

Note: Make sure to print and provide all relevant Eviews or Excel output with your answers, otherwise you will receive zero credit for this homework.

[1] Suppose you sample 5 students, asking each student their height (in inches), labeled INCH. You then transform this variable into feet by dividing each observation of INCH by 12. Label this new variable FEET. You then estimate the following regression: $INCH = \beta_0 + \beta_1 FEET$. Explain why (i) $\hat{\beta}_0 = 0$ and $\hat{\beta}_1 = 12$, (ii) the standard error of the estimate is zero, and (iii) R-squared and adjusted R-squared are one. Note: Depending on the software package, there may be a slight discrepancy in these values due to round-off error.

[2] Consider the following cross-sectional data, which is also available on my web site (<http://www.csus.edu/indiv/g/galletec/>) for easy downloading into Excel (by clicking on the link labeled Homework2Data); or just download the Eviews file directly (by clicking on the link labeled Homework2EV):

<u>Country</u>	<u>CRIME</u>	<u>GUNS</u>	<u>UNEM</u>
France	62.18	32	0.08
Norway	71.86	31.5	0.03
Colombia	4.99	7.2	0.11
Italy	37.96	12.1	0.06
Portugal	34.38	13.8	0.08
Spain	22.89	11	0.08
Thailand	8.81	16	0.01
India	1.63	4	0.07
Canada	75.49	31.5	0.06
Switzerland	36.19	46	0.03
Turkey	4.11	13	0.10
Netherlands	79.58	1.9	0.05
Finland	101.53	56	0.07
Denmark	1.92	12.4	0.02
United States	80.07	90	0.05
Japan	19.17	0.6	0.04
Czech Republic	38.22	5.2	0.07

Note: CRIME = Total crimes per capita (i.e., total crimes committed divided by number of country residents), GUNS = Number of guns owned per 100 country residents (e.g., if GUNS = 4, then for every 100 country residents there are a total of 4 guns owned), UNEM = Unemployment rate (For the sake of this homework we will define this as the total number of residents unemployed divided by the number of country residents, which is essentially the total unemployed per capita.).

There is a great deal of controversy in the literature on whether greater gun ownership leads to less or more crime. Some folks (e.g., see John Lott's 1998 book *More Guns, Less Crime: Understanding Crime and Gun Control Laws*) argue that gun ownership deters crime; whereas other folks (e.g., see Mark Duggan's 2001 paper "More Guns, More Crime" in the *Journal of Political Economy*) argue the opposite. We explore this issue using the above data.

- A. Using Eviews or Excel, based on a scattergram, the correlation coefficient, and simple regression (with the dependent variable being CRIME and the independent variable being GUNS), discuss the relationship between CRIME and GUNS. Do your results favor Lott or Duggan?
- B. Using Eviews or Excel, based on a scattergram, the correlation coefficient, and simple regression (with the dependent variable being CRIME and the independent variable being UNEM), discuss the relationship between CRIME and UNEM.
- C. Based on R-squared, which simple regression from parts A and B above best fits its data? Explain your answer.
- D. Now, estimate the following multiple regression: $CRIME = \beta_0 + \beta_1 GUNS + \beta_2 UNEM$. What happens to the estimated coefficients compared to the results obtained in parts A and B? Why is R-squared higher in this regression compared to those from parts A and B? Based solely on adjusted R-squared, comparing the results to parts A and B (i) is GUNS a meaningful variable to include in the regression?; (ii) is UNEM a meaningful variable to include in the regression? Explain.
- E. Using per capita equivalents (i.e., all variables in per capita terms), explain which of unemployment or gun ownership has the largest impact on crime.