2 Sector Model

Consider two industrial sectors in one city. Let x_1 & x_2 be the distance that the firms in sector 1 & 2 locate from city center.

Labor costs:
$$L(x_1) = 5 - \frac{5}{2}x_1$$

$$L(x_2) = 10 - 3x_2$$

Freight Costs:
$$F(x_1) = 5x_1$$

$$F(x_2) = \frac{7}{2}x_2$$

(i) Profit Functions?

$$\pi_1 = P_1 \cdot Q_1 - \left[(5 - \frac{5}{2}x_1) + 5x_1 + P(x_1)\right]$$

$$\pi_2 = P_2 \cdot Q_2 - \left[(10 - 3x_2) + \frac{7}{2}x_2 + P(x_2)\right]$$

(ii) Bid Rent Curves? $\pi_1 = \pi_2 = 0$

$$P(x_1) = P_1 Q_1 - 5 - \frac{5}{2}x_1$$

$$P(x_2) = P_2 Q_2 - 10 - \frac{1}{2}x_2$$

(iii) Assume $TR = P_1 \cdot Q_1 = P_2 \cdot Q_2 = 20$

Draw the Bid-Rent Curves

$P(x_1) = 20 - 5 - \dfrac{5}{2} x_1 = 15 - \dfrac{5}{2} x_1$

$P(x_2) = 20 - 10 - \dfrac{1}{2} x_2 = 10 - \dfrac{1}{2} x_2$

$\left(\dfrac{5}{2}, \dfrac{35}{4}\right)$

Sector$_1$ $\in \left[0, \dfrac{5}{2}\right)$

Sector$_2$ $\in \left(\dfrac{5}{2}, 20\right]$