

ECON 222

Winter 2005 – Sections A and B

Midterm Exam Questions – ANSWER KEY

PART A – True, False, Uncertain

1. TRUE - Real GDP is evaluated using 2003 prices and 2004 quantities. More computers were produced while production of all other goods remained constant; hence real GDP increased. Nominal GDP in 2004 was the same as in 2003 because the dollar value of computer sales didn't change. Since the GDP deflator is nominal GDP (which was constant) divided by the real GDP (which increased), the GDP deflator decreased. Singapore experienced deflation in 2004.
2. TRUE – Using $Y = GNP - NFP$ gives $Y = 95$. Then using $Y = C + I + G + NX$ we can solve for $G = 5$. Since $G > T - TR - INT$, the government is running a budget deficit (equal to -3 .)
3. FALSE - The nominal after-tax interest rate $(r + \pi)(1 - t)$ increases with inflation. However, the real after-tax interest rate $(r + \pi)(1 - t) - \pi$ decreases with inflation (at rate $t\pi$).
4. FALSE – Using the fact that

$$\frac{u}{148203} = 0.054$$

$$\frac{u}{147979} = 0.052$$

in each of the two months, this means that there were 8003 million unemployed in Dec. 2004 and 7695 million unemployed in Jan. 2005. Subtracting these amounts from the total labour force gives 140.200 million employed workers in Dec. 2004 and 140.284 million employed workers in Jan. 2005. Hence the number of employed workers rose over the period.

5. FALSE – An increase in expected future MPK shifts the I^d curve to the right and an increase in expected future wealth will shift the S^d curve to the left. Both of these effects together increase the gap between domestic investment and saving, causing the CA deficit to increase.
6. TRUE - As G_{JAP} increases, the saving curve in Japan shifts left. This means that the interest rate in international credit market must raise to reestablish equilibrium between desired investment and saving. This will imply a reduction in investment in both countries.

7. FALSE - Productivity growth is given by

$$\frac{\Delta A}{A} \approx \frac{\Delta Y}{Y} - 0.3 \frac{\Delta K}{K} - 0.7 \frac{\Delta N}{N}$$

Hence productivity growth from 2003 to 2004 would be approximately $4\% - 0.3(1\%) - 0.7(2\%) = 2.3\%$.

PART B – Long Questions

1. ANSWER –

(a) Setting MPK equal to the tax-adjusted user cost of capital gives

$$\frac{2}{K^{0.5}} = 0.25$$

so that $K^* = 64$.

(b) Substituting $K^* = 64$ into the production function, we can find the MPN

$$\frac{\partial Y}{\partial N} = \frac{8}{N^{0.5}}$$

Setting this equal to the wage and rearranging gives labour demand

$$N^d = 64/w^2$$

Since $N^* = 4$, it must be that $w^2 = 16$ or $w = 4$. Given that $N^s = zw$, and $N^* = w^* = 4$, we know that $z = 1$.

(c) If τ rises, then the user cost of capital will rise. This will lead to a lower level of capital K^* which will in turn lower the MPN. A fall in MPN causes labour demand N^d to fall, leading to a lower equilibrium wage and employment level in the labour market.

(d) An increase in s increases total savings, which shifts the S^d curve to the right (in the goods market) and lowers the real interest rate in a closed economy. A lower real interest rate lowers the user cost of capital, which will lead to a higher level of capital K^* .

2. (a) After-tax income is the same in both periods: $Y_1 - T_1 = Y_2 - T_2$. There is no need to borrow or lend to smooth consumption. Private saving will be zero in both periods and $C = C_1 = C_2 = Y_1 - T_1 = Y_2 - T_2$.

(b) The present value of tax collection does not change. Hence $C = C_1 = C_2 = Y - 100$ as in part(a). However individuals will save the amount of the tax cut (50) in the first period and accumulate $50(1 + r) = 55$ in the second period anticipating $T_2 = 155$. This is an example of Ricardian equivalence.

(c) A higher interest rate does not change the consumption profile of individuals since no lending or borrowing occurs. Individuals will still save 50 in the first period (to cover for the government deficit) but they will accumulate $50(1 + r) = 60$ anticipating $T_2 = 160$. The expected tax in period 2 is now higher since the interest rate is higher (and the government runs a deficit in the first period).

(d) Private saving will be negative in the first period since $Y_1 - T_1 < Y_2 - T_2$ (after-tax income is lower in period one). Individuals need to borrow to smooth consumption.

(e) An increase in the interest rate is bad news for borrowers. Both income and substitution effects go in the same direction. Private saving will increase in the first period (i.e. borrowing will fall) and consumption will decrease in both periods.

3. (a) In a steady-state: $sk^{0.5} = dk$ (saving per worker equals net investment per worker and net investment per worker is zero). Solving yields $s = 0.3$.

(b) The golden rule level of capital stock is given by: $MPK = d$. The MPK is $\frac{\partial Y}{\partial K} = \frac{N^{0.5}}{2K^{0.5}}$. Evaluating the last expression at $N = 100$ and $K = 900$, we find that $MPK = 0.1667 > d = 0.10$. Hence the economy of Tajikistan is below the golden rule level of capital. An additional unit of capital would increase output by more than what needed to replace it once depreciated. Tajikistan still has prospects for higher output and higher consumption per capita.

(c) The golden rule level of capital stock is given by: $\frac{100^{0.5}}{2K^{0.5}} = 0.10$. Solving yields $K = 2500$. The savings rate that will yield this level is: $s25^{0.5} = d25$ since $k = \frac{K}{N} = \frac{2500}{100} = 25$. Solving yields $s = 0.5$.

(d) In the short-run a sudden rise in the savings rate will decrease consumption because more resources will be directed to investment. In the long-run, higher investment will increase the capital stock (as long as the economy does not overshoot the golden rule level) and both production and consumption will be higher than they were with the lower savings rate.