

Audit sampling report

This report was created by R version 3.6.3 (2020-02-29) and its package `jfa` (version 0.5.0)¹.
`jfa` provides Bayesian and classical audit sampling analyses and is available on CRAN.

`jfa` is free software and you can redistribute it and or modify it under the terms of the GNU GPL-3 as published by the Free Software Foundation. The package is distributed in the hope that it will be useful, but without any warranty; without even the implied warranty of merchantability of fitness for a particular purpose.

Visit the package website (<https://koenderks.github.io/jfa>) to learn more!



Summary

The objective of this sampling procedure is to determine with a confidence of 95% whether the percentage of misstatement in the population is lower than the performance materiality of 17.425% (= \$2,000,000)

Table 1: Summary of the sampling results.

| Sample size | Deviations | Total taint |
|-------------|------------|-------------|
| 130 | 6 | NaN |

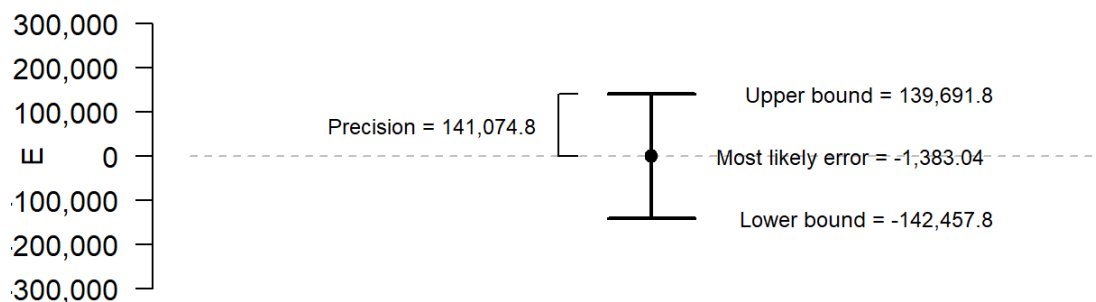
Outcome: Current sample meets these requirements

The table below summarizes the estimated misstatement in the population, including the most likely error, the 95% upper bound, and the obtained precision. As a justification of these results, appendix A contains the formulas and calculations upon which they are based. Appendix B lists the input data.

Table 2: Summary of the inferential results.

| | Most likely error | Lower bound | Upper bound | Precision |
|-----------|-------------------|--------------|-------------|-------------|
| x 100 = % | 0.000 | -0.012 | 0.012 | 0.012 |
| \$ | -1,383.038 | -142,457.836 | 139,691.760 | 141,074.798 |

95% Confidence interval



Appendix A: Formulas and calculations

These results have been calculated using the difference estimator (Touw & Hoogduin, 2011). The units of inference are individual transactions.

Notation:

| | |
|------------------------------------|--|
| Ist position: $ist = ist_euro$ | Estimated population misstatement: \hat{E} |
| Soll position: $soll = soll_euro$ | Lower bound population misstatement: $E_{0.025}$ |
| Sample size: $n = 130$ | Upper bound population misstatement: $E_{0.975}$ |
| Population size: $N = 50,152$ | Estimated unit misstatement: $\hat{\theta}$ |
| Population value: $B = 11,477,820$ | |
| Sampling risk: $\alpha = 0.05$ | |

Formulas:

$$\begin{aligned}\hat{E} &= N \times \hat{\theta} \\ &= 50,152 \times -0.02757692 = -1,383.038\end{aligned}$$

$$\begin{aligned}[E_{0.025}; E_{0.975}] &= N \times \left(\hat{\theta} \pm t_{1-\frac{\alpha}{2}} \times \frac{s_e}{\sqrt{n}} \right) \\ &= 50,152 \times (-0.02757692 \pm 2.812945) = [-142,457.84; 139,691.76]\end{aligned}$$

$$\begin{aligned}\hat{\theta} &= \frac{\sum_{i=1}^n ist_i - soll_i}{n} = \frac{-3.585}{130} = -0.02757692 \\ t_{1-\frac{\alpha}{2}} &= t_{0.975} = 1.979 \\ s_e &= \sqrt{\frac{\sum_{i=1}^n ([ist_i - soll_i] - \hat{\theta})^2}{n-1}} = \sqrt{\frac{33,897.88}{129}} = 16.21031 \\ t_{0.975} \times \frac{s_e}{\sqrt{n}} &= 1.979 \times \frac{16.21031}{\sqrt{130}} = 2.812945\end{aligned}$$

Evaluation:

✓ Upper bound lower than performance materiality $\rightarrow E_{0.975} < E_{max} \rightarrow 139,691.76 < 2,000,000$

References:

- Touw, P. & Hoogduin, L. (2011). *Statistiek voor audit en controlling*. Boom uitgevers, Amsterdam.

Appendix B: Sample data

Table 3: Relevant data obtained from the input sample.

| Row | ist_euro | soll_euro | Difference | Taint |
|-----|-----------|-----------|------------|--------|
| 96 | 0.000 | 91.546 | -91.546 | -Inf |
| 97 | 63.770 | 63.770 | 0.000 | 0.000 |
| 98 | 0.000 | 0.000 | 0.000 | NaN |
| 99 | 1,451.754 | 1,451.754 | 0.000 | 0.000 |
| 100 | 106.608 | 106.608 | 0.000 | 0.000 |
| 101 | 162.621 | 162.621 | 0.000 | 0.000 |
| 102 | 1,795.500 | 1,795.500 | 0.000 | 0.000 |
| 103 | 129.715 | 129.715 | 0.000 | 0.000 |
| 104 | 138.892 | 0.000 | 138.892 | 1.000 |
| 105 | 78.000 | 78.000 | 0.000 | 0.000 |
| 106 | 102.451 | 102.451 | 0.000 | 0.000 |
| 107 | 36.457 | 36.457 | 0.000 | 0.000 |
| 108 | 139.936 | 139.936 | 0.000 | 0.000 |
| 109 | 22.000 | 22.000 | 0.000 | 0.000 |
| 110 | 0.000 | 0.000 | 0.000 | NaN |
| 111 | 1,807.029 | 1,807.029 | 0.000 | 0.000 |
| 112 | 0.000 | 0.000 | 0.000 | NaN |
| 113 | 433.680 | 433.680 | 0.000 | 0.000 |
| 114 | 0.000 | 0.000 | 0.000 | NaN |
| 115 | 0.000 | 0.000 | 0.000 | NaN |
| 116 | 0.000 | 0.000 | 0.000 | NaN |
| 117 | 0.000 | 0.000 | 0.000 | NaN |
| 118 | 34.603 | 34.603 | 0.000 | 0.000 |
| 119 | 37.800 | 37.800 | 0.000 | 0.000 |
| 120 | 28.256 | 28.256 | 0.000 | 0.000 |
| 121 | 35.568 | 35.568 | 0.000 | 0.000 |
| 122 | 72.146 | 72.146 | 0.000 | 0.000 |
| 123 | 11.684 | 11.684 | 0.000 | 0.000 |
| 124 | 0.000 | 0.000 | 0.000 | NaN |
| 125 | 50.494 | 50.494 | 0.000 | 0.000 |
| 126 | 54.032 | 54.032 | 0.000 | 0.000 |
| 127 | 114.840 | 114.840 | 0.000 | 0.000 |
| 128 | 12.937 | 12.937 | 0.000 | 0.000 |
| 129 | 36.994 | 36.994 | 0.000 | 0.000 |
| 130 | 43.738 | 43.738 | 0.000 | 0.000 |
| 131 | 49.603 | 49.603 | 0.000 | 0.000 |
| 132 | 765.191 | 765.191 | 0.000 | 0.000 |
| 133 | 68.560 | 68.560 | 0.000 | 0.000 |
| 134 | 71.040 | 71.040 | 0.000 | 0.000 |
| 135 | 36.648 | 36.648 | 0.000 | 0.000 |
| 136 | 17.201 | 22.934 | -5.734 | -0.333 |
| 137 | 40.219 | 40.219 | 0.000 | 0.000 |
| 138 | 72.944 | 72.944 | 0.000 | 0.000 |
| 139 | 1,060.050 | 1,060.050 | 0.000 | 0.000 |
| 140 | 44.160 | 44.160 | 0.000 | 0.000 |
| 141 | 0.000 | 0.000 | 0.000 | NaN |
| 142 | 28.026 | 28.026 | 0.000 | 0.000 |
| 143 | 420.350 | 420.350 | 0.000 | 0.000 |

| Row | ist_euro | soll_euro | Difference | Taint |
|-----|-----------|-----------|------------|--------|
| 144 | 304.560 | 304.560 | 0.000 | 0.000 |
| 145 | 0.000 | 72.248 | -72.248 | -Inf |
| 146 | 20.176 | 20.176 | 0.000 | 0.000 |
| 147 | 54.828 | 54.828 | 0.000 | 0.000 |
| 148 | 50.286 | 50.286 | 0.000 | 0.000 |
| 149 | 343.992 | 347.901 | -3.909 | -0.011 |
| 150 | 76.045 | 76.045 | 0.000 | 0.000 |
| 151 | 30.745 | 30.745 | 0.000 | 0.000 |
| 152 | 51.177 | 51.177 | 0.000 | 0.000 |
| 153 | 157.489 | 157.489 | 0.000 | 0.000 |
| 154 | 46.211 | 46.211 | 0.000 | 0.000 |
| 155 | 502.632 | 502.632 | 0.000 | 0.000 |
| 156 | 195.200 | 195.200 | 0.000 | 0.000 |
| 157 | 55.958 | 55.958 | 0.000 | 0.000 |
| 158 | 146.364 | 146.364 | 0.000 | 0.000 |
| 159 | 84.806 | 84.806 | 0.000 | 0.000 |
| 160 | 226.044 | 226.044 | 0.000 | 0.000 |
| 161 | 115.306 | 115.306 | 0.000 | 0.000 |
| 162 | 268.320 | 237.360 | 30.960 | 0.115 |
| 163 | 55.094 | 55.094 | 0.000 | 0.000 |
| 164 | 17.080 | 17.080 | 0.000 | 0.000 |
| 165 | 0.000 | 0.000 | 0.000 | NaN |
| 166 | 68.560 | 68.560 | 0.000 | 0.000 |
| 167 | 2,059.260 | 2,059.260 | 0.000 | 0.000 |
| 168 | 64.500 | 64.500 | 0.000 | 0.000 |
| 169 | 84.395 | 84.395 | 0.000 | 0.000 |
| 170 | 17.286 | 17.286 | 0.000 | 0.000 |
| 171 | 85.160 | 85.160 | 0.000 | 0.000 |
| 172 | 21.600 | 21.600 | 0.000 | 0.000 |
| 173 | 13.032 | 13.032 | 0.000 | 0.000 |
| 174 | 31.500 | 31.500 | 0.000 | 0.000 |
| 175 | 40.952 | 40.952 | 0.000 | 0.000 |
| 176 | 47.760 | 47.760 | 0.000 | 0.000 |
| 177 | 38.271 | 38.271 | 0.000 | 0.000 |
| 178 | 17.219 | 17.219 | 0.000 | 0.000 |
| 179 | 51.480 | 51.480 | 0.000 | 0.000 |
| 180 | 221.707 | 221.707 | 0.000 | 0.000 |
| 181 | 491.882 | 491.882 | 0.000 | 0.000 |
| 182 | 32.191 | 32.191 | 0.000 | 0.000 |
| 183 | 59.944 | 59.944 | 0.000 | 0.000 |
| 184 | 49.024 | 49.024 | 0.000 | 0.000 |
| 185 | 37.357 | 37.357 | 0.000 | 0.000 |
| 186 | 730.850 | 730.850 | 0.000 | 0.000 |
| 187 | 95.856 | 95.856 | 0.000 | 0.000 |
| 188 | 1,178.573 | 1,178.573 | 0.000 | 0.000 |
| 189 | 39.040 | 39.040 | 0.000 | 0.000 |
| 190 | 34.596 | 34.596 | 0.000 | 0.000 |
| 191 | 38.550 | 38.550 | 0.000 | 0.000 |
| 192 | 26.046 | 26.046 | 0.000 | 0.000 |
| 193 | 2,418.150 | 2,418.150 | 0.000 | 0.000 |
| 194 | 519.360 | 519.360 | 0.000 | 0.000 |
| 195 | 0.000 | 0.000 | 0.000 | NaN |
| 196 | 23.680 | 23.680 | 0.000 | 0.000 |
| 197 | 53.060 | 53.060 | 0.000 | 0.000 |

| Row | ist_euro | soll_euro | Difference | Taint |
|-----|-----------|-----------|------------|-------|
| 198 | 19.667 | 19.667 | 0.000 | 0.000 |
| 199 | 51.341 | 51.341 | 0.000 | 0.000 |
| 200 | 0.000 | 0.000 | 0.000 | NaN |
| 201 | 28.346 | 28.346 | 0.000 | 0.000 |
| 202 | 0.000 | 0.000 | 0.000 | NaN |
| 203 | 22.374 | 22.374 | 0.000 | 0.000 |
| 204 | 3.494 | 3.494 | 0.000 | 0.000 |
| 205 | 31.120 | 31.120 | 0.000 | 0.000 |
| 206 | 72.674 | 72.674 | 0.000 | 0.000 |
| 207 | 13.183 | 13.183 | 0.000 | 0.000 |
| 208 | 17.862 | 17.862 | 0.000 | 0.000 |
| 209 | 70.442 | 70.442 | 0.000 | 0.000 |
| 210 | 52.104 | 52.104 | 0.000 | 0.000 |
| 211 | 10.104 | 10.104 | 0.000 | 0.000 |
| 212 | 25.027 | 25.027 | 0.000 | 0.000 |
| 213 | 224.100 | 224.100 | 0.000 | 0.000 |
| 214 | 43.738 | 43.738 | 0.000 | 0.000 |
| 215 | 812.818 | 812.818 | 0.000 | 0.000 |
| 216 | 170.395 | 170.395 | 0.000 | 0.000 |
| 217 | 75.900 | 75.900 | 0.000 | 0.000 |
| 218 | 72.240 | 72.240 | 0.000 | 0.000 |
| 219 | 18.609 | 18.609 | 0.000 | 0.000 |
| 220 | 35.830 | 35.830 | 0.000 | 0.000 |
| 221 | 1,066.464 | 1,066.464 | 0.000 | 0.000 |
| 222 | 758.880 | 758.880 | 0.000 | 0.000 |
| 223 | 795.648 | 795.648 | 0.000 | 0.000 |
| 224 | 37.440 | 37.440 | 0.000 | 0.000 |
| 225 | 39.200 | 39.200 | 0.000 | 0.000 |

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1. jfa 's source code can be found on its GitHub page (<https://github.com/koenderks/jfa>)↵