Intermediate Macroeconomics， Assignment 1

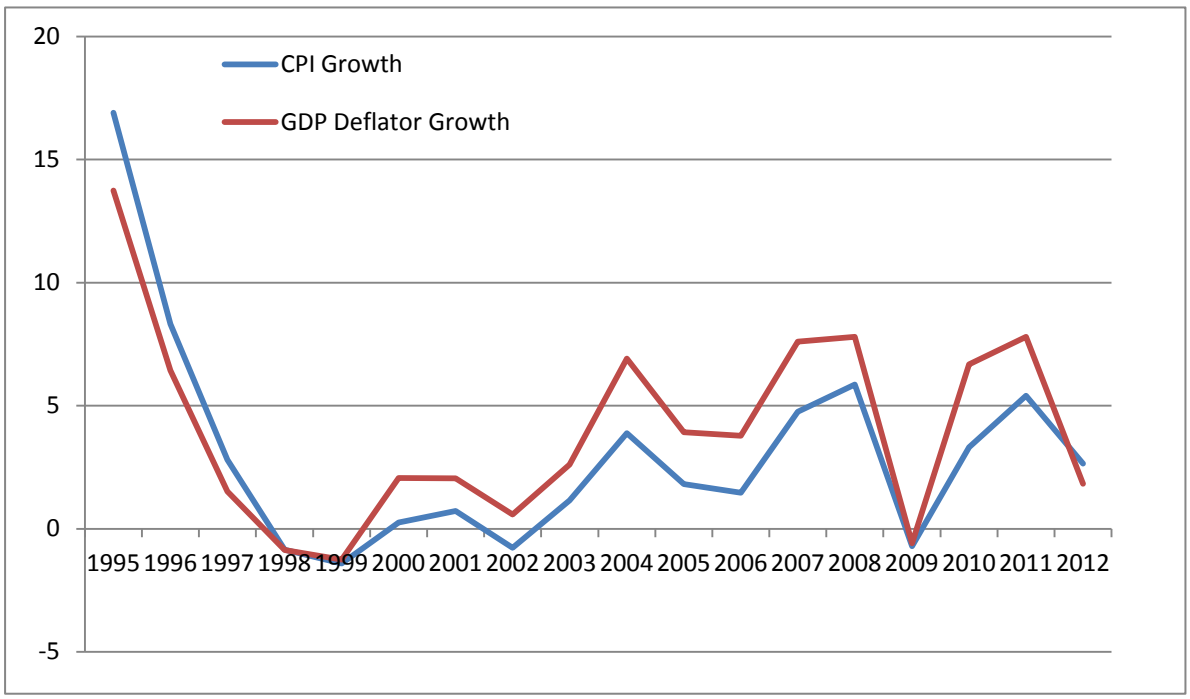
Due **March 20th** (Friday), in-class

1. What do you think are the defining characteristicsof a science? Does the study of the economyhave these characteristics? Do you think macroeconomicsshould be called a science? Why orwhy not? (Open question.)

No standard answer for this question. Either you believe that it is a science or that you don't, as long as you can provide your reasonable thoughts, your answer is the correct answer. In other words, you have to make your own argument. (Personally I think this is exactly what economics is – making arguments.)

2. During our first lecture, we have seen an interesting graph showing the difference between the change of CPI and the change of GDP deflator for the US. Try to construct a corresponding graphof China for **1995-2013**. You can find China's historical data on CPI and GDP deflator in the dataset that can be downloaded from **http://api.worldbank.org/v2/en/country/chn?downloadformat=excel**. (If you do not have a Microsoft EXCEL software available for use, a free WPS Office is available at *http://www.wps.cn/product/wps2013/*)

The graph you have obtained should look similar as the following one:



3. Consider a Cobb–Douglas production functionwith three inputs. K is capital (the number ofmachines), L is labor (the number of workers),and H is human capital (the number of collegedegrees among the workers). The productionfunction is

$$Y = K^{1/3}L^{1/3}H^{1/3}$$

a. Derive an expression for the marginalproduct of labor. How does an increase in theamount of human capital affect the marginalproduct of labor?

b. Derive an expression for the marginalproduct of human capital. How does anincrease in the amount of human capitalaffect the marginal product of human capital?

c. What is the income share paid to labor? What is the income share paid to human capital?In the national income accounts of this economy, what share of total income do you think workers would appear to receive?(Hint: Consider where the return to human capital shows up.)

d. An unskilled worker earns the marginal productof labor, whereas a skilled worker earnsthe marginal product of labor plus themarginal product of human capital. Usingyour answers to parts (a) and (b), find the ratio of the skilled wage to the unskilledwage. How does an increase in the amount of human capital affect this ratio? Explain.

e. Some people advocate government funding of college scholarships as a way of creating a more egalitarian society. Others argue that scholarships help only those who are able to go to college. Do your answers to the preceding questions shed light on this debate?

a. The marginal product of labor is

$$MPL = \frac{\Delta Y}{\Delta L} = \frac{1}{3}K^{1/3}L^{-2/3}H^{1/3},$$

and obviously an increase of the amount of human capital H increases the marginal product of labor as well.

b. The marginal product of human capital is

$$MPH = \frac{\Delta Y}{\Delta H} = \frac{1}{3}K^{1/3}L^{1/3}H^{-2/3}$$

and obviously an increase of the amount of human capital H decreases the marginal product of labor as well.

c. The income share paid to labor is

$$L \times MPL = \frac{1}{3}K^{1/3}L^{1/3}H^{1/3} = \frac{1}{3}Y,$$

and similarly, the income share paid to human capital is

$$H \times MPH = \frac{1}{3}K^{1/3}L^{1/3}H^{1/3} = \frac{1}{3}Y.$$

Since both labor payment and human capital payment goes to the worker, they will receive 2/3 of the total income.

d. The ratio of skilled wage over unskilled wage is

$$\frac{MPL+MPH}{MPL} = 1 + \frac{L}{H},$$

and obviously the increase of human capital H decrease this ratio.

e. Yes, as shown by our previous results, as more and more people get higher education, the amount of human capital H in the economy increases, which actually reduces the wage difference between educated workers and uneducated workers. This will help to create a more egalitarian society.