

Demand For Corn: $Q_C^d = 20 - P_C + P_W$

$$Q_W^d = 20 - P_W + P_C$$

Supply For Each:

$$Q_C^s = P_C$$

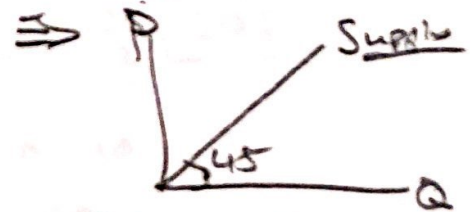
$$Q_W^s = P_W$$

where,

- P_C = price of corn

- P_W = price of wheat

- Quantity & equal price



i.e. $m=1$
 $b=0$

\Rightarrow Set Equilibrium condition

$$\Rightarrow Q_W^d = Q_W^s \quad \leftarrow \text{supply} = \text{demand}$$

$$\Rightarrow 20 - P_W + P_C = P_W$$

$$2P_W = 20 + P_C$$

$$\Rightarrow P_W = 10 + \frac{1}{2}P_C \quad \leftarrow$$

symmetric

\Rightarrow Similar for corn:

$$\Rightarrow Q_C^d = Q_C^s$$

$$\Rightarrow 20 - P_C + P_W = P_C$$

$$\Rightarrow 2P_C = 20 + P_W$$

$$\Rightarrow P_C = 10 + \frac{1}{2}P_W$$

\Rightarrow Solving for $P_c^* \neq P_w^*$

\Rightarrow

$$P_c = 10 + \frac{1}{2} \left[10 + \frac{1}{2} P_c \right]$$

$$\Rightarrow P_c = 10 + 5 + \frac{1}{4} P_c$$

$$\Rightarrow 3P_c = 60$$

$$\Rightarrow P_c^* = 20$$

$$\Rightarrow P_w^* = 20$$

Since,

Proof

$$P_w^* = 10 + \frac{1}{2} [20]$$

$$\Rightarrow P_w^* = 10 + 10 = 20$$

$$\Rightarrow (P_c^*, P_w^*) = (20, 20)$$

$$\Rightarrow (Q_c^*, Q_w^*) = (20, 20) \quad \text{Since, } Q_c^D = 20 - (20) + (20)$$

General Equilibrium Effects

+ 12 @ every price $\Rightarrow 20 + 12 = 32$

\Rightarrow Increase in the intercept a

$$\Rightarrow Q_c^D = 32 - P_c + P_w$$

$$\Rightarrow P_c = 32 - P_c + P_w$$

$$\Rightarrow 2P_c = 32 + P_w$$

$$\Rightarrow P_c = 16 + \frac{1}{2} P_w$$

Plugging in above $P_w = 10 + \frac{P_c}{2}$

$$\Rightarrow P_c = 16 + \frac{1}{2} \left[10 + \frac{P_c}{2} \right]$$

$$\Rightarrow P_c = 16 + 5 + \frac{1}{4} P_c$$

$$\Rightarrow 4P_c = 4*(21) + P_c$$

$$\Rightarrow P_c^* = \frac{84}{3} = 28$$

$$\Rightarrow P_w^* = 10 + \frac{1}{2} [28] = 24$$

$$(P_c^*, P_w^*) = (28, 24)$$

\Rightarrow Both increase
Because of demand side
linking & price is a
positive externality.

$$w/ (P_c^*, P_w^*) = (28, 24)$$

$$\Rightarrow \left. \begin{aligned} Q_c^D &= 32 - 28 + 24 = 28 \\ Q_w^D &= 20 - 28 + 24 = 24 \end{aligned} \right\} \text{Both increase because of pricing components.}$$

Slide 15.1

(13/17)

Corn Example w/ Supply Side Links

Consider, Demand: $Q_c^D = 20 - P_c$

$$Q_w^D = 20 - P_w$$

Supply: $Q_c^S = 2P_c - P_w$

$$Q_w^S = 2P_w - P_c \quad \text{also has to go up}$$

Solving:

$$\Rightarrow \begin{matrix} Q_w^D & = & Q_w^S \\ \downarrow & & \downarrow \\ (20 - P_w) & = & (2P_w - P_c) \end{matrix}$$

$$\Rightarrow 20 + P_c = 3P_w$$

$$\Rightarrow P_w = \frac{20}{3} + \frac{1}{3}P_c$$

Similarly

$$Q_c^D = Q_c^S$$

$$(20 - P_c) = (2P_c - P_w)$$

$$\Rightarrow P_c = \frac{20}{3} + \frac{1}{3}P_w$$

Solving

\Rightarrow

$$\Rightarrow P_w = \frac{20}{3} + \frac{1}{3} \left[\frac{20}{3} + \frac{1}{3} P_w \right]$$

$$P_w = \frac{20}{3} + \frac{20}{9} + \frac{1}{9} P_w$$

$$\Rightarrow 9 P_w = 60 + 20 + P_w$$

$$\Rightarrow P_w^* = \frac{80}{8} = 10$$

$$\Rightarrow P_c^* = \frac{20}{3} + \frac{1}{3} [10] = \frac{1}{3} (20 + 10) = \frac{30}{3} = 10$$

$$\Rightarrow Q_c^D = Q_c^S = 2(10) - (10) = 10 \text{ million}$$

$$\Rightarrow Q_w^D = Q_w^S = 2(10) - (10) = 10 \text{ million}$$

Suppose 12 million increase in quantity demanded for corn

$$\Rightarrow Q_c^D = 32 - P_c$$

$$\Rightarrow Q_c^D = Q_c^S$$

$$\Rightarrow (32 - P_c) = (2P_c - P_w)$$

$$\Rightarrow 3P_c = 32 + P_w$$

$$P_c = \frac{32}{3} + \frac{1}{3} P_w$$

where P_w is same as before
 $\Rightarrow P_w = \frac{20}{3} + \frac{1}{3} P_c$

$$\Rightarrow P_c^* = \frac{32}{3} + \frac{1}{3} \left[\frac{20}{3} + \frac{1}{3} P_c \right]$$

$$\Rightarrow P_c^* = \frac{32}{3} + \frac{20}{9} + \frac{1}{9} P_c$$

$$9P_c = 96 + 20 + P_c$$

$$P_c^* = \frac{116}{8} = 14.5$$

$$\Rightarrow P_w^* = \frac{20}{3} + \frac{1}{3} [14.5]$$

$$= \frac{1}{3} [34.5]$$

$$= 11.5$$

$$\Rightarrow (P_c^*, P_w^*) = (14.5, 11.5)$$

$$\Rightarrow Q_c^D = Q_c^S = 32 - (14.5) = 17.5 \text{ millions}$$

$$Q_w^D = Q_w^S = 20 - (11.5) = 8.5 \text{ millions}$$

\Rightarrow Before

$$(P_c^*, P_w^*) = (10, 10)$$

$$(Q_c^*, Q_w^*) = (10, 10)$$

After Shift

$$(P_c^*, P_w^*) = (14.5, 11.5)$$

$$(Q_c^*, Q_w^*) = (17.5, 8.5)$$

where, w/ supply side linkages, we can see an increase in price and a decrease in quantity. This is because the increase in the price of corn shifts the wheat supply curve inward, increasing price, and decreasing quantity.