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NEGOTIATION WITH SYMMETRIC DUOPOLY

NEGOCIEREA CU DUOPOUL SIMETRIC

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***Abstract**: Negotiation is often observed in the economic reality, but seldom approached in the economic theory. This paper gives two examples of negotiation with symmetric duopoly: negotiation on the product market, and negotiation on the factor market.*

***Key words**: price negotiation, symmetric duopoly*

INTRODUCTION

According two the economic theory, in a perfect competition market the price is determined at the intersection of the demand and supply curves. The market sets the price.

In a market with imperfect competition, the price can be set in three different ways.

The price can be set by sellers and accepted by buyers. This situation can occur when the number of sellers is small and the number of buyers is very large, with a small market power.

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The price is set through negotiation between sellers and buyers. This situation can occur when the number of sellers and the number of buyers is small and the buyers and sellers have significant market power.

This paperwork explains the price negotiation of a firm which enters to the market with one of the two firms which form a symmetric duopoly. There can be negotiations on two markets, the product market and the factor market. If the new firm (a buyer) enter to the product market, a product

price negotiation is possible. In the firm enter (a seller) to the factor market, a factor price negotiation is possible.

MATERIALS AND METHODS

In this paperwork we have made the following assumptions:

On the market exists two identical firms, with an identical, finite production capacity.

Both firms have a technology with constant returns, which means constant specific consumption.

Both firms have underused capacity of production.

The overall demand for product is a linear function.

The overall supply of raw material is a linear function.

The overall demand function for product is:

$Q_P = 400 - 0{,}25 \cdot P_P$

The overall supply function for raw material is:

$Q_{MP} = 20 \cdot P_{MP} - 200$

The fix cost of each firm is:

$CF = 52000$

The specific consumption of each firm is:

$$C_S = \frac{Q_{MP}}{Q_P} = 4 \Leftrightarrow Q_{MP} = 4 \cdot Q_P$$

The production capacity of each firm is: $C_P = 120$

The initial situation

In the initial situation both firms charge the same price for product and the same price for raw material. We can derive the individual demand function for product and the individual supply function for raw material.

The individual demand for product represents half of the overall demand for product. The individual demand function will be:

$$Q_P = \frac{400 - 0{,}25 \cdot P_P}{2} = 200 - 0{,}125 \cdot P_P$$

The individual supply of raw material represents half of the overall supply of raw material. The individual supply function of raw material will be:

$$Q_{MP} = \frac{20 \cdot P_{MP} - 200}{2} = 10 \cdot P_{MP} - 100$$

In the initial situation both firms charge the price $P_P = 880$ for product and charge the same price $P_{MP} = 46$ for raw material. We can calculate the total revenue, the variable cost, the total cost and the total profit for each firm:

The demanded quantity for product for each firm, results from the individual demand function for product:

$$Q_P = 200 - 0{,}125 \cdot 880 = 200 - 110 = 90$$

The supplied quantity of raw material for each firm, results from the individual supply function of raw material:

$$Q_{MP} = 10 \cdot P_{MP} - 100 = 10 \cdot 46 - 100 = 460 - 100 = 360$$

(One can observe $Q_{MP} = 4 \cdot Q_P$)

The total revenue of each firm will be:

$$VT = P_P \cdot Q_P = 880 \cdot 90 = 79200$$

The variable cost (the raw material cost) of each firm will be:

$$CV = P_{MP} \cdot Q_{MP} = 46 \cdot 360 = 16560$$

The profit of each firm will be:

$$\Pi = VT - CV - CF = 79200 - 16560 - 52000 = 10640$$

The negotiation on the product market:

We suppose that on the product market enters a buyer which at the price $P_P = 880$ wants to buy a quantity $Q_{PS} = 20$. He will address his demand to one of the two firms, the firm A.

In order to sell a quantity $Q_{PA} = Q_P + Q_{PS} = 90 + 20 = 110$, firm A have to increase the price for raw material (firm B will copy his price) at the level where the quantity of raw material allows firm A and firm B to produce the quantity demanded for each firm:

The sum of productions of firms A and B will be:

$Q_{PT} = Q_{PA} + Q_P = 2 \cdot Q_P + Q_{PS} = 2 \cdot 90 + 20 = 200$

The quantity of raw material needed for this production will be:

$Q_{MPT} = 4 \cdot 200 = 800$

The price for raw material, results from the overall supply function of raw material:

$800 = 20 \cdot P_{MP} - 200 \Leftrightarrow 1000 = 20 \cdot P_{MP} \Leftrightarrow P_{MP} = 50$

The total profit of firm A will be:

$\Pi_A = 880 \cdot 110 - 50 \cdot 4 \cdot 110 - 52000 = 22800$

The total profit of firm B will be:

$\Pi_B = 880 \cdot 90 - 50 \cdot 4 \cdot 90 - 52000 = 9200$

The buyer which enters to the product market brings a profit increase for firm A (and a profit decrease for firm B). This buyer will be able to negotiate with firm A a price smaller than $P_P = 880$.

The minimum price acceptable for firm A is the price where firm A will have a profit equal with the profit in the initial situation.

$\Pi_A = 880 \cdot 90 + P_P \cdot 20 - 50 \cdot 4 \cdot 110 - 52000 = 10640$

$P_P \cdot 20 = 10640 - 880 \cdot 90 + 50 \cdot 4 \cdot 110 + 52000$

$P_P = 272$

Negotiation on the raw material market:

We suppose that on the raw material market enters a seller which at the price $P_{MP} = 46$ wants to sell a quantity $Q_{MS} = 80$. He will address his supply to one of the firms, firm A.

In order to sell a quantity $Q_{PA} = \frac{Q_M + Q_{MS}}{4} = \frac{360 + 80}{4} = 110$, firm A has to decrease the product price (the price will be copied by firm B) to the level where the demand for firm A and the demand for firm B will be equal to the quantities produced using the quantities of raw material.

The sum of quantities of raw material purchased by both firms will be:

$Q_{MT} = Q_{MA} + Q_M = 2 \cdot Q_M + Q_{MS} = 2 \cdot 360 + 80 = 800$

The quantity of product produced with this quantity of raw material will be: $Q_{PT} = \frac{800}{4} = 200$

The price corresponding to this quantity of product results from the overall demand function for product:

$200 = 400 - 0{,}25 \cdot P_P \Leftrightarrow 0{,}25 \cdot P_P = 200 \Leftrightarrow P_P = 800$

The total profit of firm A will be:

$\Pi_A = 800 \cdot 110 - 46 \cdot 4 \cdot 110 - 52000 = 15760$

The total profit of firm B will be:

$\Pi_B = 800 \cdot 90 - 46 \cdot 4 \cdot 90 - 52000 = 3440$

The seller which enters to the raw material market brings a profit increase for firm A (and a profit decrease for firm B). This seller can negotiate a price larger than $P_{MP} = 46$ with firm A.

The maximum price that can be accepted by firm A is the price where firm A has the same profit as in the initial situation:

$$\Pi_A = 800 \cdot 110 - 46 \cdot 4 \cdot 90 - P_M \cdot 80 - 52000 = 10640$$
$$P_M \cdot 80 = 800 \cdot 110 - 46 \cdot 4 \cdot 90 - 52000 - 10640$$
$$P_M = 110$$

RESULTS AND DISCUTIONS

When a new firm (a buyer) enters to the product market, in most situations negotiation is possible. The new firm can negotiate a smaller price with one of the firms forming a symmetric duopoly. This price will be between the initial price and the minimum price accepted by the seller.

When a new firm (a seller) enters to the factor market, in most situations negotiation is possible. The new firm can negotiate a larger price with one of the firms forming a symmetric duopoly. This price will be between the initial price and the maximum price accepted by the buyer.

CONCLUSIONS

Negotiation with symmetric duopoly is possible on the factor market an also on the product market. An important condition that makes the

negotiation possible is the existence of the underused capacity of production for the firms forming the duopoly.

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