


STAT 100

Statistical Concepts and Reasoning

3.4 Relationship between Sample Size and Margin of Error

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As seen from the formula in the previous section, there is a predictable square root relationship between sample size and margin of error. The numbers found in **Table 3.1** help to explain this relationship.

Table 3.1. Calculated Margins of Error for Selected Sample Sizes

Sample Size (n)	Margin of Error (M.E.)
200	7.1%
400	5.0%
700	3.8%
1000	3.2%
1200	2.9%
1500	2.6%
2000	2.2%
3000	1.8%
4000	1.6%
5000	1.4%

From this table, one can clearly see that as sample size increases, the margin of error decreases. To cut the margin of error in half, like from 3.2% down to 1.6%, you need four times as big of a sample, like going from 1000 to 4000 respondents. In order to add additional clarity to this finding, the information from **Table 3.1** is also displayed in **Figure 3.2**.

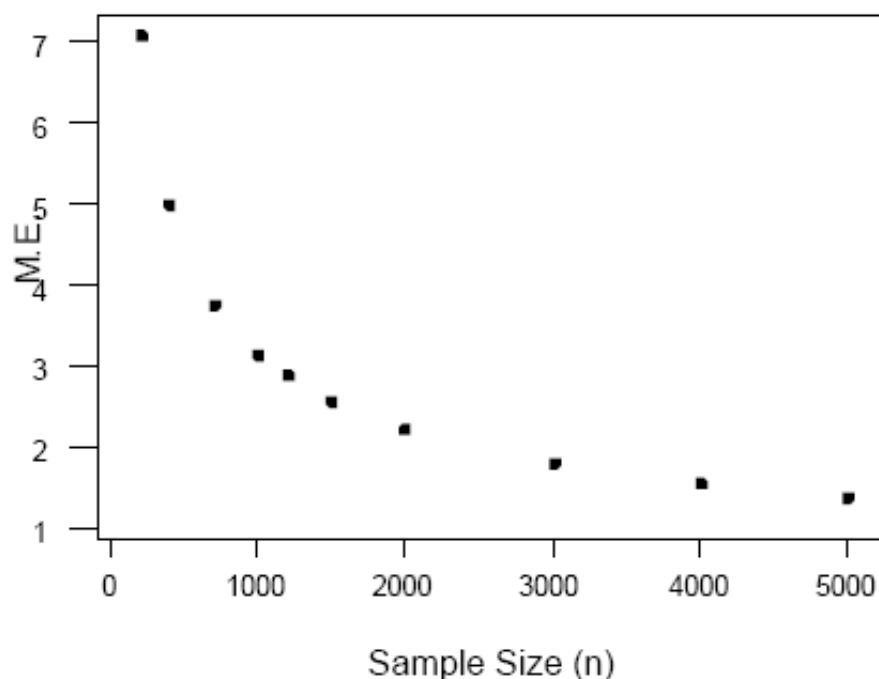


Figure 3.2 Relationship Between Sample Size and Margin of Error

In **Figure 3.2**, you again find that as the sample size increases, the margin of error decreases. However, you should also notice that there is a diminishing return from taking larger and larger samples. In the table and graph, the amount by which the margin of error decreases is most substantial between samples sizes of 200 and 1500. This implies that the reliability of the estimate is more strongly affected by the size of the sample in that range. In contrast, the margin of error does not substantially decrease at sample sizes above 1500 (since it is already below 3%). It is rarely worth it for pollsters to spend additional time and money to bring the margin of error down below 3% or so. After that point, it is probably better to spend additional resources on reducing sources of bias that might be on the same order as the margin of error. An obvious exception would be in a government survey, like the one used to estimate the unemployment rate, where even tenths of a percent matter.

◀ 3.3 The Beauty of Sampling
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up 3.5 Simple Random Sampling and Other
(/stat100/node/3) Sampling Methods ▶ (/stat100/node/18)