,467.89</td>
<td>1,083</td>
<td>2,141.11</td>
<td>722</td>
<td>293.58</td>
<td>9</td>
<td>ABC</td>
<td>2006-</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2,569.00</td>
<td>2,343</td>
<td>2,569.00</td>
<td>949.26</td>
<td>711</td>
<td>1,419.74</td>
<td>474</td>
<td>185.85</td>
<td>11</td>
<td>ABC</td>
<td>2005-</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>8,599.00</td>
<td>1,461</td>
<td>8,599.00</td>
<td>3,557.37</td>
<td>2,610</td>
<td>5,141.63</td>
<td>1,740</td>
<td>711.47</td>
<td>3</td>
<td>ABC</td>
<td>2006-</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1,270.00</td>
<td>1,570</td>
<td>1,270.00</td>
<td>510.50</td>
<td>291</td>
<td>2,560.61</td>
<td>254</td>
<td>100.08</td>
<td>1</td>
<td>NDR</td>
<td>2007-</td>
<td></td>
</tr>
</tbody>
</table>
Monetary unit sampling

At the bottom of the form is a recap of the sample parameters used. This will include the population being tested, the interval used, the seed value used, etc. This report can be printed, opened in Excel or copied and pasted into an existing Excel work sheet.

Sample Assessment

The samples are then tested and evaluated. A common method is to copy and paste the sampled items from the form into an Excel workbook and add an additional column for “audited value”. As each sample is audited, this worksheet can be updated with the results. Once all the samples have been tested, it is then possible to save this worksheet as a text file which can then be directly imported into the Web CAAT system for analysis.

The procedure to assess the sample results is illustrated using the screen shots below. In this example, the sample data has been imported into Web CAAT as a table named “musdata”. The column containing the amount to be audited is labeled as “Examined” and the amount which was determined from an audit is labeled “Audited”. There are a total of six exceptions identified – four were overstatements and two were
Monetary unit sampling

undersstatements. Note that it is not necessary for the auditor to track any of this, the system will pick this information up from the data being tested. The auditor needs only identify the name of the column containing the examined amount as well as the name of the column containing the audited amount. There are also some additional pieces of information that need to be input such as population size, sample size, etc. The process is illustrated using the screen shots below.

The menu function is “Functions | Audit functions | Monetary unit sampling assessment”.
Monetary unit sampling

The names of the columns containing the amounts examined and audited are specified, along with other information regarding the sample.

<table>
<thead>
<tr>
<th>Table</th>
<th>musdata</th>
</tr>
</thead>
<tbody>
<tr>
<td>name of column containing the examined amount</td>
<td>Audited</td>
</tr>
<tr>
<td>name of column containing the audited amount</td>
<td>Examined</td>
</tr>
<tr>
<td>W/P Code</td>
<td>Work/MUS_results.htm</td>
</tr>
<tr>
<td>All column names (for reference)</td>
<td>Audited</td>
</tr>
<tr>
<td>Example criteria</td>
<td>Show examples by clicking the drop down button to the right</td>
</tr>
<tr>
<td>Where (criteria)</td>
<td></td>
</tr>
<tr>
<td>Enter the sample size selected</td>
<td>20</td>
</tr>
<tr>
<td>Amount of the population tested, in dollars</td>
<td>300000</td>
</tr>
<tr>
<td>Expected error amount, in dollars</td>
<td>2000</td>
</tr>
<tr>
<td>Tolerable misstatement amount, in dollars</td>
<td>27000</td>
</tr>
<tr>
<td>Acceptable risk of incorrect acceptance</td>
<td>.05</td>
</tr>
</tbody>
</table>
Monetary unit sampling

Once all the information is entered, the “Process” button is clicked.

The results are then displayed. In this example, there was no overstatement risk identified.
Monetary unit sampling

Summary

Monetary unit sample selections can be effectively and efficiently selected standard audit procedures. Web CAAT is an open source system which can be downloaded at no cost. More information about the system is available at http://webcaat.org/wc/. Comments, questions and suggestions may be directed to Mike.Blakley@ezrstats.com.