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$$P_x = 8 - bQ_x^d + cP_y; \quad b > 0 \text{ and } c > 0$$

$$P_x = 20 + dQ_x^s; \quad d > 0$$

1. a) Endo: P_x , Q_x^d , Q_x^s
Exo: P_y

b) $Q_x^s = Q_x^d$, P^*
 $8 - Q_x^* + P_y = 20 + Q_x^*$

$$2Q_x^* = 12 - P_y$$

$$Q_x^* = 6 - \frac{P_y}{2}$$

$P_y > 12$ for Q_x^* to be more than 0

c) $P_x^* = 20 + Q_x^*$
 $= 20 + \left(6 - \frac{P_y}{2}\right)$, $Q_x^* = 6 - \frac{P_y}{2}$

d) The increase in one unit of P_y will increase Q_x^* by $\frac{1}{2}$

3 a.)

$$\begin{bmatrix} 0.5 & k_2 \\ k_3 & k_4 \end{bmatrix} \begin{bmatrix} Y \\ r \end{bmatrix} = \begin{bmatrix} I \\ M_d \end{bmatrix}$$

b.) $Y = C + I + G$

$$= 0.3(Y - T_0) - k_1 r + 0.5Y - k_2 r + G_0$$

$$= 0.3Y - 0.3T_0 - k_1 r + 0.5Y - k_2 r + G_0$$

$$\dot{Y} = \frac{-0.3T_0 - k_1 r - k_2 r + G_0}{0.2}$$

r^* ; $M_d = M_s$

$$k_3 Y - k_4 r = M_0$$

$$r^* = \frac{-M_0 + k_3 Y}{k_4}$$

c.)

As k_1 and k_2 get bigger it decreases the output so it would shift IS to the left which would make fiscal policy ineffective.

$$4. a) \quad 14 - 3Q = 4 + 2Q$$

$$5Q = 10$$

$$Q = 2$$

$$\text{pre-tax } Q^* = 2$$

$$\begin{aligned} P^* &= 14 - 3Q^* \\ &= 14 - 3(2) \\ &= 8 \end{aligned}$$

$$4 b) \quad Q^d = \frac{14 - P}{3}$$

$$Q^d = \begin{cases} 0, & P \geq 14 \\ \frac{14 - P}{3}, & 0 \leq P \leq 14 \end{cases}$$

$$Q^s = \frac{P - 4}{2}$$

$$Q^s = \begin{cases} 0, & 0 \leq P \leq 4 \\ \frac{P - 4}{2}, & P \geq 4 \end{cases}$$

reservation price for Consumer & Producer
so equilibrium exist.

4c) Tax on consumer; $p^d = p^s + t$

$$4 + 2Q + t = 14 - 3Q$$

$$5Q + t = 10$$

$$t = 10 - 5Q$$

$$Q \text{ after tax} = \frac{10 - t}{5}$$

$$p^{d*}$$

$$= 14 - 3Q \text{ a/t tax}$$

$$= 14 - 3\left(\frac{10 - t}{5}\right)$$

$$= 14 - \frac{30 + 3t}{5}$$

$$p^{d*} \text{ a/t tax} = \frac{40 + 3t}{5} = 8 + \frac{3}{5}t$$

$$p^{s*} \text{ a/t tax} = 4 + 2\left(\frac{10 - t}{5}\right)$$

$$= 4 + \frac{20 - 2t}{5} = 8 - \frac{2}{5}t$$

$$4d \quad \text{Tax burden} = p^{d*} \text{ a/t tax} + p^{s*} \text{ a/t tax}$$

$$8 + \frac{3}{5}t + 8 - \frac{2}{5}t$$

$$\text{Producer \%} = \frac{2}{5} = 40\%$$

$$\rightarrow \text{consumer \%} = \frac{3}{5} = 60\% \text{ paying more}$$

$$4f \quad \left. \begin{aligned} p^d &= a - bQ^d = 14 - 3Q^d \\ p^s &= c + dQ^s = 4 + 2Q^s \end{aligned} \right\} t^v = - \left(\frac{\frac{a-c}{b+d}}{2 \left(\frac{-1}{b+a} \right)} \right)$$
$$= - \left(\frac{14-4}{-3+2} \right)$$
$$= 5$$