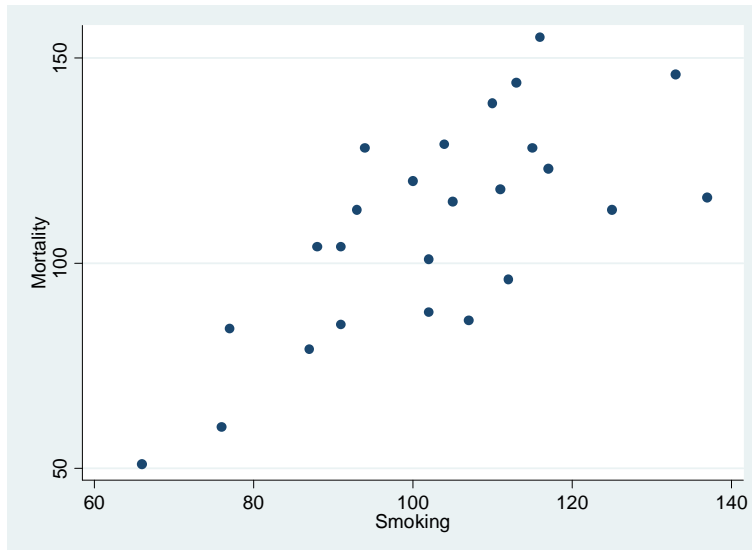


1. Table 5.11 provides data on the lung cancer mortality index (100 = average) and the smoking index (100 = average) for 25 occupational groups.

a. Plot the cancer mortality index against the smoking index. What general pattern do you observe?



b. Letting Y= cancer mortality index and X = smoking index, estimate a linear regression model

Source	SS	df	MS			
Model	8395.74904	1	8395.74904	Number of obs =	25	
Residual	7970.25096	23	346.53265	F(1, 23) =	24.23	
Total	16366	24	681.916667	Prob > F =	0.0001	
				R-squared =	0.5130	
				Adj R-squared =	0.4918	
				Root MSE =	18.615	

mortality	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
smoking	1.087532	.2209452	4.92	0.000	.6304724	1.544592
_cons	-2.885319	23.03372	-0.13	0.901	-50.5342	44.76356

$$Y_i = -2.8853 + 1.0875X_i$$

c. Test the hypothesis that smoking has no influence on lung cancer at $\alpha = 5\%$

$$H_0 : \beta_2 = 0$$

$$H_1 : \beta_2 \neq 0$$

$$t = \frac{\hat{\beta}_2 - \beta_2}{se(\hat{\beta}_2)} = 4.92$$

$$t > \text{critical } t \text{ reject } H_0$$

There is enough evidence to say that $\beta_2 \neq 0$

2. The demand for roses. Table 7.6 gives quarterly data on these variables:

Y = quantity of roses sold, dozens

X_2 = average wholesale price of roses, \$/dozen

X_3 = average wholesale price of carnations, \$/dozen

X_4 = average weekly family disposable income, \$/week

X_5 = the trend Variable taking values of 1, 2, and so on., for the period

1971-III to 1975-II in the Detroit Metropolitan area

You are asked to consider the following demand functions:

$$Y_t = \alpha_1 + \alpha_2 X_{2t} + \alpha_3 X_{3t} + \alpha_4 X_{4t} + \alpha_5 X_{5t} + u_t$$

$$\ln Y_t = \beta_1 + \beta_2 \ln X_{2t} + \beta_3 \ln X_{3t} + \beta_4 \ln X_{4t} + \beta_5 X_{5t} + u_t$$

a. Estimate the parameters of the linear model and interpret the results.

Source	SS	df	MS			
Model	52249133.2	4	13062283.3	Number of obs =	16	
Residual	10347222.8	11	940656.615	F(4, 11) =	13.89	
Total	62596356	15	4173090.4	Prob > F =	0.0003	
				R-squared =	0.8347	
				Adj R-squared =	0.7746	
				Root MSE =	969.87	

y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
x2	-2227.704	920.4659	-2.42	0.034	-4253.636	-201.772
x3	1251.141	1157.021	1.08	0.303	-1295.445	3797.726
x4	6.283002	30.62166	0.21	0.841	-61.11482	73.68083
x5	-197.4	101.5612	-1.94	0.078	-420.9348	26.13479
_cons	10816.04	5988.35	1.81	0.098	-2364.229	23996.31

$$\hat{Y}_t = 10816.04 - 2227.704X_{2t} + 1251.141X_{3t} + 6.283X_{4t} - 197.399X_{5t}$$

se (5988.348) (920.538) (1157021) (29.919) (101.156)
 $R^2 = 0.835$

In this model the slope coefficients measure the rate of change of Y with respect to the relevant variable.

b. Estimate the parameters of the log-linear model and interpret the results.

Source	SS	df	MS			
Model	1.12835383	4	.282088457	Number of obs =	16	
Residual	.284245018	11	.025840456	F(4, 11) =	10.92	
Total	1.41259884	15	.094173256	Prob > F =	0.0008	
				R-squared =	0.7988	
				Adj R-squared =	0.7256	
				Root MSE =	.16075	

ln y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln x2	-1.170727	.4883241	-2.40	0.035	-2.245521	-.0959329
ln x3	.7379375	.6528623	1.13	0.282	-.6990027	2.174878
ln x4	1.153217	.9019901	1.28	0.227	-.8320496	3.138484
x5	-.0301109	.0164188	-1.83	0.094	-.0662484	.0060266
_cons	3.572134	4.695165	0.76	0.463	-6.761856	13.90612

$$\ln \hat{Y}_t = 0.627 - 1.274 \ln X_{2i} + 0.937 \ln X_{3i} + 1.713 \ln X_{4i} - 0.182 \ln X_{5i}$$

se (6.148) (0.527) (0.659) (1.201) (0.128)
 $R^2 = 0.778$

In this model all the partial slope coefficients are partial elasticities of Y with respect to the relevant variable.

- c. $\beta_2, \beta_3,$ and β_4 give, respectively, the own-price, cross-price, and income elasticities of demand. What are their a priori signs? Do the results concur with the a priori expectations?

The own-price elasticity is expected to be negative, the cross price elasticity is expected to be positive for substitute goods and negative for complimentary goods, and the income elasticity is expected to be positive, since roses are a normal good.

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

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

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

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

ln productivity	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln ratio	.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.

4. Table 7.12 gives data for real consumption expenditure, real income, real wealth, and real interest rates for the U.S. for the years 1947-2000.

a. Given the data in the table, estimate the linear consumption function using income, wealth, and interest rate. What is the fitted equation?

Source	SS	df	MS			
Model	119322125	3	39774041.8	Number of obs =	54	
Residual	71437.3791	50	1428.74758	F(3, 50) =	27838.40	
				Prob > F =	0.0000	
				R-squared =	0.9994	
				Adj R-squared =	0.9994	
				Root MSE =	37.799	
Total	119393563	53	2252708.73			

c	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
yd	.7340283	.0137519	53.38	0.000	.7064068	.7616497
weal th	.0359756	.0024831	14.49	0.000	.0309881	.040963
i nterest	-5.521116	2.306643	-2.39	0.020	-10.15415	-.8880871
_cons	-20.63328	12.82697	-1.61	0.114	-46.397	5.130442

$$C_t = -20.6327 + 0.7340Y_d + 0.0360Wealth - 5.5212 Interest$$

$$t = (-1.6085) \quad (53.3762) \quad (14.4882) \quad (2.3067) \quad R^2 = 0.9994$$

b. What do you estimated coefficients indicate about the variables' relationships to consumption expenditure?

The three independent variables are statistically significant at the 5% level. It seems that increases in income and wealth are related to increases in consumption, whereas an increase in the interest rate corresponds to a decrease in consumption level.