ECON 222

Winter 2004 – Sections C and D

Midterm Exam Questions – ANSWER KEY

PART A – True, False, Uncertain

1. TRUE – If the labour supply curve is downward sloping, then a rise in the real wage causes a decrease in labour supply. The substitution effect from a rise in the real wage is to supply more labour, while the income effect from a rise in the real wage is to supply less labour. If the total effect is to supply less labour, then the income effect must be greater than the substitution effect.

2. FALSE – Taking Canada as an example, GDP measures output produced within the geographical borders of Canada. GNP measures output produced by Canadian factors of production (Canadian firms and workers) regardless of their location. Hence GNP is a better measure of the total income (or production) of Canadians.

3. FALSE – An increase in the savings rate will increase steady state output per worker y^*, but this will only be a one-time increase. The only way there could be a sustained increase in y^* is if there was a continual increase in the savings rate. However we assume that there is some upper bound on the savings rate (ie, the savings rate cannot continue to increase indefinitely.)

4. TRUE – The tax-adjusted user cost is given by: $u_c = \frac{(r+d)p_k}{1-t}$. The tax-adjusted user cost must decrease.

5. TRUE – A decrease in I^{US} will put downward pressure on the world interest rate so that S^{US} will also decrease. In Europe $I^{EEU} \uparrow$ and $S^{EEU} \downarrow$.

6. FALSE – Gross investment could be positive but too low to cover depreciation. Hence net investment will be negative.

PART B – Long Questions

1. a) The production function is $Y = 500logN$. From this we have $MPN = 500/N$. Setting MPN equal to the real wage and solving for N we have $N^d = 500/\omega$.

b) Setting $N^d = N^s$ we have $500/\omega = 5\omega$, so $\bar{\omega} = 10$ and $\bar{N} = 50$.

c) Setting $N^d = N^s$ we have $500/\omega = 1.25\omega$, so $\bar{\omega} = 20$ and $\bar{N} = 25$.

d) The production function is $Y = 500 + 50N$. From this we have $MPN = 50$. Setting MPN equal to the real wage, the labour demand curve is given by the equation $\omega = 50$. (ie, the labour demand curve is horizontal.)

e) Regardless of what N^s is, $\bar{\omega} = 50$. When the N^s shifts, the real wage does not change. This is different from part c), where the real wage rises given the shift in N^s.

2. a) Dividing both sides by N_t gives $y_t = k_t^{0.5}$.

b) Dividing both sides by N_{t+1} gives $\frac{K_{t+1}}{N_{t+1}} = \frac{K_t}{N_{t+1}} + \frac{sY_t}{N_{t+1}}$. Replacing N_{t+1} with $(1+n)N_t$ and simplifying gives $k_{t+1} = \frac{k_t}{1+n} + \frac{sk_t^{0.5}}{1+n}$

c) In the steady state $k_{t+1} = k_t$. Therefore we have $(1 + 0.01)k_c^* = k_c^* + 0.2(k_c^*)^{0.5}$. Solving for k_c^* gives $k_c^* = 400$ and substituting back into the production function gives $y_c^* = 20$.

d) Using the fact that $5 = \frac{y_c^*}{y_p^*} = (\frac{k_c^*}{k_p^*})^{0.5}$, therefore $\frac{k_c^*}{k_p^*} = 5^2 = 25$.

e) If $\frac{k_c^*}{k_p^*} = 5^2 = 25$ and $k_c^* = 400$, then $k_p^* = 16$. Substituting this into the equation of motion in part b) we have $(1 + 0.01)16 = 16 + s_p(16^{0.5})$. From this we get that $s_p = 0.04$.

3. a) $r = 0.075$, $I = 7.5$ and $C = 82.5$.

b) $CA = -10$, $I = 15$ and $C = 85$.

c) $CA = S - I$. So we need $S = I$. This is done by equating $Y - 10 - 0.8(Y - T) + 100r - G = 15$. Substituting the values for Y and G and solving yields $T = 12.5$.