



Lisbon School
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UNIVERSIDADE
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MASTER'S IN APPLIED ECONOMETRICS AND FORECASTING

MICROECONOMETRICS 1

EXERCISES FROM CHAPTER 3

Panel Data Dynamic Linear Models

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NOTE: To solve the questions below use the output of the empirical example that estimates the model

$$ly_{it} = \alpha ly_{it-1} + \beta_1 ln_{it} + \beta_2 ln_{it-1} + \beta_3 lk_{it} + \beta_4 lk_{it-1} + \lambda_t + c_i + u_{it} \quad t = 2, \dots, 8 \quad (1983, \dots, 1989) \quad i = 1, \dots, 492$$

where ly_{it} is the log of sales of firm i at time t , ln_{it} is the log of employment and lk_{it} is log of capital stock.

1. Classical methods.

- a) Write the command that estimates this model with Pooled OLS
- b) Is Pooled OLS consistent? Why?
- c) Write the command that estimates this model with Fixed Effects.
- d) Suppose that ln_{it} lk_{it} are strictly exogenous relatively to u_{it} . Is Fixed Effects estimator consistent? Why?
- e) Write the command that estimates this model with First differences.
- f) Characterize the bias in First Differences estimation.

2. Arellano and Bond

- a) Identify the method of estimation used in equation 4.
- b) Write the equation estimated in the output of equation 4.
- c) Identify the assumptions about the exogeneity of the independent variables used in Equation 4.
- d) Explain why was necessary to use instrumental variables in estimation of Equation 4.
- e) Write the moment conditions used in estimating equation 4 and test its validity.
- f) Given your answer in e) identify the properties of estimation of equation 4.
- g) Identify the hypothesis tested in the test referred as "Arellano-Bond test for AR(1) in first differences". Is the test result expected? Justify.
- h) What can you conclude about the result of the test "Arellano-Bond test for AR(2) in first differences"?
- i) Identify the assumptions about the exogeneity of the independent variables used in Equation 5.
- j) Write the moment conditions used in estimating equation 5 and test its validity using all information available.
- k) Given your answer in j) advise how to proceed.

- l) Refer the differences in the estimation procedure of equation 8 relatively to equation 7. What was the aim driving estimation of equation 8?
- m) Characterize the standard errors obtained in equation 8 and justify their choice.

3. Blundell and Bond

- a) Write the equation(s) estimated in output of equation 9 and identify the estimator used.
- b) Write the moment conditions used in estimating equation 9 and refer the assumptions considered about the exogeneity of the independent variables. Test their validity.
- c) Test the validity of the instruments for the variables in levels. Show how to obtain the observed value of the test statistic and the statistic distribution.
- d) With all the information available, test the validity of instruments of equation 11.
- e) Identify the properties of the estimation in Equations 10 and 11 respectively.
- f) Explain the difference in α estimates in Table 2.