Student Number .....

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EE312 Macroeconomics, 2/2013 (Sec. 046402)
Problem Sets 4 : Ch.4 Part 2 Endogenous Growth Model

Please submit at the BE office, 5th floor department of Economics building.
Deadline of submission : March 21, 2014, before 15.00 hrs.
Late submission will not be accepted.
*** Exam will consist of essay-type questions only.**

1. In the endogenous growth model, suppose that there are three possible uses of time. Let u denote the fraction of time spendt working. **Let s denote the fraction of time spent neither working nor accumulating human capital (call this unemployment)**, and $1 - u - s$ the fraction of time spent accumulating human capital. Assume that $z = 1$ and $b = 4.2$. Also assume that the economy begins period 1 with 100 units of human capital.

   (a) Define the consumer's budget constraint, the law of motion of human capital, the firm's production function and the firm's profit function. (Fill in the blanks in the table below)

Consumers	**Firm**
C = ... $H^{s'}$ = (.....)	Y = ... π = ...
b = efficiency of human capital accumulation technology	The demand curve is infinitely elastic at w = z

   (b) Define equilibrium consumption and growth of capital accumulation. (Fill in the blanks below.)
   The market clears at $w =$ ..... where $uH^d =$ .....
   Equilibrium consumption and growth of human capital accumulation: (Define H' , $\frac{H'}{H}$ and $\frac{H'}{H} - 1$.)

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   (c) From question (b), draw two diagrams; one to show equilibrium in the labour market and the other to show growth of human capital.

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(d) Suppose that for periods 1,2,3, ..., 10, $u = 0.7$ and $s = 0.05$. Calculate aggregate consumption, output, and the quantity of human capital in each of these periods. (You may use a computer program or a calculator. Make sure you understand the calculations and the intuitions behind.)

t	H	Y	C
1	100.0	70.0	70.0
2	105.0	73.5	73.5
3			
4			
5			
6			
7			
8			
9			
10			

(e) Suppose that, in period 11, $u = 0.6$ and $s = 0.15$. Then, in period 12, 13, 14,...., $u = 0.7$ and $s = 0.05$. Calculate aggregate consumption, output, and quantity of human capital inperiods 11, 12, 13, ...,20.(You may use a computer program or a calculator. Make sure you understand the calculations and the intuitions behind.)

t	H	Y	C
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

(f) Suppose alternatively that in period 11, $u = 0.6$ and $s = 0.05$. Then, in period 12, 13, 14,...., $u = 0.7$ and $s = 0.05$.Again, calculate aggregate consumption, output, and the quantity of human capital in periods 11, 12, 13, ..., 20. (You may use a computer program or a calculator. Make sure you understand the calculations and the intuitions behind.)

t	H	Y	C
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

(g) Now Suppose that in period 11, $u = 0.6$ and $s = 0.10$. Then, in period 12, 13, 14,...., $u = 0.7$ and $s = 0.05$. Calculate aggregate consumption, output and quantity of humand capital in period 11, 12, 13, ..., 20.(You may use a computer program or a calculator. Make sure you understand the calculations and the intuitions behind.)

t	H	Y	C
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

(h) What do you conclude from your results in parts (d)-(g). Discuss. [Hint: in question (e), (f) and (g) there is one-time drop in employment, call this recession. The difference is in what the unemployment do.]

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2. In the endogenous growth model, the competitive equilibrium is given by

$$Y = C = zuH$$

$$H' = b(1-u)H$$

where Y = output; C = consumption, z = total factor productivity; H and H' = levels of current nd future human capital, respectively; b = the efficiency of human capital accumulation technology; and u - time allocated to producing output.

What is the most important source of economic growth in the model? What are the growth rates of consumption, output and human capital? Explain why economuc growth is unbound in the model as well as compare the source of growth with Solow model. (If the space provided is not enough, please attach a separate paper.)