6304641811_Tha

1a.) $narr86_i = 0.7061 - 0.1512\, pcnv_i - 0.0070\, avgsen_i + 0.0121\, tottime_i - 0.0393\, ptime86_i - 0.1031\, qemp86_i$

$$t_{cal} = \frac{-0.0070 - 0}{0.0124}$$

$$= -0.5645$$

The critical value when $df = 2{,}725 - 6 = 2{,}719$ is ± 1.960. $\Rightarrow -1.96 < -0.5645 < 1.96$

$\therefore$ Not reject H_0 that $avgsen_i$ parameter is not zero. #

1b.) Model (1.1) : $F_{cal} = \frac{R^2/(k-1)}{1-R^2/(n-k)} = \frac{0.0428/(6-1)}{(1-0.0428)/(2{,}725-6)}$

$= 24.3153$

when $\alpha = 0.01$ $F_{cri} = \pm 3.02 < 24.3153$

$\therefore$ Reject H_0. #

Model (1.2) : $F_{cal} = \frac{R^2/(k-1)}{1-R^2/(n-k)} = \frac{0.0723/(9-1)}{(1-0.0723)/(2{,}725-9)}$

$= 26.4588$

when $\alpha = 0.01$ $F_{cri} = \pm 2.51 < 26.4588$

$\therefore$ Reject H_0. #

1c.) $F_{cal} = \frac{R^2_{new} - R^2_{old} / (\#\text{ of new regressors})}{1 - R^2_{new}/(n-k_{new})} = \frac{(0.0723 - 0.0428)/(3)}{(1-0.0723)/(2725-9)}$

$= 28.7888$

at $\alpha = 0.05$ $F_{cri} = \pm 2.60 < 28.7888$ $\therefore$ Reject H_0 #

2a.) df for t-test : $97{,}878 - 4 = 97{,}874$

suppose $\alpha = 0.05$, the critical value is ± 1.960.

As we can see, all the given t-values exceed the critical value.

$\therefore$ Reject H_0.

2b.) Earning before the pandemic, civil servants will get regular wage at the rate of 0.587.

So they earn more others at the rate of $e^{0.587} - 1 = 0.7986 = 79.8585\%$. #

2c.) $\hat{\beta}_3 = -0.0336$

overall wage decreases by $e^{-0.0336} - 1 = -0.0330 = -3.3042\%$. #

2d.) $\widehat{Lnwage}_i = 9.1748 + 0.587\, civil - 0.0336\, year_i + 0.0444\, civil_i \cdot year_i + u_i$

As we can see from the model the wage in year 2020 is decreasing by the rate of 0.0336 for every labor force. But civil servants and state employees will get extra money increasing from their salary at the rate of 0.0444.

$\because$ $0.0444 - 0.0336 = 0.0108$ so civil servants and state employees earn more in year 2020 by 0.0108.

While other labor force will be affected by the pandemic and lose their wage at the rate of 0.0366 in year 2020.

As we can see the decreasing and increasing rate of their wage, we will know that the control group will be better-off while the treatement group is worse-off during the pandemic. For the reason that the pandemic has a huge impact to our economy to be in a hard time, which increases expenditure for everyone to pay for their protection such as masks and alcohol. But the control group will get extra money because of having state welfare.

3a.) $H_0 : \beta_i = 0$

df = 30 − 4

	t_{cal}		t_{cri}	
cons (β_1)	2.1775	>	± 2.056	reject H_0
acetic (β_2)	0.5128	$\not>$	± 2.056	not reject H_0
h2s (β_3)	3.3954	>	± 2.056	reject H_0
lactic (β_4)	2.2538	>	± 2.056	reject H_0

Also $R^2 = 0.6552$, we may conclude that there is no multicollinearity. #

3b.) BLUE is a word from Best Linear Unbiased Estimator which has the lowest variance. This estimator is unbiased because there are many examples used.

4a.) The intercept of $\hat{\beta}_1$ is 1.0108, meaning that when there is no unemployment rate effect (= 0), the inflation rate will equal to $\hat{\beta}_1 = 1.0108$.

And the slope of $\hat{\beta}_2$ is 0.5055 which means when the unemployment rate increases by 1, the inflation rate will increase by rate of 0.5055. #

4b.) χ^2_{k-1} : $LM_{cal} = 1.0266$

At $\alpha = 0.05$, critical value of $\chi^2_1 = 3.8415 > 1.0266$

$\therefore$ Not reject H_0.

4c.) H_0 cannot be rejected, so the property of BLUE is not violated. #