

Written Exam Economics summer 2016

Development Economics

30. May, 2016

(3-hour closed book exam)

Model answer

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by “eksamen på dansk” in brackets, you must write your exam paper in Danish.

This model answer consists of 7 pages in total

The following texts are referred to in the model answer:

PRLB: Dwight H. Perkins, Steven Radelet, David L. Lindauer and Steven A. Block, 2013. “Economics of Development”, 7th edition, W.W. Norton & Company.

Ray: Debraj Ray, 1998. “Development Economics”, Princeton University Press.

Weil: David N. Weil, 2013. “Economic Growth”, Pearson International Edition, 3rd Edition, Chapters 4, 6-10, 12, 13.

Kaarsen: Kaarsen, N., 2014. Cross-country differences in the quality of schooling. Journal of Development Economics, 107, 215-224.

Problem A

Please provide short answers to the following questions and statements:

1. What is the so-called “Easterlin paradox”? Does it remain a paradox today?

The Easterlin paradox is explained in PRLB (p. 51): Richard Easterlin observed that, although per capita incomes in the United States had risen dramatically over the preceding half century, people did not seem to be any happier. Easterlin found similar results when looking across a small number of high income countries. More recent research, covering more countries, suggests that happiness and income levels are correlated, implying that economic growth improves happiness (PRLB p. 53). Thus the result does not remain a paradox.

2. Please explain what knowledge about poverty we gain from looking at the poverty gap index in addition to the poverty headcount index.

The poverty headcount index and the poverty gap are explained in PRLB (p. 185-86). The headcount index, tells us what proportion of the population is poor, and the poverty gap tells us proportionally how far below the poverty line the mean income of the poor falls. In PRLB the calculation of the poverty gap (PG) is given as

$$PG = [(PL - MC) / PL] \times H$$

where PL stands for the poverty line, MC is mean consumption per capita of all individuals below the poverty line, and H is the head count index.

3. According to the Lewis model: Do wages grow as labor is moved into the manufacturing sector during early phases of industrialization? Why/Why not?

The Lewis model is covered in PRLB (p. 691-599). Wages do not grow as labor is moved from agriculture into the manufacturing sector. The reasons are and 1) the marginal productivity of labor in the agricultural sector is zero (0) such that part of the population can be moved out of this sector with no reduction in farm output and 2) the labor supply in the manufacturing sector is perfectly elastic (because of the inflow of workers) such that the sector can hire as many workers as it wants without having to raise wages.

4. Please explain briefly why the presence of limited liability may lead a landlord to prefer sharecropping over fixed rent tenancy.

This is explained in Ray (1998, p. 439-40): If a tenant is poor and his output is uncertain, then there may be states of the world in which he will not be able to pay a fixed rent. Landlords who charge fixed rent will therefore know that such rent cannot always be paid. If the tenant is poor and the harvest fails, the rent will have to be forgiven or essentially advanced as a loan.

However, there is no guarantee that the loan will be repaid in the future, so the rent may have to be forgiven. This creates an incentive for the tenant to overinvest in risky methods of production. One way to counterbalance this tendency is for the landlord to lower the rent in bad states and raise it in good states. This solution is akin to sharecropping.

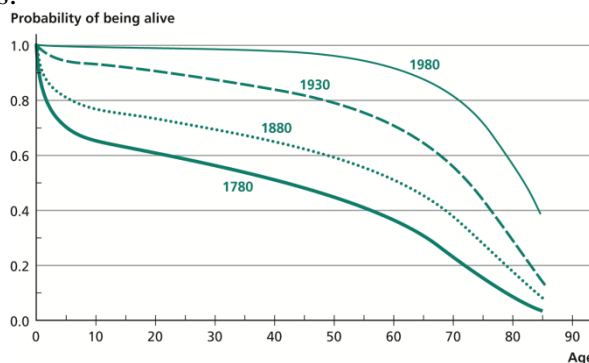
5. What are "population optimists" and "population pessimists"? Provide two theoretical arguments in favor of either view.

This is explained in PRLB (Chapter 7). Population pessimists perceive population growth as harmful to economic development. In contrast population optimists view population growth as having the potential to increase factor productivity. The theoretical arguments for the pessimists are (1) capital dilution; the investment needed to provide a constant amount of capital per worker is higher with high population growth; (2) the population growth also dilutes the human capital (less education per child) and (3) the dependency ratio is higher resulting in lower income per capita for and lower saving at any given level of income. The Malthus arguments with positive and negative feed-backs may also be mentioned. The main theoretical argument for the optimists is that population growth has the potential for increasing factor productivity. This may come about by (1) economies of scale, say in infrastructure and public service; (2)

technological change, because of larger populations having more entrepreneurs and other creators.

6. Please sketch a survival curve for a poor and a rich country, respectively.

A good figure can be found in Weil (Figure 4.13 p. 138) using survivorship functions for women in Sweden. The survival functions for 1780 and 1880 (high infant and child mortality) represents poor countries while the functions for 1930 and 1980 (low infant and child mortality) represent richer countries.



7. Please give three different motivations for providing foreign aid.

The motivations for providing aid are given in PRLB (p. 514-18). In brief the motivations are

1. Foreign policy objectives and political alliances
2. Poverty
3. Commercial ties
4. Country size
5. Democracy (after 1989)

Problem B

The answer to this problem should be based on Weil chapters 7-10 and PRLB pp. 55-74.

Please explain how growth accounting and development accounting can be used to illustrate the relative importance of factor accumulation and productivity growth in the process of economic development. Specifically,

- *illustrate how development accounting decomposes relative income differences into factors of production and productivity and discuss the relative order of magnitude observed across countries;*

Starting from a production function that incorporates physical capital and human capital as well as (total factor) productivity, expressed in per worker terms we have

$$y = Ak^\alpha h^{1-\alpha}$$

where y is output (GDP) per worker, k is physical capital per worker and h is human capital per worker.

To compare productivity in two counties, we look at the ratio of outputs in the poor and the rich country (say India and USA). Using the production function, the ratio can be expressed as

$$\frac{y_P}{y_R} = \frac{A_P}{A_R} \frac{k_P^\alpha h_P^{1-\alpha}}{k_R^\alpha h_R^{1-\alpha}}$$

Where subscript “P” indicates poor country and “R” indicates rich country. This relation shows that we can think of the actual ratio of production in the two countries as the product of the ratio of productivity and the ratio of factor accumulation:

ratio of output = ratio of productivity × ratio of factors of production

The equation also gives a method for measuring productivity differences:

$$\frac{A_P}{A_R} = \left(\frac{y_P}{y_R} \right) / \left(\frac{k_P^\alpha h_P^{1-\alpha}}{k_R^\alpha h_R^{1-\alpha}} \right)$$

This technique for breaking down differences in income into the part that is accounted for by differences in productivity and the part accounted for by different factor accumulation is called development accounting (Weil, p. 205).

Looking across countries one finds that productivity accounts for 53% of the variation in GDP per capita and that factor accumulation is responsible for 47% (Weil p. 212).

- *illustrate how productivity can be further decomposed and discuss ideas for such a decomposition of productivity gaps;*

Productivity “A” consists of two parts: Technology and Efficiency. Technology is knowledge of optimal factor combinations while efficiency is effective or ineffective use of input factors relative to the optimal input (*i.e.*, relative to the level of technology). In Weil (p. 289) productivity is decomposed into the two parts as:

$$A = T \times E$$

productivity Technology Efficiency

Neither of the measures in the equation are directly observable, but using cross country data we can obtain ratios of productivity from the development accounting and we have the ratios

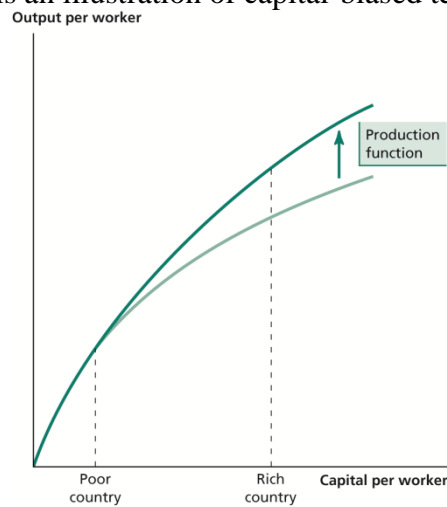
$$\frac{A_P}{A_R} = \frac{T_P}{T_R} \times \frac{E_P}{E_R}$$

In Weil the ratio of technologies is expressed as “number of years” a country’s technology lags the level in USA. At the lectures another decomposition was also shown. The message from any of the exercises is that, unless lags in technology are extremely large, most of the differences in productivity between rich and poor countries must be the result of a difference in efficiency (Weil p. 292).

- give a brief account of obstacles to technology transfers from rich to poor countries; and finally

There are two classes of obstacles to technology transfers and diffusion (Weil p. 244-48): Technology is created and developed in rich countries, making it appropriate for the existing rich country production mode and level. But this is not necessarily appropriate for the poor country production mode and level. Examples given are “capital-bias” and “skill-bias”.

Figure 8.7 in Weil is an illustration of capital-biased technological change.



The second obstacle comes about because use of new technology requires both codified knowledge and tacit knowledge. Rich countries can only transfer the codified knowledge (blueprints).

- *give a brief account of different types of inefficiencies one may encounter across the world.*

Weil (Section 10.3) discusses several types of inefficiencies:

- Unproductive Activities (activities without economic value) may come about from
 - Rent seeking (Over-regulation of the economy: Licence Raj)
 - Predator economies and states
- Idle resources
 - Unemployment/Underutilization of capital
 - Underemployment/Overstaffing
- Misallocation of factors (Need for structural transformation)
 - Lack of mobility or dual economies
 - Lack of signals (wages not equal to marginal productivity)
 - Lack of firm dynamics
 - Lack of and misallocation of finance
- Technology blocking

Problem C

The answer to this problem should be based on PRLB chapter 8, Weil sections 6.2 and 6.3 and Kaarsen.

Please describe and discuss the role of education in economic development. Specifically, describe

- *the importance of education for production and well-being;*

Education is important for production because it is an important part of human capital and the latter is modeled as a direct input in the macro production function:

$$y = Ak^\alpha h^{1-\alpha}$$

where y is output (GDP) per worker, k is physical capital per worker and h is human capital per worker. Computing the steady state level of output per worker Weil (p. 190-91) shows that

$$\frac{y_P}{y_R} = \frac{\left[A_P^{1/(1-\alpha)} \left(\frac{\gamma}{n + \delta} \right)^{1/(1-\alpha)} \right]}{\left[A_R^{1/(1-\alpha)} \left(\frac{\gamma}{n + \delta} \right)^{1/(1-\alpha)} \right]} \times \frac{h_P}{h_R}$$

where y_P is output per worker in a poor country, y_R is output per worker in a rich country, γ is the investment rate, n is the population growth rate and δ is the depreciation rate. The equation illustrates that if there are no other differences between a rich and a poor country except for their level of human capital then the ratio of steady state levels of output for two countries is proportional to the ratio of human capital.

If the relation above is given it should also be noted that education is *not* directly equal to human capital. In Weil the relation between human capital and education is given as

$$h = e^{\phi s}$$

Where s is the average number of years of schooling while ϕ is the return to schooling. Using this relation we find that a difference in years of schooling of about 6 years (say 11 years of schooling in high-income economies and 5 years of schooling in Sub-Saharan Africa, PRLB Figure 8-2 and Table 8-2) and a return to each additional year of education of 10 percent, everything else equal, can account for a relative difference in in long run incomes of $e^{0.1(5-11)} = 0.55$. Hence, if educational attainment in the form of years of schooling was the only difference between high-income countries and countries in Sub-Saharan Africa, we would expect the long run levels of GDP of the latter countries to be about half of the GDP of the former countries. Hence, schooling does not account for all of the variation in income levels (a reference to problem B may be made here).

Education is also important because knowledge is an end in itself. Education is part of the Human Development index, increased education was one of the Millennium Development Goals (MDGs) and “Quality education” is goal #4 in the Sustainable Development Goals (SDGs).

- *the educational attainment across developing countries over the past 20 years;*

PRLB (p. 258-63) gives the major trends in educational attainment. The main result is that schooling measured by enrollment rates (gross and net) have increased substantially leading to large increases in average years of schooling in almost all countries. Furthermore progress has been achieved not only in the number of years of schooling received but also in the distribution of who receives this schooling. Estimates of average years of schooling for men and women over the age of 15 reveal a gender gap that has declined significantly over time. For the developing world as a whole in 2010, women were estimated to have completed an average of 6.5 years of schooling compared to 7.6 years for men, meaning a gender ratio of 86 percent.

- *the private costs and benefits of education and the methods used to estimate the return to education;*

Private costs of education includes the direct costs such as expenses for school uniform, payment for books and other materials, transportation costs or other “unofficial” fees to ensure a child gets the attention of a teacher. In addition there are the foregone earnings, sacrificed because an

individual is in school and not working. For the majority of households in the developing nations, the opportunity costs of sending a child to school are real (PRLB p. 270).

The private benefits of education are the future higher wages obtained as a result of the education (the wage premium, given as the ratio of wages for educated workers relative to uneducated workers).

The costs and benefits are compared using the rate of return to education. Estimates of the rate of return can be often obtained from wage equations in which individual data on earnings are regressed on the number of years of schooling, and years of experience (so-called Mincer regressions). An alternative is to use the macro production function and average years of schooling in addition to a measure of physical capital. Increasingly researchers are using natural experiments to estimate the returns (PRLB p. 277).

- *issues with the quality of schooling and some possible explanations of the variation in the quality of schooling.*

An important puzzle in the educational attainment in developing countries concerns schooling and learning. The puzzle involves the fact that schooling in many developing countries often produces little in way of learning. This is illustrated by comparing results of standardized test scores across countries (PRLB p. 264-65, Weil p. 194). Kaarsen transforms the differences in standardized test scores into quality adjusted years of schooling. By this transformation he shows that schooling (quality adjusted) varies much more across countries compared to the unadjusted schooling and further that variation in quality adjusted schooling accounts for a much larger share of the variation in incomes across countries.

The main possible explanations for the variation in the quality of schooling are partly a problem of funding and partly of implementation. For funding the main issues are underfunding (developing countries are spending smaller fractions of GDP on education compared to rich countries) and misallocation of funds (developing countries spend proportionally more on tertiary education than on primary education compared to rich countries). For implementation the major problems are to get both children and teachers to attend school. For both teachers and pupils absence rates are stunningly high in developing countries compared to rich countries.