

ASSIGNMENT 1 – MICROECONOMETRICS I

Master in Applied Econometrics and Forecasting

2nd SEMESTER 2022/2023

To explain the crime rate of counties in the USA the following model is specified,

$$\log(crmrte_{it}) = \alpha + \beta_1 \log(prbconv_{it}) + \beta_2 \log(prbarr_{it}) + \beta_3 \log(avgsen_{it}) + \beta_4 \log(polpc_{it}) + \beta_5 \log(density_{it}) + \beta_6 taxpc_{it} + \beta_7 West_{it} + \beta_8 central_{it} + \beta_9 urban_{it} + v_{it} \quad (1)$$

The meaning of the variables is the following:

- *crm rte* – crimes committed per person
- *prbconv* – average 'probability' of conviction
- *prbarr* – average 'probability' of arrest
- *avgsen* – average sentence in days
- *polpc* – police per capita
- *density* – people per square mile
- *taxpc* – tax revenue per capita
- *West* – Dummy equal to 1 if the county is in the western
- *central* – Dummy equal to 1 if the county is central
- *urban* – Dummy equal to 1 if the county is in SMSA

The unobserved error v_{it} verifies the usual decomposition: c_i is the unobserved heterogeneity term constant in time; λ_t is the fixed effect of time; u_{it} is the idiosyncratic error.

The purpose of this work is to use the statistical tools and econometric techniques of linear Panel Data Models to analyse the problem associated with equation (1), taking into consideration the following topics:

1. Exploratory data analysis with the relevant descriptive statistics (1.5)
2. Estimation of Equation (1) using the Pooled OLS (3.5)
3. Estimation of Equation (1) using the Random Effects. (3.0)
4. Estimation of Equation (1) using the Fixed Effects Estimator testing for heteroskedasticity and serial correlation. (5.0)
5. Comparison of the results obtained with each estimation method (0.5)
6. Choice of the adequate estimator of Equation (1) with justification. (3.5)
7. Conclusions about the determinants of the crime rate (with the interpretation of the chosen model coefficients) and critical comments on the results. (3.0)

In presenting the results of each estimation, focus on:

- Identifying the assumptions that validate each estimation
- Justifying the choice for the estimator of the covariance matrix
- Using the usual statistical tests
- Highlighting the advantages and drawbacks of each estimation method

Observations:

To estimate model (1) use data in file “**T1.dta**”.

The text should not exceed **4 pages plus the cover and Anexes** with font “Times New Roman” and size 12pt. Line spacing should be 1.5 lines or higher. Outputs should be in Annex. **A file “.do” should be submitted with all the commands run to obtain the output in the Annex** and should run without errors.

The teams should submit the assignment by email to isabelp@iseg.ulisboa.pt, in a word document, the respective pdf file, and the do file.

The assignment should be delivered till the **20th of March** at 18h.