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Intermediate Macroeconomics Indiana University
Summer_08 Bloomington

Final Exam

Part_01: Multiple Choice Questions

Directions: There are 12 multiple choice questions in this section. Each question is worth 2 points. For each question, find the best possible answer.

1. A competitive equilibrium is Pareto optimal if there is no way to rearrange or to reallocate goods so that
   (a) anyone can be made better off.
   (b) no one can be made worse off.
   (c) someone can be made better off without making someone else worse off.
   (d) someone can be made better off without making everyone else worse off.

2. A competitive equilibrium is a state of affairs in which
   (a) markets clear, and output is maximized.
   (b) output is maximized, and all agents are equally well-off.
   (c) all agents are equally well-off and agents are price-takers.
   (d) agents are price-takers, and markets clear.

3. In an economic model, an endogenous variable is
   (a) a stand-in for more complicated variables.
   (b) determined by the model itself.
   (c) determined outside the model.
   (d) a variable that has no effect on the workings of the model.

4. The idea that an improvement in technology causes an increase in population but causes no increase in the average standard of living is attributed to
   (a) Adam Smith.
   (b) Thomas Malthus.
   (c) Robert Solow.
   (d) Milton Friedman.

5. In the Malthusian model, state-mandated population control policies are likely to
   (a) decrease the equilibrium size of the population and increase the equilibrium level of consumption per worker.
   (b) decrease the equilibrium size of the population and have no effect on the equilibrium level of consumption per worker.
   (c) have no effect on the equilibrium size of the population and increase the equilibrium level of consumption per worker.
   (d) have no effect on the either equilibrium size of the population and the equilibrium level of consumption per worker.

6. In Solow's model of economic growth, suppose that *s* represents the savings rate, *z* represents total factor productivity, *k* represents the level of capital per worker, and $f(k)$ represents the per worker production function. Also suppose that *n* represents the population growth rate and *d* represents the depreciation rate of capital. The equilibrium level of capital per worker, k^*, will satisfy the equation:

(a) $szf(k^*) = (n+d)k^*$

(b) $szk^* = (n+d)f(k^*)$.

(c) $nf(k^*) = \dfrac{sk^*}{(s+d)}$.

(d) $f(k^*) = \dfrac{s}{(n+d)}k^*$.

7. In Solow's exogenous growth model, the principal obstacle to continuous growth in output per capita is due to

(a) the declining marginal product of labor.
(b) the declining marginal product of capital.
(c) limits in the ability of government policymakers.
(d) too little savings.

8. The Golden Rule of capital accumulation maximizes the steady-state level of

(a) output per worker.
(b) capital per worker.
(c) consumption per worker.
(d) investment per worker.

9. In the context of the Solow growth model, so-called growth miracles, such as Japan, South Korea, Singapore and Hong Kong are most easily explained by

(a) reductions in the population growth rate.
(b) increases in the savings rate.
(c) removal of barriers to technology.
(d) improvements in public health.

10. In the endogenous growth models of Lucas and Romer, an increase in a worker's level of human capital

(a) increases the amount of additional human capital she can produce, but does not increase the amount of output she can produce.
(b) increases the amount of additional output she can produce, but does not increase the amount of human capital she can produce.
(c) increases both the amount of additional human capital she can produce and the amount of output she can produce.
(d) increases neither the amount of additional human capital she can produce nor the amount of output she can produce.

11. Which of the following is best characterized as being nonrivalrous?
    (a) Consumption goods
    (b) Services
    (c) Physical capital
    (d) Knowledge

12. In the endogenous growth model presented in the text, suppose that *u* represents the fraction of time spent working (as opposed to accumulating human capital) and *b* represents the efficiency of human capital accumulation. The growth rate of consumption equals
    (a) $u(1-b)-1$.
    (b) $1+b(1-u)$.
    (c) $(1-b)(1-u)$.
    (d) $b(1-u)-1$.

Part_02: Long questions

Directions: Question 1 and 2 has different numbers of point allocated. Please allocate your time wisely.

Question_01:

A. (9 points) We are considering a standard Solow Growth model. But now we have a distortionary income tax *t*. Hence the per capita consumption looks like:

$$c = (1-s)(1-t)zf(k) = (1-t)zf(k) - (1-t)szf(k)$$

Now assume that the income tax decreases from *t* to *t'*. Do the following:

i) Provide economic intuition about how this affects output per worker, capital per worker and the steady state capital per worker.
ii) Provide a graphical representation of the steady state changes in the capital stock per worker

B. (9 points) Suppose we have a standard endogenous growth model. The budget constraint for the consumer looks like: $C = w\mu H^s$ where μ is the fraction of time spent on working. The technology for human capital is defined as follows:

$$H^{s'} = b(1-\mu)H^s$$

Here, $H^{s'}$ is next or future period's capital and H^s is just this period's human capital. The term b captures the efficiency of the human capital accumulation and is assumed to be $b \succ 0$. The production function is given by:

$$Y = z\mu H^d$$

Suppose now the government is able to decrease $(1-\mu)$. Explain the following (either by graph or by words, but not both):

i) How will this effect initial level of consumption?
ii) How will this effect the human capital accumulation?

Question_02:

In this section, you will be asked three essay type questions:

- **A.** Write down first and second welfare theorems. Provide the mathematical condition that needs to be satisfied for Pareto optimality**.(2 points)**
- **B.** Write down **at least** four stylized facts of economic growth**.(4 points)**
- **C.** Write down **one** similarity between Malthus and the Solow model and **one** difference. Which of the stylized facts of economic growth Solow model can explain but Malthus model cannot**?(2 points**)