

**ECON 222A**  
**Macroeconomic Theory I**  
Fall Term 2009

*Answers to the Midterm*

**A1**

**FALSE/UNCERTAIN**

The first part of this statement is true, since real wage adjusts reasonably quickly to the equilibrium. However, at full-employment, the rate of unemployment that prevails is called the **natural rate of unemployment** which reflects unemployment owing to frictional and structural causes. The difference between actual unemployment and the natural rate of unemployment is called **cyclical unemployment**, and in the classical labour market it is equal to zero. (Possible graph: A shock either to the labour demand,  $N^d$ , or the labour supply,  $N^s$  curves)

**A2**

**FALSE/UNCERTAIN**

First, the derivation or construction of the desired savings curve comes from empirical evidence that for temporary increases in the interest rates leads to increase as well for desired savings. It is not clear for savers which of the substitution effect or the income effect is greater. ( $\uparrow r \Rightarrow \uparrow S^d$  through the S.E., but  $\uparrow r \Rightarrow \downarrow S^d$  through the I.E. (Possible graph: Illustration of the S.E. and I.E. for a saver)

**A3**

**TRUE**

Cuts in current taxes do not raise desired consumption when the Ricardian equivalence holds. Households will expect a balanced fiscal budget in the future, therefore they save the same amount as the tax cut. It results that national savings  $S^d$  is unchanged. In a small open economy,  $CA = S^d - I^d$  and since the desired investment is not affected by the tax cut, it results that the current account is not affected either.

**A4**

**FALSE**

A greater level of the capital-labour ratio does not always lead to greater consumption per worker, this is not the definition of the golden rule. In fact, at the maximum level of the capital-labour ratio,  $k$ , consumption per worker,  $c$  is equal to zero. (See figure 6.2)

## B1

a) (See Figure 3.11) From the production shows decreasing returns to scale with respect to labour ( $N$ ) and it results that the marginal productivity of labour ( $MPN$ ) does not decrease at a constant rate relative to increases in labour.

b)

$$\begin{aligned} MPN &= 3(6)(0.5)N^{-\frac{1}{2}} \\ MPN &= 9N^{-\frac{1}{2}} \\ w &= \sqrt{N^s} \\ w &= MPN \\ 9N^{-\frac{1}{2}} &= \sqrt{N^s} \\ N^* &= 9 \\ w^* &= 3 \end{aligned}$$

c) Once again plugging  $N^s$  in the equation for the  $MPN$ , then  $w^* = 2.25$

d)  $\bar{w}^* = 4.24$  and  $\underline{w}^* = 2.12$

So the average wage rate is equal to 3.18. In fact, since there are decreasing returns to scale for labour, splitting the labour markets in two parts, we should expect the average to be greater than part the wage rate for part d).

## B2

a)

$$(T - TR - INT) - G = 65 - 5 - 45 - 100$$

The government has a budget deficit of 85.

b)

$$\begin{aligned} S^d &= \bar{Y} - C^d - G \\ S^d &= 300r^w \end{aligned}$$

c)

$$\begin{aligned} CA &= S^d - I^d \\ CA &= -15 + 800r^w \\ CA &= -7 \end{aligned}$$

$CA = NX = -7$  and  $KA = 7$ . (Diagram: see assignment #2, Q3)

d) We need  $S^d = 10$  so that  $CA = 0$ , so  $G = 93$ .

(Graph: shift to the right of the  $S^d$  curve, so that in equilibrium, both curves intersect at the world interest rate.)

**B3**

a)

$$y_t = Ak_t^{0.5}$$

$$\frac{\Delta y}{y} = \frac{\Delta A}{A} + \alpha \frac{\Delta k}{k}$$

The Solow residual is 2%.

b) From the hint:

$$\begin{aligned} sAf(k_t) &= (n+d)k_t \\ 0.4(2)\sqrt{k_t} &= (0.02+0.14)k_t \\ 5 &= \sqrt{k_t} \\ k^* &= 25 \\ c^* &= Af(k^*) - (n+d)k^* \\ c^* &= 10 - (0.16)25 \\ c^* &= 6 \end{aligned}$$

(Graph: see figure 6.3)

c)

$$\begin{aligned} 0.5Ak^{-0.5} &= 0.16 \\ k^{0.5} &= 6.25 \\ k^{**} &= 39.06 \end{aligned}$$

$$\begin{aligned} s^{**}y^{**} &= (n+d)k^{**} \\ s^{**} &= \frac{(n+d)k^{**}}{Ak^{**0.5}} \\ s^{**} &= \frac{(n+d)k^{**0.5}}{A} \\ s^{**} &= 0.5 \end{aligned}$$

No, in fact, an increase in  $A$  leads the economy to a new golden rule level of capital-labour ratio.

d) Yes, from the concept of conditional convergence, in the neoclassical growth model Saskatchewan would eventually increase its capital-labour ratio and it will catch up to Al-bertan levels.