Harald Schmidbauer
Sema Bayraktar
Yonca Demİr

İstanbul Bilgi Üniversitesi

Bus 274: Further Statistics for Business

Spring 2015

PROBLEM SHEET # 5

Problem: (Continuation of the problem from Problem Sheet # 3.)

a) Infratest dimap mentions an "error margin of 1.4 (at a share of 5%) to 3.1 (at a share of 50%) percentage points." What does this mean? In particular:

- What is meant by "a share of 5%"?
- What is meant by "percentage points"?
- Find the appropriate formula and verify Infratest dimap's statement concerning the magnitude of the error margin.

b) What is the error margin at a share of 95%? (Compute its numerical value.) What share leads to the largest/smallest error margin at the given sample size, which is $n = 1004$? Does the answer even depend on the sample size?

c) What can we do with the error margin? What does it tell us? What information is missing if we are given only the point estimate $\hat{p}$?

d) Now compute a 95% confidence interval for the share p. (Make sure you remember what p means. — Why do we call p the "true parameter"?) What is the error margin in this case? (Compute its numerical value and compare it with the values given in (a).)

e) For your confidence interval in (d): What is the relation between the error margin and the standard error of $\hat{p}$? (Hint: Look again at the approximate distribution of $\hat{p}$.)

f) Compute a

- 68% confidence interval,
- 90% confidence interval,
- 99% confidence interval

for the share p. Which confidence level (68%, 90%, 95%, 99%) would you use for practical business purposes? (Hint: Which confidence level does the Infratest dimap report use? How do you know?)

g) The confidence level in (d) is 95%. Is it correct to say: "The confidence interval in (c) contains the true parameter with probability 95%"?

h) A true statement is: "The confidence interval in (d) is computed using a method which works correctly in 95% of all cases." Explain what this statement means. (You can refer to the law of large numbers in your explanation.) What does this statement imply for the particular confidence interval in (d)?

i) What should we do in this situation (see PS # 3) to reduce the (maximum) error margin to less than 1 percentage point? When we compute a new 95% confidence interval with a new sample, would this new confidence interval have

- the same center
- the same width

as the confidence interval in (d)?