Economics 2103A **Intermediate Macroeconomics II**
Midterm Solutions **Winter 2012**

SECTION A

1. TRUE - In the short-run prices are sticky and so a monetary expansion causes the real interest rate to fall as agents try to exchange excess money holdings for bonds. As the interest rate falls the cost of capital falls and firms raise investment. Therefore, the more responsive investment is to the interest rate the greater the short-run effects of monetary policy.

2. FALSE - As the cost of printing menus falls, firms will be able to change their prices more frequently. Therefore, they are more likely to respond to changes in demand by changing their price than by changing their output. As a result the aggregate supply curve becomes steeper, not flatter.

3. FALSE - While the labor force participation of these groups did increase, this can account for only about one-third of the increase in the natural rate. Also the natural rate of unemployment for all workers increased. Not just females and teenagers. It has also been argued that structural change and changes in the UI system contributed to the rise in $\overline{u}$ (you should also discuss these - see the slides).

4. FALSE/UNCERTAIN - This is only the correct answer when $r = 0$. If $r > 0$ then the intertemporal budget constraint is given by $100 + 50/(1 + r) = c_1 + c_2/(1 + r)$. Setting $c_1 = c_2 = c$ gives $100(1+r)+50 = (1+r)c+c$ which solves to give $c = (100(1+r)+50)/(2+r)$. This gives $c > 75$, when $r > 0$.

5. FALSE - If the Bank of Canada sells Treasury Bills it receives dollars in return. These dollars therefore leave circulation and the monetary base falls. Given the money supply is increasing in the money base it also falls.

SECTION B

1. .

   (a) The IS curve satisfies $Y = C+I+G$ and so is given by $Y = 100+0.8Y-400r+200-60r$ which simplifies to $Y = 1500 - 5000r$. The LM curve satisfies $M = M^d$ and so is given by $790/P = 0.8Y - 500r$. In the long-run $Y = \overline{Y}$ and so the IS curve gives $1000 = 1500 - 5000r$ and $r = 0.1$. This implies $I = 140$ and $C = 860$. Using the LM curve gives $750/P = 800 - 500 \times 0.1$ and so $P = 1$.

   (b) In the short-run P is fixed and so $P = 1$. The change in consumption and investment causes the IS curve to shift inwards so $Y = 80+0.8Y-400r+150-600r = 1150-5000r$. With $P = 1$ the LM curve becomes $750 = 0.8Y - 500r$ which can be re-written as $Y = 937.5 + 625r$. Setting the two equal gives $1150 - 5000r = 937.5 + 625r$ and so $r = 0.0378$. Sub this in the IS or LM curve to get $Y = 961.1$. Finally $I = 127.33$ and $C = 833.77$. In your diagram the IS curve should shift inwards.

(c) First find the value of r required to keep the sum $C+I$ equal to 1000. The new IS curve is $Y = 1150 - 5000r$ and so $Y = 1000$ implies $r = 0.03$. Next use the LM curve to find the value of M required value of M from $M/1 = 0.8 \times 1000 - 500 \times 0.03$. Using the LM curve, $Y = 1000$, $r = 0.03$ and $P = 1$ gives $M = 785$. In your diagram the LM curve shifts outwards.

2. .

(a) Set $W/P = MPL$ to get the labor demand curve. This gives $W/P = 25L^{-0.5}$. Using a target real wage of one implies a nominal wage of P^e and so the labor demand curve becomes $P^e/P = 25L^{-0.5}$ which can be rewritten as $L = 625(P/P^e)^2$. Sub this into the production function to get the AS curve as $Y = 50\sqrt{(}625(P/P^e)^2) = 1250P/P^e$.

(b) Use $MV = PY$ to get the AD curve as $Y = 1000/P$. Substitute $P^e = 0.8$ into the AS curve to get $Y = 1562.5P$. Now setting $AS = AD$ gives $P = 0.8$ and $Y = 1250$.

(c) The fall in M shifts the AD curve to $Y = 900/P$. Given that P^e is unchanged the AS curve does not shift. Therefore solving $AS = AD$ gives $P = 0.7589$ and $Y = 1186$. The intuition is as follows. The fall in the money supply pushes the price level downwards. However this is unanticipated by workers and firms and so the nominal wage is not renegotiated and remains at 0.8. Therefore the real wage rises to 1.05 and firms layoff workers. Employment falls from 625 to 562.

3. .

(a) In year one $\pi_1^e = 0.08$ and $\overline{u}_1 = 0.06$. Therefore $0.02 = 0.08 - (u - 0.06)$ implies $u = 0.12$. Now in year two $\pi_1^e = 0.02$ and $\overline{u}_2 = 0.5 \times 0.12 + 0.5 \times 0.06$. Therefore $0.02 = 0.02 - (u_2 - 0.09)$ implies $u_2 = 0.09$.

(b) Again in year one $\pi_1^e = 0.08$ and $\overline{u}_1 = 0.06$. Therefore $0.05 = 0.08 - (u - 0.06)$ implies $u = 0.09$. Now in year two $\pi_1^e = 0.05$ and $\overline{u}_2 = 0.5 \times 0.09 + 0.5 \times 0.06$. Therefore $0.02 = 0.05 - (u - 0.075)$ implies $u = 0.105$.

(c) In period 1 $\pi^e = 0.5 \times 0.02 + 0.5 \times 0.08 = 0.05$ and so $0.02 = 0.05 - (u_1 - 0.06)$ gives $u_1 = 0.09$. In period 2, $\pi^e = 0.5 \times 0.020.5 \times 0.02 = 0.02$ and $\overline{u}_2 = 0.5 \times 0.09 + 0.5 \times 0.06$. Therefore $0.02 = 0.02 - (u_2 - 0.075)$ gives $u_2 = 0.075$ and so the signal is beneficial.

(d) The two year approach without the signal gives $u_1 = 0.09$. With the signal we now have $\pi_1^e = 0.05 \times 0.05 + 0.5 \times 0.08 + x$ and so with $\overline{u}_1 = 0.06$ we have $0.05 = 0.065 + x - (u - 0.06)$. This gives $u = 0.075 + x$ and so the central bank will use the signal so long as $x \leq 0.015$.

4. .

(a) His intertemporal budget constraint is:

$$c_1 + \frac{c_2}{1+r} = y_1 - t_1 + \frac{y_2 - t_2}{1+r} \tag{1}$$

(b) Sub the numerical values into the budget constraint to get:

$$c_1 + \frac{c_2}{1.02} = 5500 - 2000 + \frac{1500 - 400}{1.02} \tag{2}$$

Set $c_2 = 0$ to get highest feasible consumption in first period as 4578.43. Set $c_1 = 0$ to get highest feasible consumption in second period as 4670. The budget line is downward sloping, with intercepts of 4578.43 on the c_1 axis and 4670 on the c_2 axis.

(c) Consumption smoothing implies $c_1 = c_2 = c^\star$ and so substitute this into the budget constraint to get:

$$c^\star + \frac{c^\star}{1.02} = 4578.43 \tag{3}$$

which solves to give $c^\star = 2311.88$. Therefore savings is $s = 5500 - 2000 - 2311.88 = 1188.12$ and so Henrik is a lender.

(d) With $r = 0.08$ the budget constraint becomes:

$$c_1 + \frac{c_2}{1.08} = 5500 - 2000 + \frac{1500 - 400}{1.08} \tag{4}$$

Set $c_1 = c_2 = c^\star$ and solve to get $c^\star = 2346.15$ and therefore $s = 5500 - 2000 - 2346.15 = 1153.85$. When the real interest rate rises, the price of current consumption increases relative to future consumption, thus providing incentive to save more (substitution effect). However, the future interest income on his current saving also rises, which increases the present value of lifetime resources and thereby increases both current and future consumption. This effect dampens the incentive to save (income effect). The two effects work in opposite directions. In the case here, since Henrik's saving decreases, and his current consumption increases, the income effect dominates.