SCSI2143 PROBABILITY AND STATISTICAL DATA ANALYSIS

Project II – Inferential statistics

MALAYSIA CONSUMER PRICE INDEX (CPI) IN 2016

FADHILAH BINTI NASIR, MUHAMMAD SYAHMI BIN SUFAKHI, GOVIND RAJ A/L GNANASEGARAN, NUR ATIKAH BINTI MOHD HANIF

Section 03

School Of Computing, Faculty of Engineering

Universiti Teknologi Malaysia

***Abstract* – The case study for this thesis is the price index for selected items and comparison of the price item with different state. There are 13 state of data are being collected and used in thesis while ignoring the Wilayah Persekutuan State (Wilayah Persekutuan Kuala Lumpur, Wilayah Persekutuan Putrajaya & Wilayah Persekutuan Labuan). The focuses for the analysis are Johor, Kelantan and Kedah state. Furthermore, this thesis also studies about how size of population in a state affected the price item in their state.**

I. INTRODUCTION

Consumer Price Index (CPI) can be defining as average items prices in a specific place. In Malaysia , there are many factor that effected the price of an item such as type of items either it is imported/exported items, size of population in a state and many more.

The objective of the analysis is to find out which state in Malaysia (Kelantan and Johor) has a highest price mean of gross items in June 2016.Gross items that be considered to use in this thesis are consist of:

- Coconut and eggs.
- Fish, chicken and meat
- Prawn and cuttlefish

II. METHODOLOGY

In this study, we use secondary data that collected at Malaysian Open Data website. The case study was observed was price items in 2016.

The case study of this thesis is Consumer Price Index in Malaysia in 2016, the main state that we observed are Johor, Kedah and Kelantan which is representing east cost of Malaysia, north and south side of Malaysia. Furthermore, we also take account on the size of population in each state which was split into two types of living, rural and urban place.

III. RESULT AND DISCUSSION

a) Hypothesis Testing with 2 sample (Two means : Variance unknown)

	JOHOR	KEDAH	KELANTAN	MELAKA	N.SEMBILAN	PAHANG	PERAK	PERLIS	P.PINANG	TERENG
1	7.3700	7.50000	7.09000	7.37000	7.5300	7.67	7.47000	7.67000	7.5300	
2	11.0300	12.16000	10.35000	11.62000	11.1000	20.29	12.25000	11.79000	11.1000	
3	3.5000	3.56000	3.48000	3.46000	3.7600	3.45	3.63000	3.57000	3.7600	
4	3.4800	3.36000	3.35000	3.42000	3.4600	3.42	3.36000	3.27000	3.4600	
5	3.2400	3.11000	3.05000	3.14000	3.2900	3.20	3.25000	3.01000	3.2900	
6	25.7600	27.48000	22.75000	27.35000	25.2500	25.06	26.80000	24.50000	25.2500	
7	10.2300	10.84000	10.49000	10.94000	9.4900	10.71	11.21000	10.00000	9.4900	
8	14.1000	13.52000	15.69000	15.08000	14.4200	15.27	15.19000	13.33000	14.4200	
9	13.7400	12.50000	13.57000	14.21000	14.1100	15.29	16.15000	12.83000	14.1100	
10	33.4900	36.37000	37.92000	35.50000	34.0600	34.28	37.00000	34.06000	34.0600	
11	29.9200	30.58000	34.52000	32.19000	27.7100	29.93	35.29000	27.71000	27.7100	
12	11.0200	11.63000	10.79000	13.25000	11.5700	12.40	11.56000	11.57000	11.5700	
13	8.0200	8.01000	7.59000	7.71000	8.4700	8.15	8.27000	7.66000	8.4700	
14	32.3100	33.86000	29.02000	31.75000	35.1100	33.24	29.38000	33.25000	35.1100	
15	29.7200	26.42000	31.33000	30.11000	31.5100	31.01	34.40000	30.73000	31.5100	
16	25.5100	22.83000	23.54000	26.15000	25.6800	25.67	27.98000	25.34000	25.6800	
17	262.4400	263.73000	264.53000	273.25000	266.5200	253.37	275.72000	260.29000	266.5200	
18	16.4025	16.48313	16.53313	17.07812	16.6575	17.44	17.69937	16.26812	16.6575	

TABLE 1: Data for Hypothesis Testing

Assume $\mu 1$ = mean item price index in Johor and $\mu 2$= mean item price index in Kelantan

H0 - $\mu 1 = \mu 2$

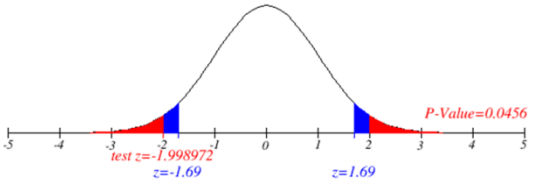
H1 - $\mu 1 \neq \mu 2$

Significant level, $\alpha = 0.05$

```
> total1 = 6.17
> total2 = 5.93
> std1 = 2.7464
> std2 = 2.6973
> n1 = 16
> n2 = 16
> t0 = (total2 - total1-0) /(sqrt((std2^2/n2)+(std1/n1)))
> t0
[1] -0.3032479
> v = ((std2^2/n2) + (std1^2/n1))^2 / (((std2^2/n2)^2)/(n2-1)) + (((std1^2/n1)^2)/(n1-1))
> v
[1] 62.23935
> alpha = 0.05
> t.alpha <- qt(alpha/2, floor(v))
> t.alpha
[1] -1.998972
>
```

FIGURE 1: Calculation of t-critical and t-statistic with v (degree of freedom)

From the calculation above, the *t0* = -0.3032479 > t v, α = t 62, 0.05 = -1.998972. This concludes that the null hypotheses are rejected and the result shows that the price item index in Johor is higher than Kelantan.



b) Correlation and Regression

The Correlation for the project will be the aspect variables between the size population in every states and price item index.

```
> # CORRELATION OF SIZE POPULATION AND MEAN OF PRICE ITEM INDEX
> x1 <- POPULATION_PRICE$..1
> y1 <- POPULATION_PRICE$..2
> cor(POPULATION_PRICE$..2, POPULATION_PRICE$..1)
[1] -0.08344655
>
```

FIGURE 2: Calculation of Correlation Coefficient using RStudio

The correlation coefficient, r = -0.08344655, which is very weak correlation, hence the correlation between the population size and mean price of item according to state are very weak.

```
Call:
lm(formula = POPULATION_PRICE$..1 ~ POPULATION_PRICE$..2)

Residuals:
    Min      1Q  Median      3Q     Max
-2.2335 -0.1379  0.0312  0.4532  1.0791

Coefficients:
                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          1.663e+01  2.724e-01  61.065 2.81e-15 ***
POPULATION_PRICE$..2 -7.237e-09  2.606e-08  -0.278    0.786
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.8718 on 11 degrees of freedom
Multiple R-squared:  0.006963,  Adjusted R-squared:  -0.08331
F-statistic: 0.07713 on 1 and 11 DF,  p-value: 0.7864
```

FIGURE 3: Calculation of Regression

From the Figure 3, there are no relationship from the type of regression between the size of population and price item index. $\gamma = -7.237 \times 10^{-9}x + 1.663 \times 10^{1}$.

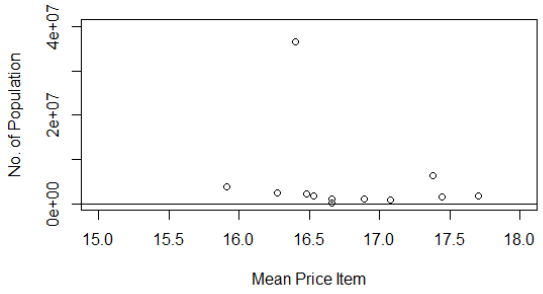


FIGURE 4: Graph between the Size of population and Mean Price Item.

From the graph, the line are slightly negative linear, however since the r is near to 0, we can conclude that there are no relationship between two variables.

c) ANALYSIS ON VARIANCE (ANOVA)

	A	B	C
1	JOHOR	KEDAH	KELANTAN
2	7.37	7.5	7.09
3	11.03	12.16	10.35
4	3.5	3.56	3.48
5	3.48	3.36	3.35
6	3.24	3.11	3.05
7	25.76	27.48	22.75
8	10.23	10.84	10.49
9	14.1	13.52	15.69
10	13.74	12.5	13.57
11	33.49	36.37	37.92
12	29.92	30.58	34.52
13	11.02	11.63	10.79
14	8.02	8.01	7.59
15	32.31	33.86	29.02
16	29.72	26.42	31.33
17	25.51	22.83	23.54

TABLE 2: Data for ANOVA

Assume $\mu 1$ = mean item price index in Johor, $\mu 2$= mean item price index in Kelantan and $\mu 3$ = mean item price index in Kedah.

H0 – $\mu 1 = \mu 2 = \mu 3$

H1 – at least one mean is different

```
Call:
   aov(formula = values ~ ind, data = stacked)

Terms:
                    ind Residuals
Sum of Squares    0.139  5823.814
Deg. of Freedom       2        45

Residual standard error: 11.37621
Estimated effects may be unbalanced
> summary.aov(anova_result)
            Df Sum Sq Mean Sq F value Pr(>F)
ind          2      0    0.07   0.001  0.999
Residuals   45   5824  129.42
```

FIGURE 5: ANOVA Calculation on RStudio

In Figure 5, the F*0* = 0.001, and the F d,n = t 45, 2, = 0.999.

The F0 (0.001) < t45, 2, (0.999), we can conclude that the null hypothesis is rejected hence the mean between 3 states are different.

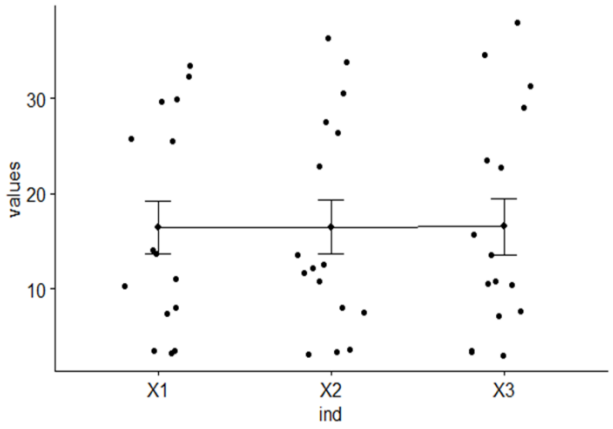


FIGURE 6: Scatter Plot showing the differences between 3 states mean of price item index

IV.CONCLUSION

In a nutshell, we can conclude that the price item index in Malaysia varies across the states. There are other states that have higher mean item price other than other states, as example given, the mean price item of Johor are much higher than Kelantan.

Furthermore, we also can make a conclusion that size of population in a state does not affect the mean of price item since there are no correlations between these two variables.

Lastly, we can make simple closing saying that every state have a distinct mean price item based on ANOVA testing which showed between 3 states which is Johor, Kelantan and Kedah. From this testing we can conclude that there are different mean for each of the states.

Reference

1. Malaysia Data Statistic,http://www.data.gov.my/data/ms_MY/dataset/transaksi-permohonan-online-ap