Levels Accounting

Background

Hall and Jones (1999) examine the determinants of output per capita across countries. They do this by comparing the level of the capital/output ratio, human capital, and residual productivity in a given country to the U.S. Their table shows the results of this from a selected set of countries

TABLE I
PRODUCTIVITY CALCULATIONS: RATIOS TO U. S. VALUES

Country	Y/L	Contribution from		
		$(K/Y)^{\alpha/(1-\alpha)}$	H/L	A
United States	1.000	1.000	1.000	1.000
Canada	0.941	1.002	0.908	1.034
Italy	0.834	1.063	0.650	1.207
West Germany	0.818	1.118	0.802	0.912
France	0.818	1.091	0.666	1.126
United Kingdom	0.727	0.891	0.808	1.011
Hong Kong	0.608	0.741	0.735	1.115
Singapore	0.606	1.031	0.545	1.078
Japan	0.587	1.119	0.797	0.658
Mexico	0.433	0.868	0.538	0.926
Argentina	0.418	0.953	0.676	0.648
U.S.S.R.	0.417	1.231	0.724	0.468
India	0.086	0.709	0.454	0.267
China	0.060	0.891	0.632	0.106
Kenya	0.056	0.747	0.457	0.165
Zaire	0.033	0.499	0.408	0.160
Average, 127 countries:	0.296	0.853	0.565	0.516
Standard deviation:	0.268	0.234	0.168	0.325
Correlation with Y/L (logs)	1.000	0.624	0.798	0.889
Correlation with A (logs)	0.889	0.248	0.522	1.000

The elements of this table are the empirical counterparts to the components of equation (3), all measured as ratios to the U. S. values. That is, the first column of data is the product of the other three columns.

Figure 1: Level Accounting

For the poorest countries (India, China, Kenya, Zaire - now the DRC), the capital/output ratios and human capital are somewhat below the US levels, but what really drives their poverty is the low level of residual productivity. The three columns under "contribution from" are multiplicative, their product is equal to the

ratio of Y/L shown in the first column.

The authors (and a host of others) have attacked the question of *why* these things vary across countries. But for the moment, let's think about how they are measuring these three contributions, so that we can understand what assumptions go into their accounting.

Project

Start with a basic Solow model. With this, you should do two things:

1. Derive the form of the production function Hall and Jones use, with the capital/output ratio, human capital, and residual productivity.

2. Derive an alternative form that incorporates the possibility of markups

Using those derivations, you should provide comments on the following questions

1. Why does the capital/output ratio make sense as a way of measuring the contribution of capital?

2. Would their results differ if there were markups?

Rules

You can work on this alone, or with a small group (2-3 people). I'll evaluate the work of the group as a whole.