

**Reading Output of Stata regress Command**

**TOPIC:** Interpreting Output of Stata regress Command

**DATA:** auto1.dta (a Stata-format data file)

**MODEL:**  $price_i = \beta_1 + \beta_2 weight_i + u_i \quad (i = 1, \dots, N)$

. regress price weight

Source	SS	df	MS	Number of obs =	74
Model	184233937	1	184233937	F( 1, 72) =	29.42
Residual	450831459	72	6261548.04	Prob > F =	0.0000
Total	635065396	73	8699525.97	R-squared =	0.2901
				Adj R-squared =	0.2802
				Root MSE =	2502.3

price	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
weight	2.044063	.3768341	5.424	0.000	1.292858	2.795268
_cons	-6.707353	1174.43	-0.006	0.995	-2347.89	2334.475

Source	SS	df	MS = SS/df
Model	184233937 = ESS	1 = k-1	184233937 = ESS/(k-1)
Residual	450831459 = RSS	72 = N-k	6261548.04 = RSS/(N-k) = $\hat{\sigma}^2$
Total	635065396 = TSS	73 = N-1	8699525.97 = TSS/(N-1) = $S_Y^2$

Number of obs = 74 = N  
 F( 1, 72) = 29.42 = **F-statistic for test of  $H_0: \beta_2 = 0$  against  $H_1: \beta_2 \neq 0$**   
 Prob > F = 0.0000 = **p-value for F-statistic**  
 R-squared = 0.2901 =  $R^2$   
 Adj R-squared = 0.2802 =  $\bar{R}^2$   
 Root MSE = 2502.3 =  $\hat{\sigma}$

price	Coef. = $\hat{\beta}_j$	Std. Err. = $s\hat{e}(\hat{\beta}_j) = \sqrt{\text{V}\hat{\text{a}}\text{r}(\hat{\beta}_j)}$
weight	2.044063 = $\hat{\beta}_2$	.3768341 = $s\hat{e}(\hat{\beta}_2) = \sqrt{\text{V}\hat{\text{a}}\text{r}(\hat{\beta}_2)}$
_cons	-6.707353 = $\hat{\beta}_1$	1174.43 = $s\hat{e}(\hat{\beta}_1) = \sqrt{\text{V}\hat{\text{a}}\text{r}(\hat{\beta}_1)}$

The printed t-statistics are those for performing **two-tail t-tests** of the null hypothesis  $H_0: \beta_j = 0$  against the alternative hypothesis  $H_1: \beta_j \neq 0$ .

- The **sample value of each t-statistic** is the **t-ratio**:

$$t_j = \frac{\hat{\beta}_j}{\text{s}\hat{\text{e}}(\hat{\beta}_j)} = \text{t-ratio for } \hat{\beta}_j \quad (j = 1, 2).$$

- The **null distribution of  $t_j$**  under  $H_0: \beta_j = 0$  is the **t[N-2] distribution**.
- The column labelled "**P>|t|**" contains the **two-tailed p-values for the t-ratios  $t_j$** .

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      t = t_j =  $\hat{\beta}_j / \text{s}\hat{\text{e}}(\hat{\beta}_j)$       P>|t| = Pr(|t|>|t_j|) = 2Pr(t > t_j)
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      5.424 = t_2 =  $\hat{\beta}_2 / \text{s}\hat{\text{e}}(\hat{\beta}_2)$       0.000 = Pr(|t|>|t_2|) = 2Pr(t > t_2)
      -0.006 = t_1 =  $\hat{\beta}_1 / \text{s}\hat{\text{e}}(\hat{\beta}_1)$       0.995 = Pr(|t|>|t_1|) = 2Pr(t > t_1)
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The printed confidence intervals are the **two-sided 95 percent confidence intervals for each regression coefficient  $\beta_j$**  ( $j = 1, 2$ ).

- In general, the **two-sided 100(1- $\alpha$ ) percent confidence interval for regression coefficient  $\beta_j$**  is:

$$\left[ \hat{\beta}_j - t_{\alpha/2}[N-2]\text{s}\hat{\text{e}}(\hat{\beta}_j), \hat{\beta}_j + t_{\alpha/2}[N-2]\text{s}\hat{\text{e}}(\hat{\beta}_j) \right].$$

- For the **two-sided 95 percent confidence intervals**,  $1-\alpha = 0.95$ ,  $\alpha = 0.05$ , and  $\alpha/2 = 0.025$ .

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[95% Conf. Interval]   $\left[ \hat{\beta}_j - t_{0.025}[72]\text{s}\hat{\text{e}}(\hat{\beta}_j), \hat{\beta}_j + t_{0.025}[72]\text{s}\hat{\text{e}}(\hat{\beta}_j) \right]$ 
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1.292858 =  $\hat{\beta}_2 - t_{0.025}[72]\text{s}\hat{\text{e}}(\hat{\beta}_2)$       2.795268 =  $\hat{\beta}_2 + t_{0.025}[72]\text{s}\hat{\text{e}}(\hat{\beta}_2)$ 
-2347.89 =  $\hat{\beta}_1 - t_{0.025}[72]\text{s}\hat{\text{e}}(\hat{\beta}_1)$       2334.475 =  $\hat{\beta}_1 + t_{0.025}[72]\text{s}\hat{\text{e}}(\hat{\beta}_1)$ 
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Note:  $t_{0.025}[72] = 1.9935$