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.

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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

[a] The total taint could not be calculated because some ist values are zero.

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 derivations 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

[a] The top row shows the misstatement as a fraction of the total value.

95% Confidence interval
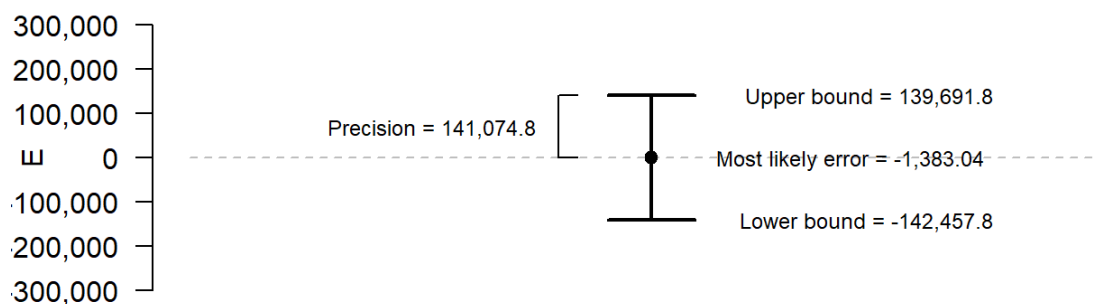
Appendix A: Derivations

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

Notation:

Ist position: $ist = \text{ist\_euro}$
Soll position: $soll = \text{soll\_euro}$
Sample size: $n = 130$
Population size: $N = 50,152$
Population value: $B = 11,477,820$
Sampling risk: $\alpha = 0.05$

Estimated population misstatement: $\hat{E}$
Lower bound population misstatement: $E_{0.025}$
Upper bound population misstatement: $E_{0.975}$
Estimated unit misstatement: $\hat{\theta}$

Calculation:

The estimated population misstatement ($\hat{E}$) is a generalization of the estimated misstatement per unit ($\hat{\theta}$):

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

The confidence interval for the total misstatement $[E_{0.025}; E_{0.975}]$ is a generalization of the upper and lower bound per unit:

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

The relevant quantities can be calculated using the following derivations:

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

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: 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

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