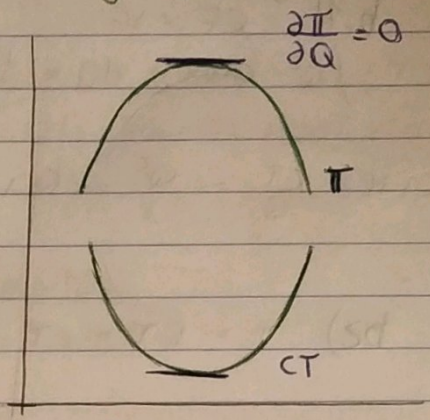
Ficha I - Mercados e Formação de Preços

Engenharia económica

$\Pi = RT - CT$ $\quad CT = CV + CF$

$RT = P \times Q$ $\quad CMg = \frac{\partial CT}{\partial Q}$

$RMg = \frac{\partial RT}{\partial Q}$ $\quad \frac{\partial \Pi}{\partial Q} = 0$



1. $\Pi = -\frac{1}{3}Q^3 - 3Q^2 + 40Q - 50$ $\quad Q_D = 12 - 0.2P$

$\Leftrightarrow P = 60 - 5Q$

a) Lucro máximo: $\frac{\partial \Pi}{\partial Q} = 0$

$\Leftrightarrow -Q^2 - 6Q + 40 = 0 \Leftrightarrow Q = -10 \vee Q = 4$

$P = 60 - 5 \times 4 = 40$ u.m.

$\Pi = -\frac{1}{3} \times 4^3 - 3 \times 4^2 + 40 \times 4 - 50 \approx 40.67$ u.m.

b) $CVM = \frac{CV}{Q}$ $\quad \Pi = \underbrace{RT}_{P \times Q} - \underbrace{CT}_{CV + CF}$

$\Pi = -\frac{1}{3}Q^3 - 3Q^2 + 40Q - 50 \Leftrightarrow \overbrace{P \times Q}^{RT} - CT = -\frac{1}{3}Q^3 - 3Q^2 + 40Q - 50$

$\Leftrightarrow (60 - 5Q)Q - CT = -\frac{1}{3}Q^3 - 3Q^2 + 40Q - 50$

$\Leftrightarrow CT = \underbrace{\frac{1}{3}Q^3 - 2Q^2 + 20Q}_{CV} + \underbrace{50}_{CF}$

$CVM = \frac{CV}{Q} = \frac{\frac{1}{3}Q^3 - 2Q^2 + 20Q}{Q} = \frac{1}{3}Q^2 - 2Q + 20$

$\frac{\partial CVM}{\partial Q} = 0 \Leftrightarrow \frac{2}{3}Q - 2 = 0 \Leftrightarrow Q = 3$ unidades

2. $RMg = 21 - 2Q$ $\quad RMg = \frac{\partial RT}{\partial Q} \Leftrightarrow RT = \int RMg \, dQ$

a) $RT = \int 21 - 2Q \, dQ = 21Q - Q^2$

$RT = P \cdot Q \Leftrightarrow 21Q - Q^2 = P \cdot Q \Leftrightarrow Q(21 - Q) = PQ \Leftrightarrow \boxed{P = 21 - Q}$

$\Leftrightarrow \boxed{Q = 21 - P}$

b) $CMg = Q^2 - 6Q + 9$ $\quad CMg = \frac{\partial CT}{\partial Q} \Leftrightarrow CT = \int CMg\, dQ$

b.1) $CF = 16$

$CT = \int Q^2 - 6Q + 9\, dQ = \underbrace{\frac{1}{3}Q^3 - 3Q^2 + 9Q}_{CV} + \underbrace{16}_{CF}$

$CTM = \frac{CT}{Q} = \frac{Q^2}{3} - 3Q + 9 + \frac{16}{Q}$

b2) $\pi = RT - CT \Leftrightarrow \frac{\partial \pi}{\partial Q} = \frac{\partial RT}{\partial Q} - \frac{\partial CT}{\partial Q} \Leftrightarrow \frac{\partial \pi}{\partial Q} = RMg - CMg$

Máximo lucro: $\frac{\partial \pi}{\partial Q} = 0 \Leftrightarrow RMg - CMg = 0 \Leftrightarrow \boxed{RMg = CMg}$

$21 - 2Q = Q^2 - 6Q + 9 \Leftrightarrow Q^2 - 4Q - 12 = 0 \Leftrightarrow Q = -2 \vee Q = 6$

$P = 21 - 6 = 15$ u.m

$\pi = RT - CT = 21Q - Q^2 - \frac{1}{3}Q^3 + 3Q^2 - 9Q - 16$

$= -\frac{1}{3}Q^3 + 2Q^2 + 12Q - 16$

$\pi = -\frac{1}{3} \times 6^3 + 2 \times 6^2 + 12 \times 6 - 16 = 56$ u.m.

3. $P = 5$ u.m.

$Q = 2000$ unidades (mercado)

$CT = Q^3 - 6Q^2 + 5Q$

Perfeitamente competitivo, curto prazo

$\boxed{RMg = P}$ $\quad \boxed{P = CMg}$

$RT = P \cdot Q$

$RMg = P$

$CMg = \frac{\partial CT}{\partial Q} = 3Q^2 - 12Q + 5$

$P = CMg \Leftrightarrow 5 = 3Q^2 - 12Q + 5 \Leftrightarrow 3Q^2 - 12Q = 0 \Leftrightarrow 3Q(Q - 4) = 0$

$\Leftrightarrow Q = 0 \vee \underline{Q = 4}$

$\pi = RT - CT = 5 \cdot 4 - (4^3 - 6 \cdot 4^2 + 5 \cdot 4) = 32$ u.m.

Nº empresas $= \frac{2000}{4} = 500$ empresas

4. $CT = Q^3 - 10Q^2 + 125Q$

Longo prazo: $\boxed{CTM = CMg}$

$\pi = 0 \Leftrightarrow RT = CT \Leftrightarrow P \cdot Q = CT \Leftrightarrow P = \frac{CT}{Q}$

$\Leftrightarrow \boxed{P = CTM}$

$CTM = \frac{CT}{Q} = Q^2 - 10Q + 125$

$CMg = \frac{\partial CT}{\partial Q} = 3Q^2 - 20Q + 125$

- $CTM = CMg \Leftrightarrow Q^2 - 10Q + 125 = 3Q^2 - 20Q + 125 \Leftrightarrow 2Q^2 - 10Q = 0$

$\Leftrightarrow 2Q(Q - 5) = 0 \Leftrightarrow \underline{Q = 0} \vee Q = 5$

- $P = CTM = 5^2 - 10 \cdot 5 + 125 = 100$ u.m.

5. $CT = Q^3 - 6Q^2 + 15Q + 100$

$RT = 51Q \Leftrightarrow P = 51$

$RMg = CMg \Leftrightarrow 51 = 3Q^2 - 12Q + 15 = 0 \Leftrightarrow 3Q^2 - 12Q - 36 = 0 \Leftrightarrow \cancel{Q = -2} \vee Q = 6$

$RT = 51 \cdot 6 = 306$ u.m.

$CT = 6^3 - 6 \cdot 6^2 + 15 \times 6 + 100 = 190$ u.m.

$\pi = RT - CT = 306 - 190 = 116$ u.m. $\Rightarrow$ lucro total

$\pi = \frac{116}{6} = 19.3$ u.m./unidade $\Rightarrow$ lucro unitário

6. $CM = \frac{Q^2}{3} - 3Q + 38 + \frac{16}{Q}$

$RMg = 62 - 4Q$

a) $RMg = \frac{\partial RT}{\partial Q} \Leftrightarrow RT = \int RMg \, dQ \Leftrightarrow RT = 62Q - 2Q^2 \Leftrightarrow RT = Q\underbrace{(62 - 2Q)}_{P}$

$\boxed{P = 62 - 2Q}$

b) $CM = \frac{CT}{Q} \Leftrightarrow CT = CM \cdot Q = \frac{Q^3}{3} - 3Q^2 + 38Q + 16$

$CMg = \frac{\partial CT}{\partial Q} = Q^2 - 6Q + 38$

Máximo lucro: $RMg = CMg \Leftrightarrow 62 - 4Q = Q^2 - 6Q + 38$

$\Leftrightarrow Q^2 - 2Q - 24 = 0 \Leftrightarrow \cancel{Q = -4} \vee Q = 6$

$\otimes P = 62 - 2 \cdot 6 = 50$ u.m.

$\otimes RT = P \cdot Q = 50 \cdot 6 = 300$ u.m.

$\otimes CT = 6^3/3 - 3 \cdot 6^2 + 38 \cdot 6 + 16 = 208$ u.m.

$\pi = RT - CT = 300 - 208 = 92$ u.m.