

The Stata file `growth-data.dta` (which you can download from the courses page under my web page <http://academics.hamilton.edu/economics/cgeorges/cgeorges.html>) contains data on output per worker in a variety of years for a variety of countries. It also contains data on investment, educational attainment, population growth rates and a number of other variables that may be relevant to our discussion of economic growth. The data was compiled by Ann Owen for David Weil's text on growth.

You can download the file to your computer or ESS account and then open it in Stata. If you expand the variable window, you will see the list of cross sectional variables included. A separate file with descriptions of the variables is also linked on my course page.

Let's look at the question of convergence of output per worker across countries. Recall that the Solow model predicts that there will be conditional convergence across countries, as countries move toward their respective steady state growth paths, whereas some endogenous growth models do not predict any such convergence. The exercise below follows the spirit of Mankiw, Romer, and Weil's (1992) investigation.

Exercise:

1. The data set includes output per capita in 1960 and the average growth rate of output per capita between 1960 and 2000 (each is a variable with one observation per country). Look for unconditional convergence in the entire sample by creating a scatter plot of the average growth rates against the 'initial' (i.e., 1960) levels of output per worker. If there was convergence on average, would you see an upward or downward slope to this plot? Do your results change if you restrict your attention to countries in Western Europe?
2. For a more formal test for unconditional convergence, you can replicate the regression run by Mankiw, Romer, and Weil and reported in their Table III (handed out in class). Note that your data is similar but not identical to that used by MRW (e.g., they only had data through the 1980s), so that your estimates should not be identical to those of MRW. Interpret your results. Are they qualitatively similar to those reported by MRW? Do you see evidence of unconditional convergence? (see additional notes below)
3. Now let's test for conditional convergence. You can, for example, replicate the regression run by Mankiw, Romer, and Weil and reported in their Table IV. Interpret your results. Do you see evidence of conditional convergence? Do all of the parameter estimates qualitatively fit the predictions of the Solow model? (see additional notes below)
4. Are there differences in growth rates across regions of the world that are not explained by the Solow model? Can you design a regression that tests whether African countries tend to have different growth patterns than countries in the rest of the world, after controlling for factors accounted for by the Solow model?

Some Stata Help:

To do most things in Stata, you can either use the menus or the command line. For example, to create a scatter plot in Stata, you can either use the menu sequence `Graphics > Twoway Graph` or use the command `twoway (scatter variable1 variable2)` at the command line. Note that you can also select other options such as setting the marker labels for the points in the scatter plot to be the country names, so that you can see which country is represented by each point.

For parts 2 and 3 of the exercise, please try to stick as closely as possible to the methods used by MRW (as indicated in Tables III and IV). You will need to select variables to use and transform some of them before you can run the regressions. For example, you will need to create a population growth variable (e.g., use the log growth formula from the handout on growth) and the log of the saving rate as a new variable. Note also that MRW assume that $d + g = 0.05$ for all countries. Note further that for the growth rate of GDP per worker, MRW use the difference in the log of GDP per person in 2000 and 1960 without dividing by the number of years, so to come closest to their methods, you should create a new growth variable by taking difference of the log of GDP per capita in 2000 and 1960.

To create new variables, you can use the menu sequence: Data > Create or Change Variables > Create New Variable. Again, you can also type in the command directly into the command window if you remember the correct syntax (to create a new variable by transforming existing variables, use the generate command).

Note that in Stata, the command for natural log is `ln()`. So if, for example, we want to create a new variable *loginvest* that is the natural log of the investment rate, and we have decided to use the variable *avginvest* (from the data set) as our measure of the investment rate, then we will generate *loginvest* using the formula `ln(avginvest/100)` - (division by 100 is simply to put it on the same scale as $d + n + g$).

Dummy variables: Note that the regional variables (such as *africa*) in the data set take on the value 1 if true and missing (.) if false. You can condition a plot or regression on these variables by using “if *africa* == 1” or “if *africa* == . ”. However, if you want to use an *africa* dummy variable in a regression, you need the dummy variable to take on the value 1 if true and 0 if false. To create such a dummy variable (e.g., *africadummy*), you can use use a conditional statement as follows: `gen africadummy = cond(africa==1,1,0)`.