



International Visitor Survey Relative Margin of Error Empirical Equation

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These equations estimate

- the Relative Margin of Error (RME) of estimated expenditure from the International Visitor Survey (IVS) at given confidence levels, given the sample sizes, and
- minimum sample sizes necessary to obtain desired RMEs at given confidence levels.

Estimating the RME for a given sample size

The equation ¹

$$RME_{1-\alpha} = \frac{z_{1-\alpha/2}}{1.96} \times \frac{1}{a + b\sqrt{n}} \quad (1)$$

with $a = 0.021$ and $b = 0.0025$, estimates the RME for sample size n at confidence level $100(1 - \alpha)\%$.

Table 1: Estimated RMEs for given sample sizes at confidence levels 95%, 90% and 80% for expenditure.

Sample Size	Confidence Level		
	95%	90%	80%
20	31.1	26.0	20.3
50	25.9	21.6	16.9
100	21.7	18.2	14.2
200	17.7	14.8	11.6
500	13.0	10.9	8.5
1000	10.0	8.4	6.5
2000	7.5	6.3	4.9
5000	5.1	4.2	3.3
10000	3.7	3.1	2.4

Notes

The equations provide an approximation to assist quick analysis. More precise estimates of the margin of error require the microdata and statistical tools.

The empirical equation was established based on historical IVS data after the 2013 revision. It is not valid to apply the equation to other surveys or other measures. Applying the equation to years prior to 2013 will be less precise and only indicative.

For the technical details and methodology, please refer to "Technical paper - Empirical Equations For International Visitor Survey Relative Margin of Error".

Required sample size for RME target

The equation ¹

$$n = \frac{1}{b^2} \left(\frac{z_{1-\alpha/2}}{1.96 RME_{1-\alpha}} - a \right)^2 \quad (2)$$

with $a = 0.021$ and $b = 0.0025$, gives the required sample size to achieve a given RME, at confidence level $100(1 - \alpha)\%$.

Table 2: RME vs sample size for IVS expenditure at confidence levels 80%, 90% and 95%.

Expected RMEs	Confidence Level		
	95%	90%	80%
5	5127	3427	1922
10	999	628	314
15	334	194	81
20	135	69	22

RME, sample size and confidence level

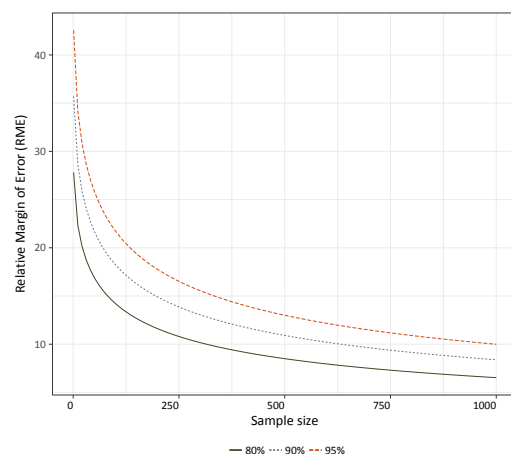


Figure 1: RMEs vs n for IVS spendings with confidence level 80%, 90% and 95%.

¹ $z_{1-\alpha/2}$ is the normal score (z-score) with values 1.96, 1.64, 1.28 for $\alpha = 0.05, 0.10, 0.20$ respectively.