

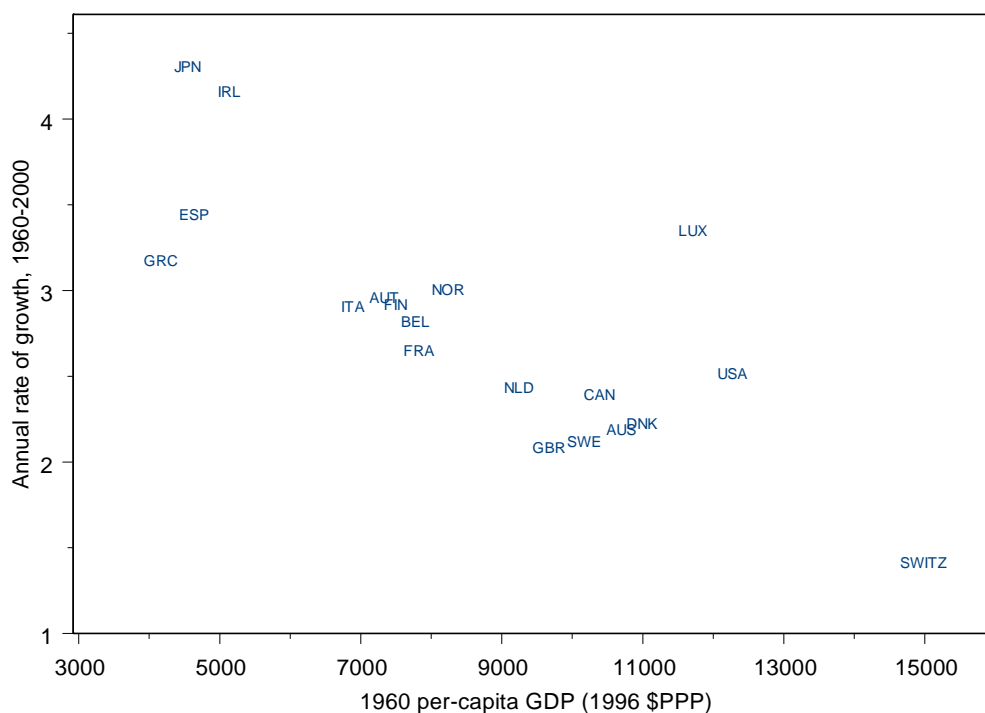
The Growth and Development of Nations in the Global Economy

Midterm Exam, Fall 2005

Short Answer Questions: Please answer 4 of 6 Questions (10 points each)

1. Easterly talks about the “financing gap approach” to development policy. What is the financing gap? What effect would filling the gap have on growth and on income according to the Harrod-Domar model?
2. The figure below shows average growth rates for the 1960 to 2000 period plotted against 1965 GDP per-worker for a group of European, American and Oceanic countries that roughly comprise the OECD.

Convergence of OECD Countries



Nelson and Wright (in “The Erosion of U.S. Technological Leadership as a Factor in Postwar Economic Convergence”) argue that these countries were able to catch up with the US in per-capita GDP terms because they closed the technology gap between themselves and the US. According to these authors, what are some of the reasons that these countries could close the technology gap? How is this Nelson-Wright explanation of convergence different from that offered by the standard Solow growth model with exogenous technological progress?

3. We have seen that birth rates are lower in richer countries than in poorer countries. We have also seen suggestive evidence that this is not due to lack of access to contraception in poorer countries, but rather to higher desired fertility rates in poorer countries. List four reasons why desired fertility rates might be lower in wealthier countries.

4. What does it mean to say that ideas are “non-rival” goods? Why is patent protection (that grants inventors monopoly power over the use of their ideas) often seen as a precondition for private firms to generate new technology? Why might patent protection slow down the process of convergence?

5. Some authors argue that that investment creates positive externalities within an economy by contributing to its overall level of technological capability. One way to represent this externality is to write total factor productivity or the technology multiplier for an economy as $A(t) = aK(t)^\beta$, where $K(t)$ is *total* installed capital stock in the economy. Using this representation, the aggregate production function for the economy in period t becomes $Y(t) = [aK(t)^\beta] K(t)^\alpha L(t)^{1-\alpha}$. For an individual firm j in this economy, its firm-specific production becomes $Y_j(t) = A(t) K_j^\alpha L_j^{1-\alpha}$, where the j subscripts denote the capital and labor used by that firm only.

In the presence of externalities such as these, why does firm j 's investment decisions depend on its expectations about investment decisions by other firms? How might this dependence of investment on expectations result in multiple equilibrium outcomes for the economy?

6. In class we studied the relationship between health (and especially height) and income based on research by Strauss and Thomas. What is the relationship between height and wage in Brazil? Does this relationship change when you look at only those workers with no years of education? Why might this second relationship be a better indicator that health and income are related?

Long Questions: Please answer 1 of 2 Questions (30 points)

1. This question is related to the original version of the Solow model with no technological change. It asks about the Solow model with no human capital, and then asks you to incorporate human capital. After that it asks you more general questions about education.

- a. Draw the figure of the Solow steady state with capital per worker on the x-axis and depreciation, investment, and output on the y-axis. Remember that γ is the savings rate (a constant fraction of output), δ is the depreciation rate (a constant fraction of capital), and n is the population growth rate. (Ignore, for now, human capital and endogenous growth.) Label each curve in your graph well.
- b. Show, in your figure, the steady state level of output and explain why the steady state is a stable one.
- c. Now let us take into account human capital. The original production function was: $y = f(k) = Ak^\alpha$. We will now use h to denote the amount of labor input per worker which is related to their schooling. The new production function is: $y = f(k) = h^{(1-\alpha)}Ak^\alpha$. If h equals 1 this is identical to the original Solow model. Draw the figure of the Solow model for a country whose h is greater than one. Which lines or curves in this figure look the same as that in part a? Which look different? Will the growth rate be higher or lower than in part a? the level of per-capita income?
- d. A researcher would like to get a good estimate of h in the US, or the returns to a year of education. She compares Americans with a high school degree to those who completed their first year of college and then dropped out and finds that the people who started college earn 10% more than those with only a college degree. She takes this as evidence that the returns to education are 10% per year. Is she correct? Why or why not?
- e. Your family receives a letter in the mail from Oxfam asking you to donate money to their "Education Now" campaign. The letter says 125 million children are not enrolled in primary school. They say "there is an overwhelming consensus that education is central to development and poverty reduction." Your mother remembers that you took a class on growth and development and asks you if you think that increasing access to education will increase growth. Tell her what you think (your opinion). Give some historical evidence and some cross-country evidence.

2. The table below presents some basic statistics that describe South Korea’s economic performance over the 1965 to 1990 period of the ‘East Asian Miracle.’

TABLE 1

1965 South Korean per capita GDP relative to US	1990 South Korean per capita GDP relative to US	South Korea Average Rate of Growth of Per-Capita GDP, 1965-1990	South Korea Average Rate of Growth of Physical Capital Per-Worker, 1965-1990	South Korea Average Rate of Growth of Human Capital Per-Worker, 1965-1990	South Korea Average Rate of Total Factor Productivity Growth, 1965-1990
11%	44%	5.7%	7.4%	3.9%	1.7%

- a. Over the 1965-1990 period, South Korea’s savings rate was just above that of the US (29% versus 22%) and its population growth rate was also just above that for the US (1.2% versus 1%). From the perspective of Solow growth theory, what explains the catch-up in South Korean material living standards relative to the US? Be sure to think about both steady state income levels as well as transition dynamics (meaning growth that takes place outside the steady state).
- b. Using the same parameters that you used in problem set 4 to calculate total factor productivity growth (TFPG), we find using the data above that TFPG in South Korea was 1.7% per-annum over the 1965-1990, accounting for 30% of South Korea’s growth in per-capita GDP over this period. How does this record of TFPG compare with that of other countries over this same time period?
- c. From the perspective of Pack and Saggi (“Inflows of Technology and Indigenous Technological Development”), why is it remarkable that Korea was able to obtain the high levels of technological development signaled by these TFPG figures? That is, please explain in detail what forces tend to block the acquisition of technological capacity via foreign direct investment and other modes of technology transfer. How did Korea overcome these obstacles?
- d. Finally, how might Korea’s international acquisition of technology spilled over and influenced investment decisions by domestic firms? In answering this question, you may want to reflect on how Korea’s technology acquisition policy may have helped firms avoid a ‘trap of expectations.’ In doing so, please be sure to thoroughly explain the model of expectations and investment decisions that you have in mind.