10-1-09

- WELFARE ISSUE
  PAYOFF GOVERNMENT
- ORIGINAL SPENCER BRANDER MODEL
  ONLY 1 COUNTRY CAN SUBSIDIZE/TAX EXPORTS
- OTHER POSSIBLE SET UPS:
  - QUANTITY COMPETITION: 2 COUNTRIES CAN SUBSIDIZE/TAX EXPORTS
  - PRICE COMPETITION
    - ONLY 1 COUNTRY CAN SUBS/TAX
    - 2 COUNTRIES CAN SUBS/TAX
- REMARKS ON THE GENERAL ISSUE OF X-SUBSIDIES.

GOV. PAYOFF = WELFARE

IN ~~GENAL~~ GENERAL:

CONS. SURPLUS + PROD. SURPLUS + GOV. REV.

PROD. SURPLUS = FIRMS PROFITS

GOV. REV. = − COST OF SUBSIDY PROGRAM.

LAST CLASS

ORIGINAL SPENCER BRANDER

$S_1^* = 9$

USING NE EQUATIONS:

$$q_1^* = 12 + \frac{2}{3} 9 = \boxed{18}$$

$$q_2^* = 12 - \frac{1}{3} 9 = \boxed{9}$$

$$p^* = 12 - \frac{1}{3} 9 = \boxed{9}$$

EFFECTIVE $\pi_1^* = \underbrace{p^* q_1^*}_{\text{PROD. PROFITS}} + s_1 q_1^* = \boxed{162} + 162 = \boxed{324}$

$$\pi_2^* = p^* q_2^* = \boxed{81} = \boxed{W_2^*}$$

$$\boxed{W_1^* = 162}$$

COMPARISON WITH CASE OF NO GOV. INTERVENTION: NE q'S with $MC_1 = MC_2 = 0$

$$p = 36 - q_1 - q_2$$

$$q_1 = q_2 = 12 \qquad p = 12$$

$$\pi_1 = \pi_2 = 144$$

$$\boxed{W_2 = W_1 = 144}$$

"OPTIMAL SUBSIDY" OUTCOME COINCIDES WITH OUTCOME OF SEQ. QUANTITY GAME WHEN FIRM 1 GOES FIRST.

QUANTITY COMPETITION

ORIGINAL S-BRANDER: MODEL 1 — ONLY 1 COUNTRY CHOOSES s_1

MODEL 2: BOTH COUNTRIES CHOOSE s_1, s_2

MODEL 2

COUNTRIES 1 & 2 CHOOSE s_1, s_2 (i.e. NE IN s_1, s_2)

↓

FIRMS 1 & 2 CHOOSE q_1, q_2 (i.e. NE IN q_1, q_2)

SPNE:

STEP 1: FIND NE q's ASSUMING FIRMS HAVE EFFECTIVE MC'S EQUAL TO c_1, c_2

STEP 2: FIND NE IS s_1, s_2 ASSUMING COUNTRIES MAX. WELFARE & FIRMS PRODUCE NE. QUANTITIES.

STEP 1: $p = 36 - q_1 - q_2$

NE q's $\quad c_1, c_2$

$\Longrightarrow$ (DONE LAST CLASS)

$$\max_{q_1} [p - c_1] q_1 = [36 - c_1 - q_1 - q_2] \cdot q_1$$

(*) $\dfrac{\partial}{\partial q_1} = 0$

$$\max_{q_2} [p - c_2] q_2 = [36 - c_2 - q_1 - q_2] q_2$$

(**) $\dfrac{\partial}{\partial q_2} = 0$

SOLVING (*) & (**) $\Longrightarrow$

$$\boxed{\begin{aligned} q_1 &= \tfrac{1}{3}[36 - 2c_1 + c_2] \\ q_2 &= \tfrac{1}{3}[36 - 2c_2 + c_1] \\ p &= \tfrac{1}{3}[36 + c_1 + c_2] \end{aligned}}$$

STEP 2: NE IN s's

ASSUMING

$$\max_{s_1} W_1(s_1, s_2) = p q_1 \text{ or}$$

$= \text{EFFECT. PROFITS} - s_1 \cdot q_1$

$$\max_{s_1} \; W_1(s_1, s_2) = \frac{1}{3}\left[36 + c_1 + c_2\right] \cdot q_1$$

$$= \frac{1}{3}\left[36 + c_1 + c_2\right] \frac{1}{3}\left[36 - 2c_1 + c_2\right]$$

$$c_1 = -s_1$$
$$c_2 = -s_2$$

$$= \frac{1}{9}\left[36 - s_1 - s_2\right]\left[36 + 2s_1 - s_2\right]$$

$$\frac{\partial W_1}{\partial s_1} = \frac{1}{9}\left\{\left[36 + 2s_1 - s_2\right](-1) + 2\left[36 - s_1 - s_2\right]\right\} = 0$$

$$\Longrightarrow \text{(A)} \quad \boxed{s_1 = R_1(s_2) = \frac{36 - s_2}{4}}$$

SIMILARLY

$$\max_{s_2} \; W_2(s_1, s_2)$$

$$\Longrightarrow \boxed{s_2} = R_2(s_1) = \boxed{\frac{36 - s_1}{4}} \text{ (AA)}$$

SOLVING Δ & $\Delta\Delta$

$\Longrightarrow$

$$S_1^* = S_2^* = 7.2$$

$$W_1 = W_2 = p\,q_i = 103.7$$

$$q_1 = q_2 = 14.4$$

$$p = 7.2$$