ECON 211A/240, Problem Set 1.

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Out: October 1, 2003. Due: Friday, October 15, 2003

Question 1: Factors vs. Productivity.

Download the Hall-Jones dataset from http://elsa.berkeley.edu/˜chad/HallJones400.asc. Merge in the GADP variable with the data on output, factors, and productivity. GADP (government anti-diversion policies) is an index of the average expropriating and diversionary behavior for each country. Taking the perspective of the firm, treat GADP as an indicator of a tax, τ, on output. Assume that the representative firm in country i has a production function that matches the one employed by Hall and Jones in their growth-accounting exercise:

$$Y_i = K_i^{\alpha}(A_i H_i)^{1-\alpha},$$

where variables are expressed in per-capita units.

1. Write down the decision problem of the representative firm. Be sure to incorporate τ.
2. Assuming a fixed interest rate of r, derive an expression for the optimal capital stock. Express your answer as $\log(K)$ rather than the level.
3. Transform the data to match your result in (1.2). Regress $\log(Y)$ on $\log(A)$. Does the regression coefficient match that which you might naively expect by inspecting the production function? Describe the omitted variable bias, if any.
4. Return to the capital specification that you derived in (1.2). Suppose that the A is really the same across countries, but that the imputed A term measures expropriation and diversion risk. Report the results of a regression in which you use GADP as the indicator of τ (and exclude the imputed A). Control for (log) human capital by using the theoretically appropriate coefficient (i.e., from the production function).
5. Make a reasonable assumption about the value of τ for the United States. What do your results in (1.4) imply about the level of τ for the poorest ten countries? For the median country?
6. Repeat (1.4) and (1.5), but this time include A in the regression specification in the theoretically appropriate way.
7. In this framework, is there a logical problem in connecting A and expropriation? Explain.

Question 2: Expropriation and the Choice of Technology.

Consider the following two-period model. There are two agents: a worker and an expropriator. The worker has utility that is CES in consumption,

$$U_w = [c_{w,1}^{\gamma} + c_{w,2}^{\gamma}]^{1/\gamma},$$

and the expropriator has linear utility (for simplicity's sake). The worker starts with an endowment y. She has access to two technologies for saving: simple storage and "cottage industry" that yields $f(k)$. Assume that $f'() > 0, f''() < 0$, and $f'(0) \gg 1$. Use γ to denote the fraction of her savings (s) that she invests in the cottage industry. $(1-\gamma)s$ is therefore stored. The expropriator cannot touch the stored savings, but he can choose to expropriate a fraction $\leq \tau$ of the output from the machine.

1. Write down the budget constraints of each agent.
2. What expropriation rate does the expropriator choose?
3. Solve for the sub-game equilibrium.
4. Now suppose that side payments are possible at date $t = 2$ and that the agents can contract on (i.e., credibly commit to...) $t = 2$ behavior. Describe the resulting equilibrium (or set of equilibria).
5. Assume that the growth accountant can observe the aggregate stock of capital, but not its sectoral composition. Would he calculate the correct decomposition of output into factors versus TFP? Why or why not?
6. Suppose instead that only the capital stock of the expropriable sector is observed by the growth account. Would he calculate the correct decomposition of output into factors versus TFP? Justify your answer.
7. How does this relate to the dichotomy between expropriation and productivity of Problem 1?

Question 3: Costs of Intermediation.

There is a continuum of firms, indexed by i, with wealth $W_i \in [0, M]$, for $K < M < 2K$. The economy has one sort of project available for investment. This project requires an investment of K and pays off $P > K$. If firm i's wealth is smaller than K and it wants to invest, it needs to take a loan L_i. he cost of monitoring a firm i that gets a loan L_i is $\alpha + \beta L_i^2$. Each firm decides whether to invest in the project and how much to lend on the competitive loan market.

1. Solve for the equilibrium.
2. Compare two economies with different α.
3. Relate this result back to Lucas' calculation that we saw in class.