

Exam 2. Econ420. Fall 2009
Professor Lutz Hendricks

Instructions:

- Answer all questions.
- *Explain* your answers – do not just state them.
- *Show* your derivations – do not just state the final result.
- The total time is 75 minutes.
- The total number of points is 100.

1 Romer Model

The Romer model is summarized by the following equations:

- Production functions:

$$Y_t = A_t L_{yt} \quad (1)$$

$$\Delta A_t = A_{t+1} - A_t = \bar{z} A_t L_{at} \quad (2)$$

- Resource constraint:

$$\bar{N} = L_{yt} + L_{at} \quad (3)$$

- Allocation of labor:

$$L_{at} = \ell \bar{N} \quad (4)$$

$$L_{yt} = (1 - \ell) \bar{N} \quad (5)$$

Questions:

1. [5 points] Derive the balanced growth rates of A and y .
2. [15 points] Plot the time paths of $\ln(A_t)$ and $\ln(y_t)$ for an economy that experiences a permanent reduction in ℓ at date t_0 . Explain.

2 Walrasian Labor Market

1. [5 points] Draw the labor market diagram for the Walrasian labor market. Be sure to label the axes. Just to be specific, assume the production function is $Y = AK^\alpha L^{1-\alpha}$.
2. [10 points] How would a *temporary* increase in productivity (A) change today's employment and wages? Explain why you think labor supply and labor demand shift (or don't shift).
3. [10 points] How would *permanent* increase in productivity (A) change today's employment and wages? Explain why your answer differs from #2.

3 Inflation

Assume that the price level in year 1 is $P_1 = 100$, the price level in year 10 is $P_{10} = 150$, and the nominal interest rate is $i = 9\%$ per year.

1. [8 points] Calculate the *annual* inflation rate.
2. [7 points] Calculate the real interest rate *per year*.
3. [5 points] Calculate the *annual* real return on holding money.
4. [8 points] Is anticipated inflation more or less costly than unanticipated inflation? Explain.

4 IS Curve

1. [5 points] What does the Permanent Income Hypothesis say?
2. [7 points] Why is the marginal propensity to consume out of current income small?
3. [15 points] Figure 1 shows the lifetime earnings profiles of two households. Both face the same constant interest rate, which we set to zero for simplicity. Plot age consumption profiles for both households that are consistent with the Permanent Income Hypothesis. Explain what you draw.

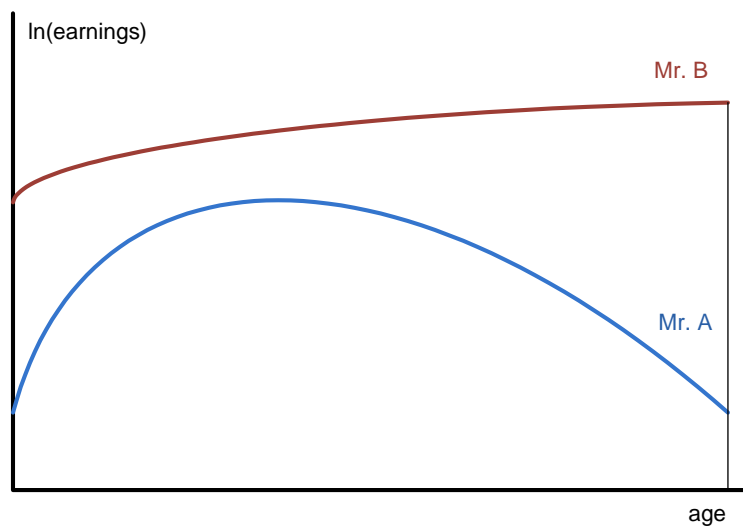


Figure 1: Age earnings profiles

5 Answers: Exam 2. Fall 2009. Econ420

5.1 Romer Model

1. $g(A) = g(y) = \bar{z}\ell\bar{N}$. Derived by dividing the law of motion for A by A .
2. Until the shock: constant growth, so that $\ln(A)$ and $\ln(y)$ follow straight lines. At t_0 the growth rate of A falls, but the level of A does not change – the $\ln(A)$ curve has a downward kink. The growth rate of y also falls, but the level of y rises. See figure 6.4 in the Jones text.

5.2 Walrasian Labor Market

1. See figure 7.3 in the Jones text.
2. Labor demand is MPL, which increases with A . The curve shifts out. Labor supply depends on lifetime income, which rises, but not by much because the increase in A is temporary. Wages and employment both rise.
3. Here the income effect on labor demand is stronger. Wages rise more. Employment rises less (or falls).

5.3 Inflation

1. The inflation rate is $(1 + \pi)^{10} = 1.5$ or $\pi = 0.041$.
2. Formula: $(1 + r)^T = \frac{(1+i)^T}{(1+\pi)^T}$. $(1 + \pi)^T = 1.5$. $(1 + i)^T = 1.09^{10} = 2.37$. $1+r = (2.37/1.5)^{0.1} = 1.047$. Alternatively, using the Fisher equation: roughly $r = i - \pi$ or $4.9\% = 9\% - 4.1\%$.
3. The real return on money is the negative inflation rate.
4. Anticipated inflation is less costly. It is built into contracts, so that inflation does not distort relative prices.

5.4 IS Curve

1. When the household chooses consumption, she should only consider the present value of lifetime income, not how much is earned in each period.
2. If a household experiences a transitory increase in income, she spreads the consumption gain over her entire lifetime.
3. Draw two parallel log consumption lines. The constant interest rate suggests to draw straight lines. The levels should be such that the area under each consumption curve is roughly the same as the area under each earnings curve (not exactly because this is in logs).