

How much will be produced if Firm 2 pays Firm 1
not to produce

Without compensation we have seen that

$$Q_1^0 = \frac{1}{2} P_1$$

$$Q_2^0 = Q_2^*(Q_1^0) = \frac{1}{2} [P_2 - Q_1^0]$$

But Firm 2 could afford to pay Firm 1

$$\Pi_2(Q_1, Q_2^*(Q_1)) - \Pi_2(Q_1^0, Q_2^0)$$

to produce Q_1 less than Q_1^0

With this payment, Firm 1's cost function is

$$C_1(Q_1) - [\Pi_2(Q_1, Q_2^*(Q_1)) - \Pi_2(Q_1^0, Q_2^0)]$$

$$= C_1(Q_1) + [BM_2 - \Pi_2(Q_1, Q_2^*(Q_1))]$$

$$+ [\Pi_2(Q_1^0, Q_2^0) - BM_2]$$

Changes in Q_1 do not affect the second term in brackets so marginal cost depend on

$$C_1(Q_1) + [BM_2 - \Pi_2(Q_1, Q_2^*(Q_1))]$$

which is the same as in the case where Firm 1 paid Firm 2

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To summarize,

$$P_1 = MC_1(Q_1) + MD_2(Q_1, Q_2)$$

$$P_2 = MC_2(Q_1, Q_2)$$

which are the same equations that describe what should be produced!!

What will be profits if firm 2 pays firm 1 not to produce and $P_1 = 11$, $P_2 = 10$

From before

Should be produced

$$Q_1 = 4 \quad \Pi_1 = 20$$

$$Q_2 = 3 \quad \Pi_2 = 5$$

Will be produced

$$Q_1 = 5.5 \quad \Pi_1 = 22.25$$

$$Q_2 = 2.25 \quad \Pi_2 = 1.0625$$

The amount firm 2 could afford to pay is

$$5 - 1.0625 \approx 4$$

but all it will have to pay is

$$22.25 - 20 = 2.25$$