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LECTURES ON

ECONOMIC GROWTH

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WHY DOESN'T CAPITAL FLOW FROM RICH TO POOR COUNTRIES?

1. Introduction

The egalitarian predictions of the simplest neoclassical models of trade and growth are well known and easy to explain, as they follow from entirely standard assumptions on technology alone. Consider two countries producing the same good with the same constant returns to scale production function, relating output to homogeneous capital and labor inputs. If production per worker differs between these two countries, it must be because they have different levels of capital per worker: I have just ruled everything else out! Then the Law of Diminishing Returns implies that the marginal product of capital is higher in the less productive (that is, the poorer) economy. If so, then if trade in capital goods is free and competitive, new investment will occur only in the poorer economy, and this will continue to be true until capital-labor ratios, and hence wages and capital returns, are equalized.

We do, of course, see some investment by wealthy countries in poorer ones, but an example with some rough numbers will help to make clear just how far the capital flows we observe fall short of the flows predicted by the theory I have just sketched. According to Robert Summers and Alan Heston (1988, table 3, pp. 18–21), production per person in the United States is about fifteen times what it is in India. Suppose production in both these countries obeys a Cobb-Douglas-type constant returns technology with a common intercept:

$$(1) \qquad y = Ax^{\beta},$$

where y is income per worker and x is capital per worker. Then the marginal product of capital is $r = A\beta x^{\beta-1}$, in terms of capital per worker, and thus:

$$(2) \qquad r = \beta A^{1/\beta} y^{(\beta-1)/\beta}$$

in terms of production per worker. Let $\beta = 0.4$ (an average of U.S. and Indian capital shares), again for both countries. Then the formula (2) implies that the marginal product of capital in India must be about $(15)^{1.5} = 58$ times the marginal product of capital in the United States.

If this model were anywhere close to being accurate, and if world capital markets were anywhere close to being free and complete, it is clear that, in the face of return differentials of this magnitude, investment goods would flow rapidly from the United States and other wealthy countries to India and other poor countries. Indeed, one would expect *no* investment to occur in the wealthy countries in the face of return differentials of this magnitude. I worked out the arithmetic for this example to make it clear that there is nothing at all delicate about this standard neoclassical prediction on capital flows. The assumptions on technology and trade conditions that give rise to this example must be drastically wrong, but exactly what is wrong with them, and what assumptions should replace them? This is a central question for economic development. In this chapter I consider four candidate answers to this question.

2. Differences in Human Capital

The sample calculation in the last section treats effective labor input per person as equal in the countries being compared, ignoring differences in labor quality or human capital per worker. The best attempt to correct measured labor inputs for differences in human capital is Anne Krueger's (1968) study. Her estimates are based on data from the 1950s, but the percentage income differentials between very rich and very poor countries have not changed all that much in the last 25 years and, in any case, a rough estimate is better than none at all. Her method is to combine information on each country's mix of workers by level of education, age, and sector with U.S. estimates of the way these factors affect worker productivity, as measured by relative earnings.

Krueger's main results are given in her table III (p. 653), which gives estimates of the per capita income that each of the 28 countries examined could attain, expressed as a fraction of U.S. income, if each country had the same physical capital per worker endowment as did the United States. The estimates range from around .38 (India, Indonesia, Ghana) to unity (Canada) and .84 (Israel). These numbers have the dimension of the relative human capital stocks raised to the power of labor's share, so taking the latter at .6 (as I did in my introductory example), the estimated relative human capital endowments ranged from about .2 to unity. That is, each American or Canadian worker was estimated to be the productive equivalent of about five Indians or Ghanaians. (Compensation per employed civilian in the United States in 1987 was about $24,000, so this estimate implies that a typical worker from India or Ghana could earn about $4,800 in the United States.)

To redo my introductory example with Krueger's estimated human capital differentials, reinterpret y in equations (1) and (2) as income per *effective* worker. Then the ratio of y in the United States to y in India becomes 3 rather than 15, and the predicted rate of return ratio becomes $(3)^{1.5} = 5$ rather than 58. This is a substantial revision, but even so, it leaves the original paradox very much alive: a factor of 5 difference in rates of return is still large enough to lead one to expect capital flows much larger than anything we observe.

If it had turned out that replacing labor with effective labor had *entirely* eliminated the estimated differences in the marginal product of capital, this would have answered the question with which I began this chapter, but only by replacing it with an even harder question. Under constant returns, equal capital returns implies equal wage rates for equally skilled labor, so that if there were no economic motive for capital to flow, there would be no motive for labor flows either. Yet we see immigration at maximal allowable rates and beyond from poor countries to wealthy ones. We do not want to resolve the puzzle of capital flows with a theory that predicts, contrary to the evidence provided by millions of Mexicans, that Mexican workers can earn equal wages in the United States and in Mexico.

3. External Benefits of Human Capital

Obviously, we could resolve the puzzle of the inadequacy of capital flows at any time by *assuming* that marginal products of capital are equalized, and using equation (2) and the estimated income differential to estimate the relative levels of the intercept parameter A (often called the level of technology) in the two countries being compared. This is almost what I will do in this section, but I will do so in a way that has more content, by assuming that an economy's technology level is just the average level of its

workers' human capital raised to a power. That is, I assume (as I did in Chapter 1) that the production function takes the form

$$(3) \qquad y = Ax^{\beta}h^{\gamma},$$

where y is income per effective worker, x is capital per effective worker, and h is human capital per worker. I interpret the term h^{γ} as an external effect (just as in Romer 1986a and b). It multiplies the productivity of a worker at any skill level h, exactly as does the intercept A in (3).

The marginal productivity of capital formula implied by (3) is

$$(4) \qquad r = \beta A^{1/\beta} y^{(\beta-1)/\beta} h^{\gamma/\beta}.$$

I propose to estimate the parameter γ using Edward Denison's (1961) comparison of U.S. productivity in 1909 and 1958, and then to apply this estimate to equation (4) using Krueger's cross-country estimates of relative human capital stocks in 1959 to obtain a new prediction on relative rates of return on capital.

The estimation of γ is as reported in my earlier paper (see Chapter 1, p. 45). Using Denison's estimates for the 1909–1959 period in the United States, output per man-hour grew about one percentage point faster than capital per man-hour. Denison estimates a growth rate of h, attributed entirely to growth in schooling, of .009. With the technology (3), this implies that $(1 - \beta + \gamma)$ times the growth rate .009 of human capital equals .01. With a capital's share $\beta = .25$, these numbers imply $\gamma = .36$. That is to say, a 10 percent increase in the average quality of those with whom I work increases my productivity by 3.6 percent. (This estimate is based on the assumption that the total stock of human capital grows at the same rate, .009, as that part of the stock that is accumulated through formal schooling. I do not have any idea how accurate an assumption this is.)

Now taking the Krueger estimate that five Indians equals one American, the predicted rate of return ratio between India and the United States becomes $(3)^{1.5}5^{-1} = 1.04$. That is, taking the external effects of human capital into account in the way I have done entirely eliminates the predicted return differential. Notice that this result is in no way built into my estimation procedure. The value of γ estimated from the 1909–1958 U.S. comparison exactly eliminates the return differential in a 1959 India–U.S. comparison.

One might accept this calculation as a resolution of the question I posed in my title. This was the argument in my earlier paper, based on U.S. data only, and I am surprised how well it works in a cross-country comparison. But it is important and troublesome, I think, to note that the cross-country comparison is based on the assumption that the external benefits of a country's stock of human capital accrue *entirely* to producers within that country. Knowledge spillovers across national boundaries are assumed to be zero. Ordinary experience suggests that while some of the external benefits of increases in individual knowledge are local, confined to single cities or even small neighborhoods of cities, others are worldwide in scope. But, without some real evidence on the scope of these external effects, I do not see how to advance this quantitative discussion any further. The argument of this section and the preceding one suggests that correcting for human capital differentials reduces the predicted return ratios between very rich and very poor countries from about 58 at least to about 5, and possibly, if knowledge spillovers are local enough, to unity.

4. Capital Market Imperfections

I have been discussing capital flows in static terms, taking it for granted that differences in marginal products of capital at a point in time imply flows of capital goods through time. In the one-good context I am using, such flows are simply borrowing contracts: the poor country acquires capital from the rich now, in return for promised goods flows in the opposite direction later on.

Suppose countries A and B are engaged in such a transaction, and that the capital stocks in the two countries are growing on paths that will eventually converge to a common value. If we look at goods flows through time between these two countries, we see a phase in which goods flow from advanced A to backward B, followed by a phase (which lasts forever) in which goods flow from B to A in the form of interest payments or repatriated profits. This sort of pattern was implicit in my statement of the capital flow problem. For such a pattern to be a competitive equilibrium, it is evident that there must be an effective mechanism for enforcing international borrowing agreements. Otherwise, country B will gain by terminating its relationship with A at the point where the repayment period begins, and,

foreseeing this, country A will never lend in the first place. A capital market imperfection of this type is often summarized by the term "political risk."

A serious difficulty with political risk as an explanation for the inadequacy of capital flows lies in the novelty of the current political arrangements between rich and poor nations. Until around 1945, much of the Third World was subject to European-imposed legal and economic arrangements, and had been so for decades or even centuries. A European lending to a borrower in India or the Dutch East Indies could expect his contract to be enforced with exactly the same effectiveness and by exactly the same means as a contract with a domestic borrower. Even if political risk has been a force limiting capital flows since 1945, why were not ratios of capital to effective labor equalized by capital flows in the two centuries before 1945?

I do not know the answer to this question, but, in seeking one, I see no reason to assume that the role of the colonial powers was simply to enforce a laissez-faire trading regime throughout the world. The following monopoly model, very much in the spirit of Adam Smith's (1776/1976) analysis of an earlier phase of colonialism, seems to me suggestive in several ways.

Consider an imperial power whose investors have access to capital at a (first) world return of r. Assume that the imperialist has exclusive control over trade to and from a colony, but that the labor market in the colony is free. Now suppose, at one extreme, that the colony has *no* capital of its own, and no ability to accumulate any. Then capital per worker, x, in the colony can be chosen by the imperialist, and the entire income repatriated. Under these conditions, what value of x is optimal from the viewpoint of the imperial power, viewed as a monopolist?

Let the production function in the colony be $y = f(x)$. Then the monopolist's problem is to choose x so as to maximize

$$(5) \qquad f(x) - [f(x) - xf'(x)] - rx,$$

or total production less wage payments at a competitively determined wage less the opportunity cost of capital. The first-order condition for this problem is

$$(6) \qquad f'(x) = r - xf''(x),$$

so that the marginal product of capital in the colony is equated to the world return r plus the derivative of the colony's real wage rate with respect to capital per worker. It is the imperialist's monopsony power over wages in the colony that is crucial. His optimal policy is to retard capital flows so as to maintain real wages at artificially low levels.

With the Cobb-Douglas technology assumed in my earlier examples, the formula (6) implies that $r = \beta^2 x^{\beta-1} = \beta f'(x)$. With a β value of .4, then, the return on capital in the colony should be about 2.5 times the European return. These are quantitatively interesting rents. The possibility that such rents were important is, I think, reinforced by many of the institutional features of the colonial era: the carving up of the Third World by the European powers, and the frequent granting of exclusive trading rights to monopoly companies.[1]

In a country like India or Indonesia, where most of the workforce was (and still is) engaged in traditional agriculture, it is hard to imagine that the ability to control capital inflows from abroad gave the imperialists much monopsony power over the *general* level of wages. Put another way, the value of capital imported from Europe must have been a small fraction of capital in these countries as a whole, most of which was land. If monopoly control over capital imports was an important source of colonial return differentials, it must have been because only a small part of the colonial labor force was skilled enough to work with imported capital in, say, goods manufacturing. But to explore this possibility, we would obviously need a more refined view of the nature of human capital than one in which five day-laborers equal one engineer.[2]

Insofar as monopoly control over trade in capital goods was an important factor in the determination of capital-labor ratios prior to 1945, I do not see any reason to believe that it ceased to be a factor after the political end of the colonial age. Monopoly returns are not of interest to Europeans only. There is much unsystematic evidence of heavy private taxation of capital inflows in Indonesia, in the Philippines, in the Iran of the Shah, and in other poor economies that are otherwise attractive to foreign investors.

1. With its emphasis on capital investment, Dobb's (1945) discussion of late nineteenth and early twentieth-century colonialism is closer to the model in this chapter than is Smith's. According to Davis and Huttenback (1989), investment in the late British empire was open to firms from any country on competitive terms, which would obviously be inconsistent with this model. Moreover, they do not find rates of return in the British colonies that exceeded European returns for similar investments.

2. See Nancy Stokey (1988) for a model in which high human capital workers do qualitatively different things than do low human capital workers.

Restrictions on capital flows imposed by the borrowing country are often explained as arising from a mistrust of foreigners or a reluctance to let development proceed "too fast," but I think such explanations warrant a Smithian skepticism.

5. Conclusions

Why does it matter which combination, if any, of the four hypotheses I have advanced is adequate to account for the absence of income-equalizing international capital flows? The central idea of virtually all postwar development policies is to stimulate transfers of capital goods from rich to poor countries. Insofar as either of the human capital–based hypotheses reviewed in Sections 2 and 3 of this chapter is accurate, such transfers will be fully offset by reductions in private foreign investment in the poor country, by increases in that country's investments abroad, or both. Insofar as returns on capital are not equalized, but where return differentials are maintained so as to secure monopoly rents, capital transfers to poor countries will also be fully offset by reductions in private investments. Giving goods to a monopolist does not reduce his interest in exploiting potential rents.

Only insofar as political risk is an important factor in limiting capital flows can we expect transfers of capital to speed the international equalization of factor prices. In a world of largely immobile labor, policies focused on affecting the accumulation of human capital surely have a much larger potential. So too, I think, do policies in which aid of any form is tied to the recipient's openness to foreign investment on competitive terms.

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MAKING A MIRACLE

1. Introduction

In 1960, the Philippines and South Korea had about the same standard of living, as measured by their per capita GDPs of about 640 U.S. 1975 dollars. The two countries were similar in many other respects. There were 28 million people in the Philippines and 25 million in Korea, with slightly over half of both populations of working age. Twenty-seven percent of Filipinos lived in Manila, 28 percent of South Koreans in Seoul. In both countries, all boys of primary school age were in school, and almost all girls, but only about a quarter of secondary-school-age children were in school. Only 5 percent of Koreans in their early twenties were in college, as compared to 13 percent in the Philippines. Twenty-six percent of Philippine GDP was generated in agriculture, and 28 percent in industry. In Korea, the comparable numbers were 37 and 20 percent. Ninety-six percent of Philippine merchandise exports consisted of primary commodities and 4 percent of manufactured goods. In Korea, primary commodities made up 86 percent of exports, and manufactured goods 14 percent (of which 8 percent were textiles).

From 1960 to 1988, GDP per capita in the Philippines grew at about 1.8 percent per year, about the average for per capita incomes in the world as a whole. In Korea, over the same period, per capita income grew at 6.2 percent per year, a rate consistent with the doubling of living standards every 11 years. Korean incomes are now similar to Mexican, Portuguese, or Yugoslavian, about three times incomes in the Philippines, and about one-third of incomes in the United States.[1]

1. The figures in the first paragraph are taken from the 1984 *World Development Report*. The income and population figures in this paragraph and the next are from Summers and Heston (1991).