ECON 2103 Intermediate Macroeconomic Theory II
Past Exam Answers

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1 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 M rises, households attempt to exchange excess money holdings for bonds. This pushes up the price of bonds and so the interest rate fall. The greater the increase in consumption demand to this fall in the interest rate, the greater the increase in output. However, the more sensitive consumption is to a decline in the interest rate the flatter the IS curve.

3. FALSE - The fiscal expansion boosts demand and so in the short-run output rises. As household income rises so does money demand. However, without an increase in the money supply this generates an increase in the real interest rate as households look to exchange bonds for money. This causes consumption and investment to fall, offsetting the initial rise in output. Therefore the more sensitive money demand is to income the more the interest rate has to rise and so the more consumption and investment fall.

4. 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.

5. FALSE. In the worker misperception model workers misinterpret a rise in the nominal wage as an increase in the real wage. Therefore they supply more labour. This pushes the real wage down and employment up. Higher employment means higher output and so the real wage and output move in opposite directions.

6. TRUE - When 25% of firms and workers renegotiate each period then 75% of wages are stuck and cannot respond to changes in P. However when 50% renegotiate only 50% cannot respond. Therefore with more wages responding, less firms/workers have a real wage that differs from the target and so less firms are producing away from $\overline{Y}$ at each price level, that is the SRAS curve is steeper.

7. 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).

8. UNCERTAIN - this depends on whether the effect of the policy on inflation is anticipated. If the policymaker announces that it is going to reduce inflation and the public believe this then the Phillips curve move inwards as π^e drops and inflation can be reduced without a rise in u. On the other hand if the public's expectations do not change then the Phillips curve does not shift and the decline in π generates a movement along the Phillips curve and higher u.

9. FALSE - An unanticipated increase in inflation lowers the real interest rate. As a result borrowers pay less interest and lenders get a lower return on their savings. In other words it is borrowers who gain at lenders' expense.

10. 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.

11. TRUE - the money supply is given by $M = B\mu$ where $\mu = (1 + cr)/(rr + cr)$. Substituting in the numerical values for cr and rr gives $\mu = 1.2/0.25 = 4.8$ and therefore $M = 100 \times 4.8 = 480$.

12. TRUE - If policy makers consistently used the Phillips curve to determine how much inflation was needed to lower unemployment, people would react to this policy by expecting the policy maker to to raise inflation every time unemployment was high. This change in inflation expectations would cause an outward shift in the Phillips curve, and an even higher rate of inflation would now be needed to lower unemployment.

13. FALSE - According to Kydland and Prescott the fact that the policymaker also cares about unemployment will give it an incentive to set inflation above what it announced in order to try to get $\pi > \pi^e$ and exploit the Phillips curve to lower unemployment. Thus the announcement is time inconsistent. The public recognizes this and so sets π^e above what is announced. The result is that $\pi = \pi^e$ and unemployment is not lowered.

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) The IS curve gives goods market equilibrium, $Y = C + I + G$. Sub in for the consumption and investment functions to get $Y = 100 + 0.75(Y - T) - 500r + 150 - 500r + G = 250 + 0.75Y - 0.75T + G - 1000r$ which simplifies to $Y = 1000 - 3T + 4G - 4000r$. In the diagram the IS curve shifts outwards and the response of output is to increase by \$300.

(b) The LM curve gives money market equilibrium, $M^d = M$ and so with $P = 1$ is given by $M = Y - 1000r$ which can be written as $1000r = Y - M$.

(c) To impose $IS - LM$ equilibrium sub the LM curve into the IS curve to get $Y = 1000 - 3T + 4G - 4(Y - M)$. This can be rewritten as $5Y = 1000 - 3T + 4G + 4M$ and so $Y = 200 - 0.6T + 0.8G + 0.8M$. The shift in the IS curve is the same as in part (a), but now the increase in Y generates an increase in money demand. Without an increase in money supply this leads to an increase in the interest rate, which causes consumption and investment to fall and therefore leads to an offsetting effect on aggregate demand.

(d) In order to prevent the decline in C and I the Central Bank needs to increase the money supply in order to prevent the interest rate rising. In the $IS - LM$ diagram this shows up as a shift out of the LM curve.

3. .

(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.

4. (a) The overall price level is the weighted average of the prices set by the sticky price firms and the flexible price firms. That is $P = sP^e + (1 - s)[P + (Y - \overline{Y})]$. Rearrange this to get $(1 - s)Y = P + (1 - s)\overline{Y} - sP^e + sP$ which can be written as $Y = \overline{Y} + [s/(1 - s)](P - P^e)$.

(b) The quantity equation says that $MV = PY$ and so with $V = 1$ the aggregate demand curve is given by $Y = M/P$.

(c) The aggregate supply curve becomes $Y = 1 + 0.5/0.5(P - 1) = P$. The aggregate demand curve is $Y = 4/P$. Setting AS = AD gives $P = 4/P$ and so $P = 2$ and therefore $Y = 2$.

(d) The aggregate supply curve becomes $Y = 1 + 0.25/0.75(P-1) = P/3$. The aggregate demand curve is unchanged and so $2/3 + P/3 = 4/P$ and so $P = 2.61$. Finally $Y = 4/2.61 = 1.53$. In this case Y does not deviate as far from $\overline{Y}$. This is because with more flexible price firms more of the fluctuations in aggregate demand are captured by the price level rather than output.

5. .

(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 $x \leq 0.015$.

6. (a) If the government keeps its promise $\pi = \pi^e = 2$ and so $Y = 10$ and $L = 2^2 + (10 - 1.2 \times 10)^2 = 8$.

(b) Sub the AS curve in the loss function to get $L = \pi^2 + [2(\pi - \pi^e) - 0.2\overline{Y}]^2$. The government then minimizes this taking $\pi^e = 2$ as given. $dL/d\pi = 2\pi + 4[2(\pi - \pi^e) - 0.2\overline{Y}] = 0$ which can be written as $10\pi = 8\pi^e + 0.8\overline{Y}$. Sub in $\pi^e = 2$ and $\overline{Y} = 10$ to get $\pi = 2.4$. Using the AS curve we have $Y = 10 + 2(2.4 - 2) = 10.8$ and then $L = 2.4^2 + (10.8 - 1.2 \times 10)^2 = 7.2$. In this case with π^e fixed the government has an incentive to set $\pi > \pi^e$ and exploit the AS curve to get $Y > \overline{Y}$.

(c) The government's reaction function is given by $10\pi = 8\pi^e + 0.8\overline{Y}$ from part (b) which at $\overline{Y} = 10$ can be written as $\pi = 0.8 + 0.8\pi^e$. With rational expectations and no uncertainty the public's reaction function is given by $\pi^e = \pi$ and so the Nash equilibrium is given by $\pi = 0.8 + 0.8\pi$ which solves to give $\pi^\star = 4$. With $\pi = \pi^e = 4$ we have $Y = 10$ and so $L = 4^2 + (10 - 1.2 \times 10)^2 = 20$. In this case the public recognizes the government's incentive to set $\pi > \pi^e$ and so does not believe the announcement. With higher π^e the government has an incentive to set higher π, which the public recognizes etc etc. At $\pi = \pi^e = 4$ neither party has an incentive to deviate and so this is the Nash equilibrium.