

EE 325 STATA Session II

- Table 7.11 gives data for the manufacturing sector of the Greek economy for the period 1961-1987.

- See if the Cobb-Douglas production function fits the data given in the table and interpret the results. What general conclusion do you draw?

Source	SS	df	MS	Number of obs =	27
Model	5.37753949	2	2.68876975	F(2, 24) =	407.50
Residual	.158356562	24	.00659819	Prob > F =	0.0000
				R-squared =	0.9714
				Adj R-squared =	0.9690
Total	5.53589605	26	.212919079	Root MSE =	.08123

lnoutput	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lncapital	.1398108	.1653906	0.85	0.406	-.2015386 .4811603
lnlabor	2.328398	.5994894	3.88	0.001	1.091112 3.565683
_cons	-11.93657	3.211061	-3.72	0.001	-18.56388 -5.30927

- Now consider the following model:

$$\text{Output / labor} = A(K / L)^{\beta} e^u$$

where the regressand represents labor productivity and the regressor represents the capital labor ratio. What is the economic significance of such a relationship, if any? Estimate the parameters of this model and interpret your results.

Source	SS	df	MS	Number of obs =	27
Model	2.17537967	1	2.17537967	F(1, 25) =	233.65
Residual	.232757738	25	.00931031	Prob > F =	0.0000
				R-squared =	0.9033
				Adj R-squared =	0.8995
Total	2.40813741	26	.09262067	Root MSE =	.09649

lnproducti-y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnclratio	.6807562	.0445355	15.29	0.000	.5890337 .7724788
_cons	-1.155956	.0742171	-15.58	0.000	-1.308809 -1.003103

The elasticity of output/ labor ratio (labor productivity) with respect to capital/labor ratio is about 0.68, meaning that if the latter increases by 1% labor productivity, on average, goes up by about 0.68%. A key characteristic of developed economies is a relatively high capital/labor ratio.

- Table 9.1 Public school teachers' salaries (Dollars) by geographical region. Consider and estimate the following model with the dummy variable:

$$Y_i = \beta_1 + \beta_2 D_{2i} + \beta_3 D_{3i} + u_i$$

Where Y = (average) salary of public school teacher in state i

$D_{2i} = 1$ if the state is in the Northeast or North Central

= 0 otherwise

$D_{3i} = 1$ if the state is in the South

= 0 otherwise

t = time

D = 1 for observations in 1970-1981

= 0 otherwise

Find the mean salary of public school teacher in the South and the mean salary of public school teacher in the Northeast or North Central.

Source	SS	df	MS	Number of obs =	51
Model	98985177.3	2	49492588.6	F(2, 48) =	1.10
Residual	2.1523e+09	48	44839670.6	Prob > F =	0.3399
				R-squared =	0.0440
				Adj R-squared =	0.0041
Total	2.2513e+09	50	45025787.3	Root MSE =	6696.2

salary	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
d2	1524.099	2363.139	0.64	0.522	-3227.311 6275.509
d3	-1721.027	2467.151	-0.70	0.489	-6681.566 3239.512
_cons	48014.62	1857.204	25.85	0.000	44280.46 51748.77

$$Y_i = 48,014.62 + 1,524.099D_{2i} - 1,721.027D_{3i}$$

The mean salary of public school teacher in the South is \$(48,014.62 - 1,721.027).

The mean salary of public school teacher in the Northeast or North Central is \$(48,014.62 + 1,524.099).

3. The Use of Dummy Variables in Seasonal Analysis

Table 9.4 U.S. Refrigerator Sales (thousands), 1978-1985 (quarterly)

a. Consider and estimate the following model with the dummy variable:

$$Y_t = \beta_1 D_{1t} + \beta_2 D_{2t} + \beta_3 D_{3t} + \beta_4 D_{4t} + u_t$$

Where Y = refrigerator sales, thousands

Source	SS	df	MS	Number of obs =	32
Model	59654886.6	4	14913721.7	F(4, 28) =	518.00
Residual	806142.375	28	28790.7991	Prob > F =	0.0000
				R-squared =	0.9867
				Adj R-squared =	0.9848
Total	60461029	32	1889407.16	Root MSE =	169.68

frig	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
d1	1222.125	59.99041	20.37	0.000	1099.24 1345.01
d2	1467.5	59.99041	24.46	0.000	1344.615 1590.385
d3	1569.75	59.99041	26.17	0.000	1446.865 1692.635
d4	1160	59.99041	19.34	0.000	1037.115 1282.885

b. Instead of assigning a dummy for each quarter and suppressing the intercept term to avoid the dummy variable trap, what should we do?

Source	SS	df	MS	Number of obs =	32
Model	915635.844	3	305211.948	F(3, 28) =	10.60
Residual	806142.375	28	28790.7991	Prob > F =	0.0001
				R-squared =	0.5318
				Adj R-squared =	0.4816
Total	1721778.22	31	55541.2329	Root MSE =	169.68

frig	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
d2	245.375	84.83926	2.89	0.007	71.58966 419.1603
d3	347.625	84.83926	4.10	0.000	173.8397 521.4103
d4	-62.125	84.83926	-0.73	0.470	-235.9103 111.6603
_cons	1222.125	59.99041	20.37	0.000	1099.24 1345.01

4. Table 8.9 Savings and Personal Disposable income (billions of dollars), United States, 1970-1995.

- a. Given the data in the table, estimate the following linear savings function using personal disposable income

$$\text{Time period 1970-1981: } Y_t = \lambda_1 + \lambda_2 X_t + u_{1t} \quad n_1 = 12$$

$$\text{Time period 1982-1995: } Y_t = \gamma_1 + \gamma_2 X_t + u_{2t} \quad n_2 = 14$$

$$\text{Time period 1970-1995: } Y_t = \alpha_1 + \alpha_2 X_t + u_{3t} \quad n_1 + n_2 = 26$$

$$\text{Time period 1970-1981: } Y_t = \lambda_1 + \lambda_2 X_t + u_{1t} \quad n_1 = 12$$

Source	SS	df	MS	Number of obs =	12
Model	16456.2587	1	16456.2587	F(1, 10) =	92.19
Residual	1785.03254	10	178.503254	Prob > F =	0.0000
				R-squared =	0.9021
				Adj R-squared =	0.8924
Total	18241.2912	11	1658.2992	Root MSE =	13.361

savings	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
income	.0803319	.0083665	9.60	0.000	.0616901 .0989737
_cons	1.016115	11.63771	0.09	0.932	-24.91432 26.94655

$$\text{Time period 1982-1995: } Y_t = \gamma_1 + \gamma_2 X_t + u_{2t} \quad n_2 = 14$$

Source	SS	df	MS	Number of obs =	14
Model	2614.39647	1	2614.39647	F(1, 12) =	3.14
Residual	10005.2214	12	833.768451	Prob > F =	0.1020
				R-squared =	0.2072
				Adj R-squared =	0.1411
Total	12619.6179	13	970.739837	Root MSE =	28.875

savings	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
income	.0148624	.0083932	1.77	0.102	-.0034248 .0331496
_cons	153.4947	32.71227	4.69	0.001	82.22075 224.7686

$$\text{Time period 1970-1995: } Y_t = \alpha_1 + \alpha_2 X_t + u_{3t} \quad n_1 + n_2 = 26$$

Source	SS	df	MS	Number of obs =	26
Model	76621.7867	1	76621.7867	F(1, 24) =	79.10
Residual	23248.3	24	968.679166	Prob > F =	0.0000
				R-squared =	0.7672
				Adj R-squared =	0.7575
Total	99870.0867	25	3994.80347	Root MSE =	31.124

savings	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
income	.0376791	.0042366	8.89	0.000	.0289353 .046423
_cons	62.42267	12.76075	4.89	0.000	36.08578 88.75957

- b. On the basis of the Chow test that there was a difference in the regression of savings on income between the two periods. Consider and estimate the following model with the dummy variable:

$$Y_t = \alpha_1 + \alpha_2 D_t + \beta_1 X_t + \beta_2 (D_t X_t) + u_t$$

Where Y = Savings

X= Personal disposable income

t = time

D = 1 for observations in 1982-1995

= 0 otherwise

- (i) Test the coefficients individually statistically significant at the 5 percent level? From this test, how would you describe the difference in the two regressions (coincident regression, parallel regression, concurrent regression, dissimilar regression)?

Source	SS	df	MS	Number of obs =	26
Model	88079.8327	3	29359.9442	F(3, 22) =	54.78
Residual	11790.2539	22	535.920634	Prob > F =	0.0000
Total	99870.0867	25	3994.80347	R-squared =	0.8819
				Adj R-squared =	0.8658
				Root MSE =	23.15

savings	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
d	152.4786	33.08237	4.61	0.000	83.86992 221.0872
income	.0803319	.0144968	5.54	0.000	.0502673 .1103964
dx	-.0654694	.0159824	-4.10	0.000	-.098615 -.0323239
_cons	1.016115	20.16483	0.05	0.960	-40.80319 42.83542

$$H_0 : \alpha_2 = 0$$

$$H_0 : \beta_2 = 0$$

$$H_1 : \alpha_2 \neq 0$$

$$H_1 : \beta_2 \neq 0$$

$$P\text{-value} = 0.000$$

$$P\text{-value} = 0.000$$

$$\text{reject } H_0$$

$$\text{reject } H_0$$

There is enough evidence suggest that the coefficients individually statistically significant at the 5 percent level.

The two regressions are dissimilar regressions.

- (ii) Write down the mean personal savings function for 1970-1981 and the mean personal savings function for 1982-2005.

Mean savings function for 1970-1981

$$E(Y_t | D_t = 0, X_t) = 1.1061 + 0.0803X_t$$

Mean savings function for 1982-1995

$$E(Y_t | D_t = 1, X_t) = (1.0161 + 152.4786) + (0.0803 - 0.0655)X_t = 153.4947 + 0.0148X_t$$