

SGPE Summer School. Tutorial 5.

Q1. Let the production function be  $Y = K^{\frac{1}{3}}(EN)^{\frac{2}{3}}$ .

- (a) What will production and production per capita be if  $K = 8$ ,  $E = 1$  and  $N = 27$ ?
- (b) What will production and production per capita be if  $K = 16$ ,  $E = 1$  and  $N = 54$ ?
- (c) Compare the answers and explain.

Q2. Illustrate the effects on the steady state capital stock of the following shocks (in terms of the real interest rate and capital per unit of effective labour) and explain the results:

- (a) An increase in the depreciation rate.
- (b) An increase in the mark-up.
- (c) Consumers become more impatient.

Q3. The people of the Hexagon seem to like to solve their problems with government regulation (unlike the people of the Pentagon, who seem to like to solve their problems with markets).

The Hexagonians decide at some point to introduce a set of laws to shorten the working week by limiting the number of hours that a person can work per. The new regulations end up reducing the number of hours worked per capita by 10 percent.

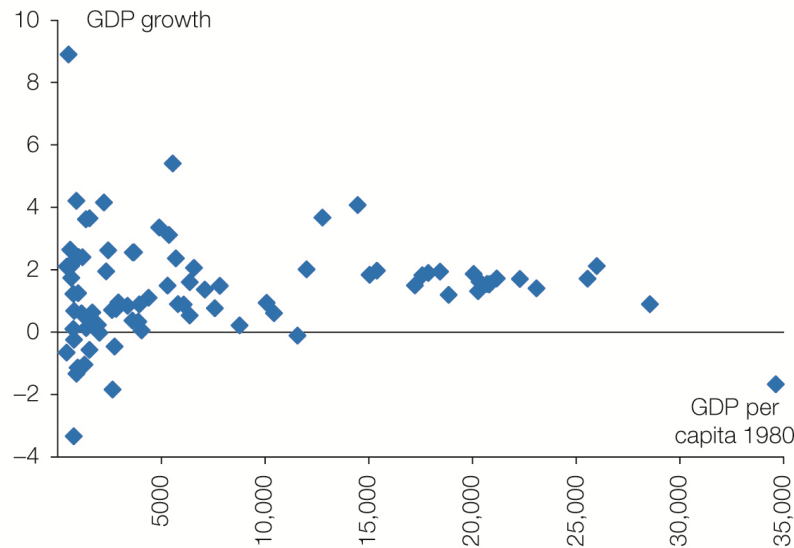
We can model this by using a version of the production function  $Y = F(K, EHN)$ , where  $H$  is hours worked, and the other variables are as they were before.

- (a) What is the condition determining the steady state capital stock per effective worker given our new production function?
- (b) How is the steady state capital stock affected by the change in regulation if the natural rate of unemployment remains unchanged?
- (c) Suppose that Hexagonia has no population growth, and no technological development. The capital stock is initially at the steady state level. Draw diagrams with time on the horizontal axis to illustrate what happens over time with the capital stock, investment, the real interest rate, and production after the reduction in working time.

Q4. In the growth model that we have discussed, population growth leads to steady-state growth in total output, but not in output per worker. Do you think this would still be true if the production function exhibited increasing or decreasing returns to scale? Explain.

**Q5. According to Fig. 5.15 (reproduced below), there is much higher dispersion of growth rates among poor countries than among high-income countries. What could be the reasons?**

Fig. 5.15 GDP per capita in 1980 and growth 1980–2009, all countries



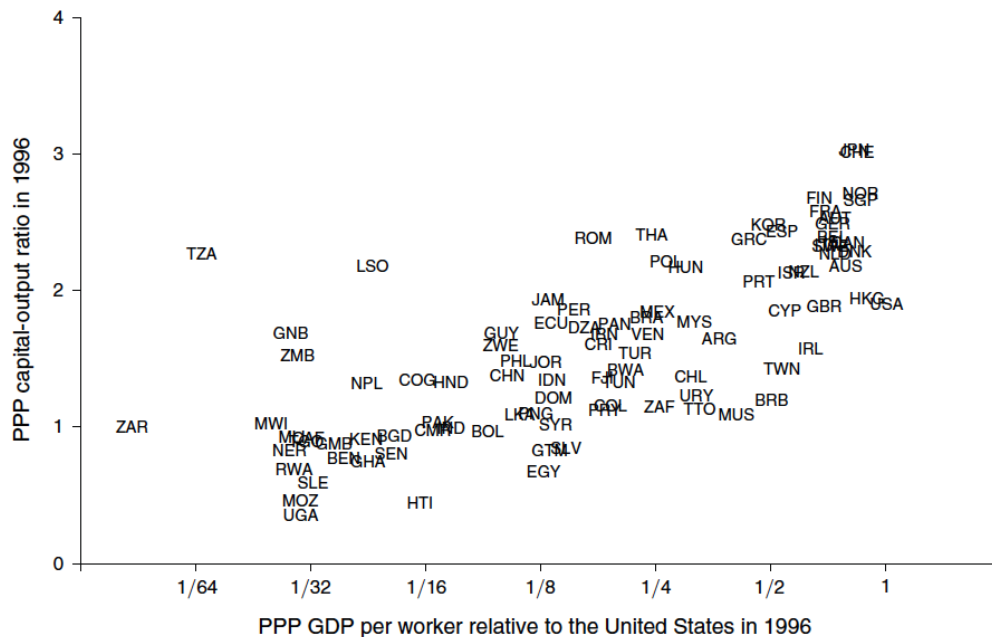
Note: GDP per capita, PPP (constant 2005 international \$).  
Source: World Bank, International Comparison Program database.

**Q6. Suppose that there was no depreciation of capital. How would this affect...**

- (a) ...the levels of the capital stock and production?
- (b) ...the growth rates of the capital stock and production?

**Q 7. Do you think is it a good idea to tax capital income? Explain.**

**Q8. As seen in the figure<sup>1</sup> below (the data are also available in your textbook in Table 5.1, and in Hsieh & Klenow's 2010 paper), most poor countries have a low level of capital relative to income. Why is this? Discuss this question with the help of the equation for K/Y in the text.**



<sup>1</sup> Hsieh, Chang-Tai, and Peter J. Klenow. 2010. "Development Accounting." *American Economic Journal: Macroeconomics*, 2(1): 207-23.

**Q9. Should the government subsidise research and development (R&D)? (*Hint: Are there any externalities or market failures?*)**

**Q10. Should the government subsidise education?**

**Q11. What, in your judgement, is the most important reason why countries have not converged to the same level of income per capita?**

**Q12. Given the formula that you found above for steady state income per capita, what is the implied relationship between income and the degree of competitiveness? Should governments always want to drive mark-ups to zero? Can you think of any reasons why mark-ups might actually be good for long run income growth?**