

SIMON FRASER UNIVERSITY
Department of Economics

Econ 305
Intermediate Macroeconomic Theory

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MIDTERM EXAM

Answer the following questions True, False, or Uncertain. Briefly explain your answers. No credit without explanation. (10 points each).

1. Tax increases reduce employment.

UNCERTAIN. *This is false if taxes are lump-sum. A lump-sum tax reduces household wealth, which increases labor supply (assuming leisure in a 'normal' good). However, if income/wage taxes are increased, then employment could fall if the substitution effect offsets the income effect.*

2. Inflation occurs when all prices increase.

FALSE/UNCERTAIN. *By definition, inflation occurs when a price index increases. Price indices weight the prices of many goods (according to expenditure shares), and can rise even when some of the prices in the index fall.*

3. Empirical evidence suggests that per capita income is converging across countries.

UNCERTAIN. *There is no evidence of unconditional convergence, where every country converges to the same level of per capita income. However, there is evidence in favor of conditional convergence, which allows each country to have its own steady state per capita income level. Conditional convergence just implies that countries that are farther away from their own steady state grow faster, but this does not necessarily imply that poor countries grow faster than rich countries, simply because poor countries might have lower steady state per capita incomes (e.g., if their savings rates are lower).*

4. Higher interest rates lead to lower current consumption.

UNCERTAIN. *This is true unambiguously for borrowers. However, for lenders it could be false if the income effect dominates the substitution effect.*

5. All else equal, countries with relatively volatile output should have higher savings rates.

TRUE/UNCERTAIN. *According to Friedman's Permanent Income Hypothesis, an individual's (or country's) saving rate should be an increasing function of the relative importance of the transitory component of income. Therefore, if volatile output reflects a high variance of temporary shocks, then the country should save more. (If income fluctuations are primarily driven by permanent shocks, then consumption would fluctuate a lot, with little effect on saving).*

The following questions are short answer. Briefly explain your answer. Clarity will be rewarded.

6. (25 points). Consider a static one-period economy as discussed in Chapter 4. Output is produced using the production function: $Y = zN$. The representative household's preferences are given by

$$U(C, \ell) = \sqrt{C} + \sqrt{\ell}$$

As discussed in class, the household's time constraint is $h = \ell + N$. For simplicity, suppose there is no government in this economy.

- (a) Compute the competitive equilibrium wage rate and employment for this economy.

In this case, the optimality condition

$$\frac{U_\ell}{U_c} = w$$

implies

$$\sqrt{\frac{C}{\ell}} = z$$

since $w = MPN = z$ in this case. Using the constraint $\ell + N = h$ to substitute out ℓ , imposing the equilibrium condition $C = zN$, and then solving for N gives

$$N = \left(\frac{z}{1+z} \right) h$$

- (b) What happens to employment and the wage rate when z increases? Interpret your result using a Labor Supply/Labor Demand graph.

From the solutions in part (a), it is clear that when z increases, both w and N increase. In this case, the labor demand graph is a flat line with intercept z (since the MPN is independent of N), and the labor supply curve is upward sloping. When z increases, the labor demand curve shifts up, and both z and N increase. (Although the labor supply curve also shifts up due to a positive income effect, we know from the solutions in part (a) that this upward shift does not offset the upward shift in labor demand, so that on net N rises).

7. (25 points). Consider two countries (country A and country B) with the following characteristics: Each produces output using the Cobb-Douglas production function $Y = zK^{1/3}N^{2/3}$. In addition, in both countries the labor force grows by 1% per year, and the capital stock depreciates at the annual rate of 5%. Suppose the savings rate in country A is 20% and the savings rate in country B is 5%.

- (a) Compare the steady state levels of per capita income in countries A and B.

The steady state condition is

$$sy = (n + \delta)k$$

Using the production function to solve for k^ , we get*

$$k^* = \left(\frac{zs}{n + \delta} \right)^{3/2}$$

which then implies

$$y^* = z \left(\frac{zs}{n + \delta} \right)^{1/2}$$

Since z , n , and δ are the same for both countries, we have

$$\frac{y_A}{y_B} = \sqrt{\frac{s_A}{s_B}} = \sqrt{4} = 2$$

- (b) What does your answer to part (a) suggest about the role of saving and investment in explaining the observed cross-sectional differences in per capita incomes?

There are huge differences in per capita incomes across countries. Per capita incomes in the richest countries are 30 or more times greater than those in the poorest economies. To explain this kind of variation would require saving rates to differ by nearly a factor of 1000! Clearly, with the above production function, differences in savings rates can only explain part of the observed differences in per capita incomes.

- (c) Suppose instead the production function in each country is $Y = zK^{2/3}N^{1/3}$, so that capital's share is now higher. How does your answer to part (a) change? Does this suggest a role for 'human capital' in explaining cross-sectional differences in per capita incomes?

Repeating the same steps as in part (a), we now get

$$\frac{y_A}{y_B} = \left(\frac{s_A}{s_B} \right)^2 = 16$$

Now saving rate differences are amplified. Now to generate per capita income ratios of 25-30 would only require saving rate ratios of 5 or 6, which is not too implausible. The problem, of course, is that data suggests that capital's share of GDP is 1/3, not 2/3. However, if we adopt a broad view of capital, and view part of it as compensation for 'human capital', then this might work. (See Mankiw, Romer, Weil (QJE, 1992) for details).