THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

# ECON 3123 Midterm Exam

Solutions and Grading Rubrics

**Multiple Choice Questions** D D C D C (4 points each)

**Question 6 (20 points)**

a. Goods demand is $Z = c+I+G$. At equilibrium, $Z = Y$. Therefore, the equilibrium output is

$$Y^* = \frac{1}{1 - c_1(1 - t_1) - b_1}[(c_0 - c_1 t_0 + b_0 + G) - b_2 i].$$

The equilibrium taxes is

$$T^* = t_0 + \frac{t_1}{1 - c_1(1 - t_1) - b_1}[(c_0 - c_1 t_0 + b_0 + G) - b_2 i].$$

Grading: 1 point for equilibrium condition, 2 points for $Y^*$, 2 points for $T^*$,

b. When $b_0$ drops the equilibrium taxes drop. As a result, the balanced budget requires a drop in $G$. Since output is increasing in both $b_0$ and $G$, the drop in output will be reinforced.

Grading: 5 points for drop in taxes, 5 points for reinforcement.

c. Drops in $Y$ and $b_0$ lead to a decrease in $I$. Since $I = S + T - G$ and $G = T$, the private saving drops.

Grading: 2 points for IS relation, 3 points for result.

**Question 7 (30 points)**

a. The goods demand is $Z = C + I + G$. At equilibrium, $Z = Y$. Therefore,

$$Y = 2.75 - 5i.$$

Grading: 2 points for equilibrium condition, 8 points for IS relation.

b. At equilibrium, $H^s = H^d = H$ and $Y^* = 2.5$. Then

$$H = [c + \theta(1-c)]M^d = [0.2 + 0.25 \times (1-0.2)] \times 2 \times 2.5 \times (0.7 - 4 \times 5\%) = 1.$$

Grading: 2 points for equilibrium condition, 2 points for the formula, 6 points for solution.

c. At equilibrium, $H^s = H^d = H'$ and $Y^* = 2.5$. Now $\theta' = 0.3$.

$$H = [c + \theta'(1-c)]M^d = [0.2 + 0.3 \times (1-0.2)] \times 2 \times 2.5 \times (0.7 - 4 \times 5\%) = 1.1.$$

Grading: 1 point for new notation, 1 point for formula, 3 points for result.

d. Recall that in equilibrium, $Y = 3 - 5(i + x)$. Since $x = 15\%$, $Y' = 2$ and $H^s = H^d = H'' = 0.88$.

Grading: 1 point for $Y, i, x$ relationship, 1 point for new notation, 1 point for formula, 2 points for result.

**Question 8 (30 point)**

a. $\$P_{2,t} = \frac{\text{Face Value}}{(1+i^e_{1,t+1})(1+i_{1,t}+x)} = \$89.07$.

b. $\$P_{3,t} = \frac{\text{Face Value}}{(1+i^e_{1,t+2})(1+i^e_{1,t+1}+x)(1+i_{1,t}+x)} = \$83.28$.

c. $y_{3.t} = \left(\frac{\text{Face Value}}{\$P_{3,t}}\right)^{\frac{1}{3}} = 6.29\%$.

Grading: 5 points for formula, 5 points for results.