PEA

Viacheslav Knyazev

January 31, 2020

1 PEA 3

1.1 Introduction

A study done in Alberta in 2019 asked the following question:

> If you knew that PM will impose a carbon tax in Alberta, after he got elected, would you still have voted for him?

The data is provided in an excel file. The data in each group is drawn independently and at random from a homogenous sample. The groups being compared are independent of each other. The data in each group sampled without replacement does not exceed 8% of its respective population. The data was obtained by calling random telephone numbers across Alberta.

1.2 Part A

Where were the measurements taken? Alberta

When were the measurements taken? 2019

How were the measurements taken? By calling random numbers across Alberta

Why were the measurements taken? To find out if the PM would have been voted if the electorate knew about the carbon tax

1.3 Part B

Based on the information in the excel file is there evidence that shows that is a difference between the proportion of male and female in AB who would have voted the PM if they known he would impose a carbon tax?

Write down the Null, and Alternate Hypotheses. Is it a two tail test?

$$H_0 : p_1 = p_2$$
$$H_A : p_1 \neq p_2$$

Two-tail test.

$n_1 =$ Number of males
$n_2 =$ Number of females
$\hat{p}_1 =$ Proportion of males who responded positively
$\hat{p}_2 =$ Proportion of females who responded positively

Are the conditions met for testing? Yes, the sample is independent, random, and from all Alberta and therefor normal.

Compute the $\hat{p}_{pooled}$ and $\hat{q}_{pooled}$.

$$\hat{p}_{pooled} = \frac{n_1 * \hat{p}_1 + n_2 * \hat{p}_2}{n_1 + n_2}$$

$$n_1 * \hat{p}_1 = 78$$

$$n_2 * \hat{p}_2 = 48$$

$$n_1 = 136$$

$$n_2 = 128$$

$$\hat{p}_{pooled} = \frac{78 + 48}{136 + 128} = 0.477$$

$$SE_{pooled} = \sqrt{\frac{0.477(1 - 0.477)}{136} + \frac{0.477(1 - 0.477)}{128}} = 0.061$$

Find the test-statistic in this case: z

$$z = \frac{p_1 - p_2}{SE_{pooled}} = \frac{0.574 - 0.375}{0.061} = 3.26$$

Find the p-value

$$P(z < 3.26) + (1 - P(z < 3.26)) = 0.0012$$

What is your conclusion based on the p-value?
The result is less than 0.05, therefore we reject the Hypothesis.

Construct a 95% Confidence interval for the difference in proportions of male and female voters in Alberta.

$$CI = p_1 \pm z * SD = 0.574 - 0.375 \pm 1.96 * 0.061$$

$$Upper = 0.31856$$

$$Lower = 0.07944$$