The Microeconomic Foundations of Price Rigidity

Additional Homework Problems

ECON 3133

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Answers

1.

a. When the economy is at long-run equilibrium, $P = P^f$ and $Y = Y^*$. So in the long run $Y = Y^* = 4{,}000$. Since $G = 750$ and $M^S = 600$, substitute the values for Y^*, G, and M^S in the aggregate demand equation and solve for P to get

$$P = P^f = 1.$$

b. Since the increase in money supply is anticipated, everybody will know that as a result of increased money supply, prices will increase, and real balances, that is, M^S/P, will stay constant. Therefore, $P = P^f$, $Y = Y^* = 4{,}000$, and M^S/P will remain at its previous value of 600. Hence, prices must increase. The new level of prices is obtained by solving the following equation:

$$600 = M^S/P = 620/P.$$

So P = 620/600 = 1.03. The net effect of an anticipated increase in money supply from 600 to 620 is that prices increase by 3.33% and real output stays at its previous level.

c. Since people expect the money supply to increase to 620, they will believe that P will increase to 1.03333 (see part b). Therefore, $P^f = 1.03333$. The equation of the aggregate supply curve will be

$$Y^S = n\times h\times(1 - b)\times(P - P^f) + Y^* = 20{,}000\times(P - 1.0333) + 4{,}000.$$

The equation of the aggregate demand curve, when $G = 750$ and $M^S = 670$, will be

$$Y^D = 1{,}101 + 1.288\times750 + 3.221\times(670/P).$$
$$Y^D = 1{,}101 + 966 + 2{,}158.07/P.$$
$$Y^D = 2{,}067 + 2{,}158.07/P.$$

Setting $Y^S = Y^D$ and rearranging the terms generate the following equation in P:

$$20{,}000\times(P - 1.0333) + 4{,}000 = 2{,}067 + 2{,}158.07/P.$$
$$20{,}000\times P + 18{,}733.67 - 2{,}158.07/P = 0.$$
$$20{,}000\times P^2 + 18{,}733.67\times P - 2{,}158.07 = 0.$$

Solving this equation for P shows P = 1.040397. Substituting this value of P in the AD or AS equation gives Y = 4,141.27.

2.

a. $W = (1/3)\times(X + X_{-1} + X_{-2})$.

b. The contract wage negotiated this period, X, is

$$X = (1/3)\times(W + W_{+1} + W_{+2}) - (d/3)\times[(U - U^*) + (U_{+1} - U^*) + (U_{+2} - U^*)].$$

The average economy-wide wage for this period, next period, and the following period are

$$W = (1/3)\times(X + X_{-1} + X_{-2}),$$

$$W_{+1} = (1/3)\times(X_{+1} + X + X_{-1}),$$

$$W_{+2} = (1/3)\times(X_{+2} + X_{+1} + X).$$

The equations for W, W_{+1}, and W_{+2} are then substituted into the equation for X which is then simplified as follows to get the optimal X as a function of lags and leads of X and current and expected future deviations of unemployment from its natural rate:

$$X = (1/3)\times((1/3)\times(X + X_{-1} + X_{-2}) + (1/3)\times(X_{+1} + X + X_{-1}) + (1/3)\times(X_{+2} + X_{+1} + X)) - (d/3)\times[(U - U^*) + (U_{+1} - U^*) + (U_{+2} - U^*)].$$

$$X = (1/3)\times X + (2/9)\times X_{-1} + (1/9)\times X_{-2} + (2/3)\times X_{+1} + (1/9)\times X_{+2} - (d/3)\times[(U - U^*) + (U_{+1} - U^*) + (U_{+2} - U^*)].$$

$$(2/3)\times X = (2/9)\times X_{-1} + (1/9)\times X_{-2} + (2/3)\times X_{+1} + (1/9)\times X_{+2} - (d/3)\times[(U - U^*) + (U_{+1} - U^*) + (U_{+2} - U^*)].$$

$$X = (1/3)\times X_{-1} + (1/6)\times X_{-2} + (1/3)\times X_{+1} + (1/6)\times X_{+2} - (d/2)\times[(U - U^*) + (U_{+1} - U^*) + (U_{+2} - U^*)].$$

3. If expectations are rational, then in the Lucas model anticipated monetary policy has no effect on output. However, when wages and prices are sticky, then by definition, P need not and may not adjust to keep $Y = Y^*$. Therefore, monetary policy can affect output. This can occur in the wage contract model.