

**WAYNE STATE UNIVERSITY | ECONOMICS DEPARTMENT**  
**ECO5100: INTRODUCTORY STATISTICS AND ECONOMETRICS |**  
**FINAL PROJECT**

DUE 8/1

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**Instructions:**

Answer all four questions.

Make sure you report all code and results.

For all questions, write out a fitted model with coefficients, standard errors,  $R^2$  / adjusted  $R^2$ , and number of observations.

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**1. Estimating Keynesian consumption function (cons.csv)**

Keynesian (aggregate) consumption function shows the relationship between total consumption (C) and disposable income ( $Y_d$ ):

$$C = A + MPC * Y_d$$

where A is (autonomous) consumption when income is zero, and MPC is marginal propensity to consume.

Using historical data from 1929 to 2002, estimate **A** and **MPC**.

Graph the data with a regression line. Comment on your findings.

**2. Estimating Cobb-Douglas function (cobb-douglas.csv)**

The Cobb-Douglas production function describes how an economy's output level (Y) is determined from the inputs of labor (L) and capital (K), and the general level of technology (A):

$$Y(L, K) = AL^\alpha K^\beta$$

Taking the natural log of both sides will obtain:

$$\log(Y) = \log(A) + \alpha \log(L) + \beta \log(K)$$

- a) Using the historical data from 1958 to 1972, estimate  $\alpha$  and  $\beta$ .
- b) If  $\log(A)$  is the constant (intercept) of the estimated regression above, *take the exponent of  $\log(A)$  to get A.*

### 3. Determinants of cross country GDP growth rates (growth.csv)

- a) Using a version of data on growth rates of countries from 1965 to 1975 assembled by Barro and Lee (1994), estimate the effects of the following variables *on GDP growth* over that period:
- initial GDP (GDPgrowth)
  - male secondary education (MSE)
  - female secondary education (FSE)
  - male higher education (MHE)
  - female higher education (FHE)
  - life expectancy (life\_exp)
  - education spending as % of GDP (eduGDP)
  - investment spending as % of GDP (invGDP)
  - government spending as % of GDP (govGDP)
  - political stability index (pol)
- (for this model, you do not need to transform any variables)*
- Which of the above control variables are statistically significant?
- b) Would a model with less variables be a better fit? What test would you use to compare different models? Run additional models and show which fits the data better.

### 4. Estimating crime model (crime.csv)

- a) Using the following independent variables, estimate their effects on crime (total crimes in 1993 / 100,000, by state):
- % of population in state living below the poverty level in 1993 (pov)
  - metropolitan population as % of state population (metro)
  - population per square mile (popdens)
- b) What would be the interpretation of your coefficients if you used  $\log(\text{crime})$ ? Run that model and interpret the coefficients.