



Dr. Marcel Bluhm  
Assistant Professor of Economics

The Wang Yanan Institute for Studies in Economics  
Xiamen University

---

## Special Topics in Applied Econometrics: Cross-Country Studies Summer Term 2012

### Hands-On Assignment 1: Estimating a Growth Equation Via Pooled OLS

Please take out the following hands-on assignment in Matlab

For all solutions see, see program „HandsOn1.m“

1. Go to the website of Penn World Tables and download data in .csv format on real GDP per capita (rgdp) for all countries for the time period 1970-2009. Import these data into an Excel spreadsheet which can subsequently be loaded into Matlab
2. Run the program „DataProg.m“ to process the data into a balanced data set of quinquennial data, containing the growth rate of real GDP per capita between  $t$  and  $t-1$  as well as the log of real GDP per capita
3. Using the data, estimate Equation (1.2) via pooled OLS [Equation (1.3)] with  $y_{it}$  the growth rate of real GDP per capita between  $t-1$  and  $t$  and  $x_{it}$  the period initial value of the log per capita real GDP, that is,  $(rgdpl_{t-1})$   
The resulting coefficient estimates for the constant and  $rgdpl$  are 0.0189 and 0.0105, respectively. Note that from a theoretical point of view we would expect the coefficient on  $rgdpl$  to be negative if there was convergence. Assuming a causal relationship, the significant coefficient on  $rgdpl$  indicates that during a 5 year period the gap between a country's current output and equilibrium output increases by 10.5%, that is, there is divergence. This result is very likely due, because the regression model is not appropriate (country-specific heterogeneity not captured).
4. Estimate the asymptotic variance of the regression parameters [Equation (1.4)] and calculate the t-statistic of the regressors  
The t-stats are 0.4645 and 2.1607, respectively, that is, the constant is not significant and the  $rgdpl$  is significant at a 5% significance level
5. Test for serial correlation in the error terms  
The coefficient for the lagged error term is significant (4.6743) at a 5% significance level. this indicates that serial correlation is present.
6. Test for heteroscedasticity. Choose hit to contain  $rgdpl$  and  $rgdpl^2$   
The Chi<sup>2</sup> distributed test statistic equals 4.0971. At three degrees of freedom the critical value at a 5% significance level is 7.82 (see attached table below). The null of homoscedasticity is thus not rejected.
7. If necessary, calculate heteroscedasticity and serial correlation robust standard errors for the estimated parameters.  
Since the tests indicate serial correlation, the standard errors of the estimated coefficients need to be calculated with a robust approach [Equation (1.5)]. The t-statistics for the

constant and rgdpl are 0.3441 and 1.7384, respectively. They are thus not significantly different from zero at a 5% significance level.

8. Interpret results

Since both explanatory variables are not significantly different from zero, the model performs poorly in explaining real gdp per capita growth.

Degrees of freedom (df)	<u>Chi-Squared</u>											
	1	0	0	0.1	0.2	0.5	1.07	1.64	2.71	3.84	6.64	10.8
2	0.1	0.2	0.5	0.7	1.4	2.41	3.22	4.6	5.99	9.21	13.8	
3	0.35	0.6	1	1.4	2.4	3.66	4.64	6.25	7.82	11.3	16.3	
4	0.71	1.1	1.7	2.2	3.4	4.88	5.99	7.78	9.49	13.3	18.5	
5	1.14	1.6	2.3	3	4.4	6.06	7.29	9.24	11.1	15.1	20.5	
6	1.63	2.2	3.1	3.8	5.4	7.23	8.56	10.6	12.6	16.8	22.5	
7	2.17	2.8	3.8	4.7	6.4	8.38	9.8	12	14.1	18.5	24.3	
8	2.73	3.5	4.6	5.5	7.3	9.52	11	13.4	15.5	20.1	26.1	
9	3.32	4.2	5.4	6.4	8.3	10.7	12.2	14.7	16.9	21.7	27.9	
10	3.94	4.9	6.2	7.3	9.3	11.8	13.4	16	18.3	23.2	29.6	
<b>P value (Probability)</b>	0.95	0.9	0.8	0.7	0.5	0.3	0.2	0.1	0.05	0.01	0	
	<b>Nonsignificant</b>								<b>Significant</b>			