FT Assignment #4

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11.1

x	y	xy	x^2	y^2
11.8	10.4	122.72	139.24	108.16
12.5	16.5	206.25	156.25	272.25
15.7	22.9	359.53	246.49	524.41
19.2	26.6	510.72	368.64	707.56
21.9	33.8	740.22	479.61	1142.44
23.3	42.8	997.24	542.89	1831.84
$\Sigma x = 104.4$	$\Sigma y = 153$	$\Sigma xy = 2936.68$	$\Sigma x^2 = 1933.12$	$\Sigma y^2 = 4586.66$

(a) $SS(x) = \Sigma x^2 - \frac{(\Sigma x)^2}{n} = 1933.12 - \frac{(104.4)^2}{6}$

$= 116.56$

$SS(y) = \Sigma y^2 - \frac{(\Sigma y)^2}{n} = 4586.66 - \frac{(153)^2}{6} = 685.16$

$SP(xy) = \Sigma xy - \frac{\Sigma x \Sigma y}{n} = 2936.68 - \frac{104.4 \times 153}{6}$

$= 274.48$

$r = \frac{SP(xy)}{\sqrt{SS(x)\, SS(y)}} = \frac{274.48}{\sqrt{116.56 \times 685.16}} = 0.97$

The variable X (inflation rate) and Y (lending rate) are positively correlated.

(b) We need to test

$H_0 : \rho = 0$ Vs $H_1 : \rho \neq 0$

Test statistic

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} = \frac{0.97\sqrt{6-2}}{\sqrt{1-(0.97)^2}}$$

$$= 7.98$$

$|t| > t_{n-2} = t_4 = 2.776$ so H_0 is rejected.

we can conclude that leading rate increases significantly with the increase of inflation rate.

(c) From a

$SS(x) = 116.56$

$SS(y) = 685.16$

$SP(xy) = 274.48$

Now,

$$b = \frac{SP(xy)}{SS(x)} = \frac{274.48}{116.56} = 2.355$$

$$a = \bar{y} - b\bar{x} = \frac{\Sigma y}{n} - b\frac{\Sigma x}{n}$$

$$= \frac{153}{6} - (2.355)\frac{104.4}{6}$$

$$\therefore a = -15.477$$

So. fitted line $\hat{y} = a + bx$

$= -15.477 + 2.355x$

(d) If the inflation rate $x = 25.5$

then $\hat{y} = -15.477 + 2.355(25.5)$

$= 44.58$

(e) We have to test $H_0 : \beta = 0$ Vs $H_1 : \beta \neq 0$

$$s^2 = \frac{SS(Y) - b\,SP(xy)}{n-2} = \frac{685.16 - 2.355(274.48)}{6-2}$$

$= 9.7$

~~we hav~~ Test statistic

$$t = \frac{b}{\sqrt{s^2/SS(x)}} = \frac{2.355}{\sqrt{9.7/116.56}}$$

$= 8.164$

Since $|t| > t_{n-2} = t_4 = 2.776$, So H_0 is rejected.

Thus regression is significance.