Analyzing The Employment Insurance Coverage Survey (EICS)

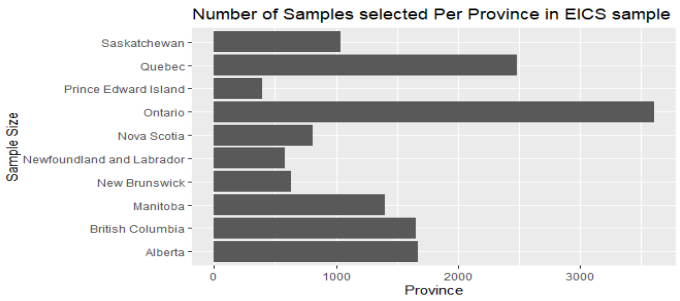
Table of Contents

1) Introduction

The Employment Insurance Coverage Survey (EICS) is a follow up survey conducted to those people sampled in the Labor Force Survey (LFS). The purpose of this survey is to get a deeper understanding of the relationship between the number of people in receipt of Employment Insurance (EI) benefits and the number of people unemployed. Starting in 1997, this survey tried to track the performance of the EI benefits program. This survey outputs the number of people covered by EI, the sample mean of EI benefits received split into groups and the proportion of people who may need EI but do not get access to EI. The data is used to analyze the role of EI benefits to the person or household income during periods of unemployment. The survey also seeks to improve the understanding of the parity between people who receive EI benefits. In this paper, we will answer which characteristics of people receive higher benefits and try to determine parity of benefits given to different categories of people.

2) Methodology

The EICS survey was sampled via a Stratified Random Sampling based on the Labor Force Survey (LFS) design strata which grouped samples by provinces and also by wealth. The strata were based on the most recent census information (2011) because the strata becomes less efficient the farther it is from the census source date. The target population of this survey is the five groups (or types) of people who are potential employment insurance recipients. This is a follow up to the LFS survey hence its sampling frame is the list of all samples in the LFS survey. The sampling unit is one household in the LFS survey and the element here is a person from a noninstitutionalized population who is at least 15 years old. (See plot below for distribution of samples per province).



3) Method of Data Collection

The data was collected via telephone interviews seven weeks after being interviewed for a different survey (Labor Force Survey). The data was collected on members of the household aged 15 or above and are not in the Canadian Armed Forces wherein a maximum of 3 people per household are sampled. In the case that a household moves, the information is obtained from the new household that moved in. Survey results are then inputted by the interviewer, who is a *Statistics Canada Employee* [(1)], in a computerized questionnaire. In the case of non-response in the first call, the senior interviewer follows up otherwise they are recorded as no response. *The non-response rate* [(2)] for this survey is not given, but we estimate it to be similar to the Labour Force Survey Non-response rate which is 10 percent. Although Statistics Canada used proper survey methods with a Stratified Random Sample and a trained interviewer, Non-sampling errors are very hard to avoid. These include errors in inputting the answers, misunderstanding of instructions and non-response. One measure of Sampling Error Statistics Canada uses is the *Coefficient of Variation* [(3)]. The Coefficient Variation of EICS PUMF (estimate of the percentage of people available for employment insurance) is 2.4% which is relatively small, hence we assume that sampling errors are small.

(1) Interviewers are supervised under senior interviewers to ensure they comply with previous concepts and procedures

(2) Nonresponse rate: Number of samples who did not respond divided by total number of samples

(3) Coefficient of Variation: (estimate / standard error of estimate) * 10

4) Research Questions and Analysis

Research Question 1: **Does the Mean Employment Insurance for those who joined a Union greater than those who did not?**

- For this Research question we will analyze the parity of Employment Insurance between those who are members of a Union compared to those who are not

Variables Used

- Response: Amount of Employment Insurance Received (**benamt**)
    - Type: Quantitative Variable (Numeric)
- Explanatory: Union Status (**union_g**)
    - Type: Categorical Variable, Nominal Scale (Member, Not a Member)

Assumptions

- Independence Assumption
    - It is reasonable to assume that the percentage of people who are members of a Union is independent from the percentage of people who are not members
- Randomization Condition
    - Based on how Statistics Canada gathered this survey via a Stratified Random Sample, it is reasonable to assume that the amount of Employment Insurance Received is representative of all member and non members of a union
- Nearly Normal Condition
    - We have a large dataset (1338 samples), by the central limit theorem this would be approximately normal, we can also see this on the side by side histogram (fig 4.1)
- Equal Variance Assumption
    - To test this assumption, we conducted an F-test (Appendix A.1) which resulted into not rejection of Null (No evidence that variance are not equal)

Hypothesis Test

- H0: *The Mean amount of Employment Insurance Received by people who are in union is equal to those who did not join a union*

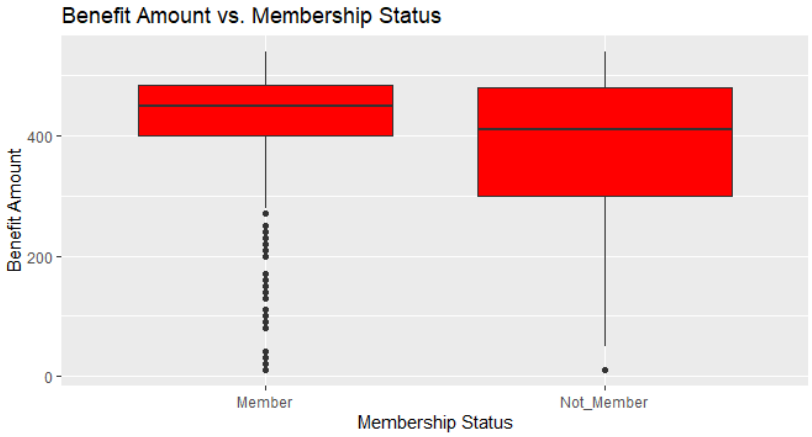
- Ha: *The Mean amount of Employment Insurance Received by people who are in union is greater than those who did not join a union*

We perform a two sample t-test assuming equal variances because our F-test for equal variances do not show any statistically significant difference (See Appendix A.1). From the output of our t-test (See Appendix A.2), we can see that the p-value is very small (way smaller than 0.05), hence we can conclude that the mean benefits received by people who join a union is **greater** than those who do not join a union. That is, on average people who join a Union receive higher Employment Insurance than those who do not join a Union.

Confidence Interval and Interpretation

- We are 95% confident that the mean amount of Employment Insurance Received by people who join a union is about 24 to 48 dollars larger than those who did not join a union (see Appendix A.3 for the output of our t-confidence interval).

Results and Conclusion



- We can see from the plot that the median benefit amount received by members is greater than those who are non members. There are lots of lower ‘outliers’ in the lower tail of the benefit amount received by members. We can also see that their variances are similar which supports our assumption that they have equal variances

We recommend for you to join a Union if you would like to receive a higher Employment Insurance Benefit. On average, the amount of insurance received by Union members are about 24 to 49 dollars larger than those who are non members

Research Question 2: **Is there an Association between receiving Employment Insurance Benefits and Immigration Status?**

Variables Used

- Response: Received Employment Insurance Benefits (**benefit**)
    - Type: Categorical Variable with Ordinal Scale (Received or did not Receive EI benefits)
- Explanatory: Immigrant Status (**immigr_g**)
    - Type : Categorical Variable with Nominal Scale(Immigrant or Born in Canada)

Assumptions

- Independence Assumption
    - It is reasonable to assume that the samples are drawn
- Randomization Condition
    - The Randomization Condition is Satisfied
- 10% Condition
    - The 10% Condition is Satisfied
- Sample Size Assumption
    - The Sample Size Assumption is Satisfied

Hypothesis Test

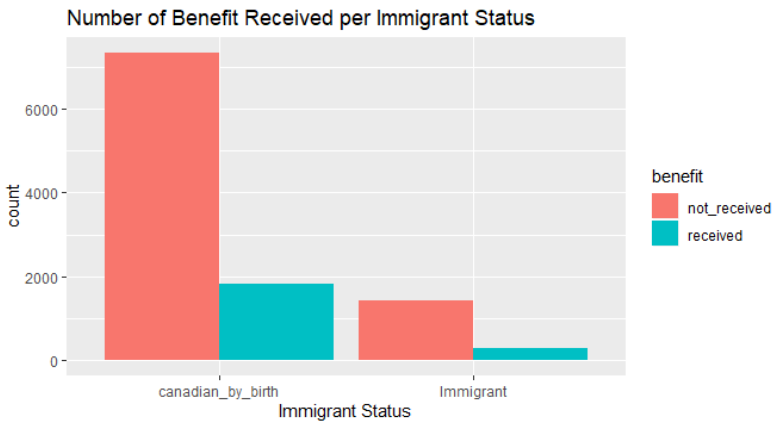
- H0 (Null Hypothesis): *There is no Association between receiving Employment Insurance benefits and immigration status*

- Ha (Alternative Hypothesis): *There is an Association between receiving Employment Insurance benefits and immigration status*

From the output of our Chi Square tests for association (See Appendix B.1), we can see that the p-value is very small (way smaller than 0.05), hence we can conclude that there

is an association between receiving Employment Insurance benefit and Immigration Status

Results and Conclusion



-

Table 4.1	Not Received	Received	Sum
Canadian By Birth	7341	1812	9153
Immigrant	1419	279	1698
Sum	8760	2091	10851

Table 4.1 (Contingency Table)

- Even by just eyeballing the contingency table, we can clearly see a difference in the amount of Canadian By Birth who received Insurance benefit than those who are Immigrants. The proportion of Canadian By Birth who received benefits is equal to 19.7% but the proportion of immigrants who received benefits is only 16.4%

Table 4.2	Not Received	Received
Canadian By Birth	-3.2294	3.2294
Immigrant	3.2294	-3.2294

Table 4.2 (Adjusted Standardized Residuals)

- The adjusted standardized residuals have magnitude greater than 3, hence we can give a Directional Conclusion. We conclude that Canadians by birth tend to receive benefit more often than we would expect more and Canadian Immigrants would receive benefits less often than we would expect if the variables are truly independent.

APPENDIX

A.1) F-test to compare variance

```
        F test to compare two variances

data:  benamnt by union_g
F = 0.92242, num df = 426, denom df = 910, p-value = 0.3383
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
 0.7856736 1.0882559
sample estimates:
ratio of variances
         0.9224207
```

A.2) Two sample One sided t-test

```
        Two Sample t-test

data:  benamnt by union_g
t = 5.7508, df = 1336, p-value = 5.496e-09
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 25.85154      Inf
sample estimates:
    mean in group Member mean in group Not_Member
                424.9883                388.7706
```

A.3) Two sided T-test (95% Confidence Interval)

```
        Two Sample t-test

data:  benamnt by union_g
t = 5.7508, df = 1336, p-value = 1.099e-08
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 23.86303 48.57238
sample estimates:
    mean in group Member mean in group Not_Member
                424.9883                388.7706
```

B.1) Pearson Chi Squared Test

```
        Pearson's Chi-squared test

data:  contingency.table.eics
X-squared = 10.429, df = 1, p-value = 0.00124
```

5) References (SDA CHASS)

Link to Data:

http://sda.chass.utoronto.ca/sdaweb/html/eics.htm?fbclid=IwAR3I4HQmmBCr23Ur6YQkr6n-wd4zUA1ne-Cn5VgtLwUcDLGffUm1kqHrThY

Link to Documentation:

http://sda.chass.utoronto.ca/sdaweb/dli2/eics/eics17/more_doc/EICS2017gid.pdf?fbclid=IwAR1D9YRIUwBQm3af-Ere0cL2_wMCTLA2mZNqr58sp3xs2S1qmOknOsqBgWQ