

UNIVERSITY OF BRISTOL
Department of Economics

Statistics and Introduction to Econometrics
(ECON 12122)

Exercise 5.

**Please bring your solutions to questions marked by * to the relevant tutorial,
answers to these questions will be circulated later.**

1*. The following is an annual sample of 22 observations from the UK economy.

Year	ΔW	UN
1974	18.89	2.00
1975	29.46	3.10
1976	11.08	4.20
1977	8.36	4.40
1978	13.43	4.30
1979	17.98	4.00
1980	21.93	5.10
1981	9.15	8.10
1982	4.61	9.50
1983	1.07	10.40
1984	3.57	10.60
1985	4.97	10.90
1986	3.89	11.10
1987	2.34	10.00
1988	2.63	8.00
1989	4.34	6.20
1990	6.72	5.80
1991	5.70	8.00
1992	0.76	9.70
1993	-0.47	10.30
1994	0.00	9.40
1995	3.11	9.60

ΔW is the annual percentage change in wages per unit of manufacturing output. un is the percentage unemployment rate

- (a) Write down an econometric model of the relationship between ΔW and un. Justify your choice of explanatory and dependent variable.
- (b) Graph both variables over time. Comment on your results.

TURN OVER

(c) Graph a scatter plot of the two variables. Discuss whether there appears to be a linear relationship between them and if there are any outliers.

(d) Draw by hand a linear relationship between ΔW and un . What are your estimates of the intercept and slope? Are they sensible? Explain.

2. The following is annual data 1972-1995 for the quantity of cigarettes (measured as tobacco products) purchased and their price in the UK.

	Q	P
1972	144.87	14.43
1973	153.32	14.61
1974	151.14	17.05
1975	145.58	21.72
1976	141.84	25.20
1977	136.00	30.84
1978	134.99	33.28
1979	134.41	36.42
1980	130.64	42.67
1981	121.18	52.62
1982	111.87	60.78
1983	110.60	64.91
1984	106.81	71.68
1985	103.94	77.93
1986	101.41	85.34
1987	100.66	88.04
1988	100.92	90.92
1989	100.94	93.59
1990	100.00	100.00
1991	97.55	114.35
1992	92.14	126.39
1993	87.43	138.40
1994	85.93	148.16
1995	85.19	158.18

Where Q is an index of tobacco products purchased (1990=100) and P is a price index of tobacco products (1990=100).

(a) Write down an econometric model of the relationship between Q and P. Justify your choice of explanatory and dependent variable.

(b) Graph a scatter plot of the two variables. Discuss whether there appears to be a linear relationship between them.

(c) Draw by hand a linear relationship between Q and P. What are your estimates of the intercept and slope? Discuss whether your estimate of the slope is reasonable and how you would interpret it.

- (d) Explain how you would use your estimate of the slope to derive an estimate of the price elasticity of demand for tobacco products.
- (e) Suppose you wished to predict the effects of a ten per cent increase in the tax on cigarettes had on the demand, explain how you would go about it, indicating what further information you might need.
- (f) Discuss whether you might want to introduce any other explanatory variables into the analysis.

3*. In the simple Keynesian consumption function

$$C_t = a + bY_t + u_t \quad t=1,2,\dots,T$$

data is available for C_t (expenditure on consumption) and Y_t (disposable income). u_t is an unobserved random disturbance with $E(u_t | Y_t) = 0$. a and b are unknown parameters.

- (a) Derive an expression for and explain what is meant by $E(C_t | Y_t)$.
- (b) Keynes claimed that
 - (i) the marginal propensity to consume (mpc) was positive but less than one.
 - (ii) the average propensity to consume ($C_t/Y_t = \text{apc}$) declines with income.
 - (iii) the mpc is less than the apc.

Explain how each of these propositions can be stated as a hypothesis about the parameters of the model above. In answering (ii) and (iii) you may assume that u_t is zero (as it is on average).