Econ. 553a
Yale University

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Econometrics IV: Time Series Econometrics

Empirical Project
Optional Part of Take Home Examination

Reference Material: Any reference material allowed.

Due Date & Time: Friday 12 January 2000, 12:00 noon.

Credit: If you do this empirical project you need only attempt 2 of the 3 questions on the final take home examination.

Empirical Project[1]

1. Download multi-country macro data files from the Penn World Tables at the Toronto or NBER sites on the internet. Below is the Toronto address. Just follow the instructions for downloading files given at this site. The URL is http://datacentre.epas.utoronto.ca:5680/pwt/pwt.html

2. The data set provides annual data for 152 countries. Select the series for real GDP per capita (RGDPC) for the USA and one other country that is of interest to you. Make sure that you have at least 30 observations for each series. With the data you have obtained in this way, perform the following empirical exercise whose object is to estimate the growth rate of real GDP per capita for each country.

   (a) Use the simple trend regression model

   $$y_t = a + bt + u_t, \quad t = 1, ..., n \tag{1}$$

   where y_t is the logarithm of real per capita GDP and u_t is an error process which, in general, is serially correlated. Assume that

   $$u_t = \alpha u_{t-1} + \varepsilon_t \tag{2}$$

   where ε_t is $iid(0, \sigma^2)$.

   (b) Estimate equation (1) under assumption (2) and report your estimates of the growth rate parameter . Try using the following feasible procedures. Report your estimates in a Table so that it is easy for you to consider and comment on your results.

      i. Simple OLS regression of (1);

      ii. Cochrane-Orcutt regression of (1) with $n-1$ transformed observations using an estimate of α in (2) obtained from a preliminary regression that uses OLS regression residuals. Report your estimates of α;

[1] This exercise is based on the recent cross country study by Canjels and Watson (1997) on growth rate estimation. See also the paper by Phillips and Lee (1996) on efficient trend extraction.

iii. Cochrane-Orcutt estimation of (1) supplemented with the following equation for the first observation

$$y_1 = const. + u_1.$$

That is, use feasible generalised least squares estimation of (1) using n observations.

iv. Simple OLS regression on (1) reformulated in first differences.

(c) Replace (2) with a general $AR(p)$ model for the errors and use the BIC model selection criterion to estimate the order, p, of this autoregression using the residuals from an OLS regression on (1) as data. Use the fitted $AR(p)$ model to transform the data in (1) and then reestimate the parameter . Report the new estimates alongside those obtained by the other methods.

(d) Briefly discuss your results and compare them with those of Canjels and Watson (1997).

Write up your project as a scientific paper, paying attention to the quality of your presentation. Be sure to provide a full discussion of the methods being used and indicate limitations of the approach you are using wherever you think it is appropriate.

References[2]

Canjels, N. And M. Watson (1997). "Estimating deterministric trend in the presence of serially correlated errors," Review of Economics and Statistics, 184-200.

Phillips, P.C.B., and C. C. Lee (1996), "Efficiency Gains from Quasi-Differencing under Nonstationarity" in P.M. Robinson and M. Rosenblatt (Eds.) "Essays in Memory of E.J. Hannan". New York: Springer.

[2]Copies of these two references are available from Mary in 30 Hillhouse Avenue.