

## **THE POWER'S MECHANISM OF A MONOPOLY IN A MARKET ECONOMY**

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*ABSTRACT: Monopolies make their presence felt in a market economy, not necessarily through 100% ownership control of a market, nor less, because there is a law that sanction its existence; in most cases, the existence of a monopoly and hence its corollary, i.e. monopoly power, has as the primary cause the presence of market imperfections, that is if those are present on the long term, become state of fact. Thus, in our approach, we consider that to be appropriate to release the mechanism of a monopoly, based on a mathematical tool, which begins from the immutable economic concepts of monopoly.*

*Key words: monopoly, monopolist, elasticity, demand*

*JEL code: D42*

### **Introduction**

The etymology of the word "monopoly" is derived from the Greek word "monos polein" which means to sell oneself, the only seller being called monopolist.

Monopoly (Greener, 2001) is a situation where the producer of a specific good or a service provider controls the market by removing all existing or potential competitors; the disposal of competition can put the producer in a position that will give him the opportunity to establish the prices and, therefore, will put him in the position to collect monopoly profits.

The Monopolist sets the prices to which he will supply the quantities required; but here we must stress the characteristic of monopoly, in terms of demand: the demand satisfied by the monopoly is - at least theoretically - of equal size to the entire market (thus the demand is, if these conditions are met, immutable, a decreasing function of price) demand (for that product - good or service).

The essential condition is that the monopolist has absolute control in terms of fixing the price; the monopolist is the "price giver".

There can be a brand monopoly. This kind of monopoly is different from the product monopoly because the brand makes the difference between the products on a market. The theory of monopolistic competition has its bases in the idea that competition and monopoly are untruthfully bounded. At this point, very important is the substitution degree of the products. For this it is necessary that those products have no close substitutes, which allow consumers to turn their attention to other products (Lipsey and Chrystal, 2002). If the product is quite easy to substitute, the monopolistic company will lose its monopoly power soon. The monopolistic competition appears

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when, at the same time, there is a differentiation between the products and an important amount of selling.

Also, the profit maximization law is complied with because the producer establishes the most profitable quantity of production (he is a “quantity giver”) with the conditions of imposing the price (he is a “price giver”). But the producer is aware of the fact that a smaller sold production quantity at a corresponding higher price gives him no advantages, on the contrary, the maximization of the monopolistic profit brings the minimization of the wellness (Pareto).

The monopoly can be temporary. This is the case of an enterprise that is selling a new product. In this case she temporarily has a monopolistic position on the market that will not be weakened when other companies will succeed in producing similar products that can replace the first one. It is a fact that the innovator has a monopolistic power on the market, a monopoly that tends to disappear when imitating products are placed on the market. This is also the reason why today, companies consider the research and development very important for the company. Research and development means innovation and innovation means a temporary monopolistic power that the company possesses for a period of time.

### **The pure and natural monopoly**

For a monopoly to be maintained in an economy it is necessary to have entry barriers; it must be specified the fact that the monopolist not always aims to obtain profit, but to establish market conditions where trading of goods or services - goods or services that may be provided by several producers, their number is not relevant to the monopoly - is done; this type of monopoly is called pure monopoly.

Along with the concept of pure monopoly there is the concept of natural monopoly, which is nothing but a monopoly arising from the economies of scale (power companies, telephone companies, natural gas supply companies). The mechanism presented in our paper is related foremost to the concept of pure monopoly.

The demand, due to which the production activities carried out by the monopoly is rational, is equal to the size of the entire market demand, as we already said. This fact is not without consequences for the fundamental of a monopoly power - and, possibly, for the purpose of restricting this power, by natural means or through measures taken by the authorities. The company is the only one that meets the whole individual market demand. This is the reason why the producers' independency results from the fact that he is free to choose the price for selling the products, a price that will evidently have repercussions on the demand level and implicitly on the revenues of the firm.

Here we can observe a prime regulator of the monopoly' power: the market demand for the product / products made by the monopoly is stratified into several levels, a certain quantity being purchased, or might be bought with any price, and *not with another price*. Selling the entire production, i.e. the entire quantity of products (acquired gradually, each buyer paying the price for a quantity or another quantity), confers to the monopoly the sum corresponding with the payments (of the sums representing the prices) consumers realize for the benefit of the monopoly. All these prices, by summing them up, form the total (gross) income of monopoly.

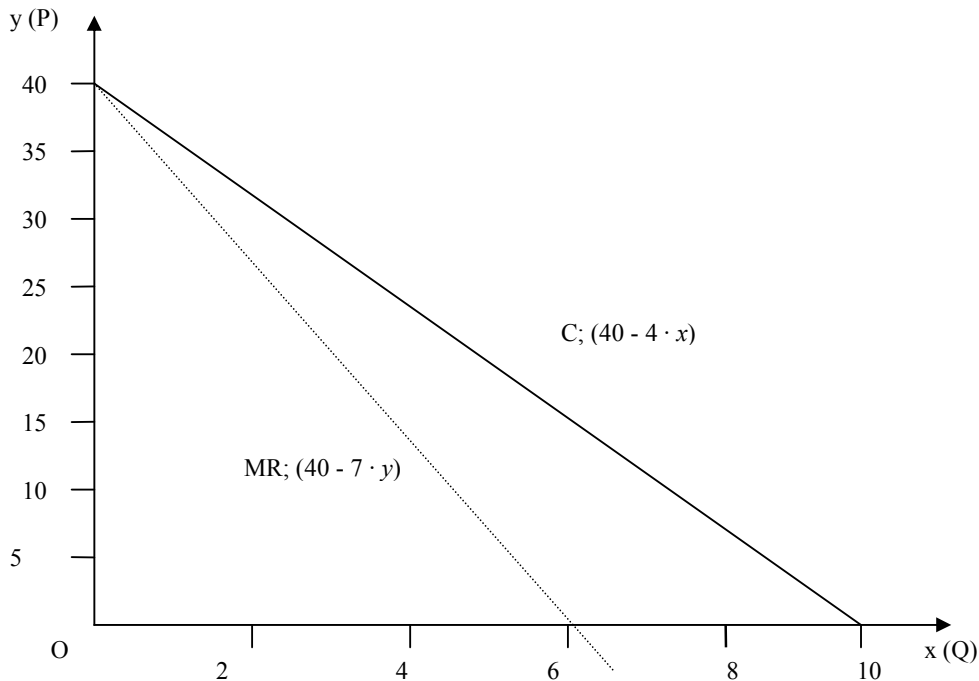
Total revenue obtained by the monopoly (total revenue = price x quantity;  $TR = p \times q$ ) may register an increase or a decrease, as the monopoly production exceeds a certain level, depending on positive or negative marginal revenue (MR), which, in turn, depends on the demand elasticity ( $\epsilon$ ) – that is, whether the demand is elastic or inelastic. The primary cause is not, however, the fact of demand being elastic or not, but, as we said above, the feature of the demand satisfied by the monopoly being - in those conditions - *identical* to the entire market demand. This is, we repeat, a decreasing function of price, that is dependent on the feature of any consumer to want to consume *more* just if, for this, will pay *less*.

Because of this, and in addition, because some consumers have high incomes, some have income – let us say – of an average size, while others get very low incomes, in order to sell all of these, starting from a certain level - high – of the price, it will sell the entire quantity produced - whose size is considered sufficient to satisfy the whole demand - only after repeated price reductions: to sell *one more* unit of product, the monopoly is forced by his principal defective of not being able to compete with anyone (this, of course, if the monopoly is indeed a monopoly - that is not a pseudo-monopoly) to decrease, *once more*, the price paid by the consumer for that unit of product (Maddala and Miller, 1989).

Thus, depending on the absolute value of demand elasticity ( $e$ ), we face three possible scenarios, namely:

- If  $e > 1$ , the increase percentage in the quantity required is greater than the decrease percentage in price, reflecting an increase in revenue as they increase production and registration of positive marginal revenue (MR);
- If  $e = 1$ , the increase percentage in the amount requested is equal to the percentage of reduction in price, which generate a steady flow of incomes and null marginal revenues;
- If  $e < 1$ , the increase percentage in the quantity required is less than the decrease percentage in price, which means a decrease in revenues as they decrease production and, like, recording negative marginal revenues.

In the chart below the demand curve (C) and marginal revenue curve (MR) can be observed:



**Fig. no. 1 – The demand curve and marginal income curve**

The demand curve is one of a function, typically the first degree, type  $40 - 4 \cdot x$  - that being the form of the function used by us in this graph - and the marginal income curve is given by the corresponding function, according to the same degree, that is the first degree, as the demand function - to illustrate the marginal income curve, we use a function of the form  $40 - 7 \cdot y$ .

It is important to note that the point on the demand curve appropriate to the situation in which elasticity equals 1 is based on the following coordinates (Maddala and Miller, 1989):

1. In the economic sense, the first coordinate is expressed by the fact that *production is maximum* – which, geometrically speaking, can be found in the point of the axis Ox (horizontal axis of the graph) where marginal income curve (MR) intersects with this axis;
2. Analogously, the second coordinate is expressed, both in the economic sense and in the intuitive – and also practical – sense by the price corresponding to the maximum level of production, *the minimum price* - which is located, in the geometrical sense, on the axis Oy (vertical axis graph), in the corresponding point to the level of (maximal) output.

The monopoly will never extend the activity in the zone of inelastic demand curve, and if this, however, happens, the monopoly will experience a decline in total incomes; in the same time, the increased production will increase total costs, so in terms of incomes decrease and costs increase, the profit will significantly reduce. Hence, we state the conclusion that the monopoly will always function in the area of the demand curve's elasticity.

### **The monopoly and perfect competition**

Next, we approach the problem of the difference between the monopoly and the perfect competition: under conditions of perfect competition, operators face a perfectly elastic demand curve, hence  $MR = P$  (price), both of which being considered constant. The situation is however different in the monopoly situation, due to the fact that monopolies face a decreasing demand curve: MR curve (marginal income) is, too, decreasing, and marginal income will be lower than the price.

### **Profit maximization**

Profit maximization requires setting production at the level where marginal revenues equals marginal cost ( $MR = MC$ ), whilst monopolist sets production at the point where  $MR = MC$  and then requests the highest price he can get for the production, according to the demand curve, this does not necessarily means the monopoly will obtain profit. A monopoly, however, can not be assumed, nor in theory, or much less in practice; producing from a single factory exists, and at least there may be several production locations (manufactory, halls, etc.), but in this case the above condition must be met.

This is achieved by a business management - exactly, of the entire market production - able to match the marginal costs of each plant: if the monopoly has two, or ten, factories, the marginal cost of each production must be equal to all the others.

The monopolist will produce a quantity of goods Q at a price P, and if the price is less than the average costs involved in producing goods, the monopoly will suffer losses on the short term; however, like traders operating in the sphere of perfect competition, it will continue to work in the short term as long as variable costs are covered.

The financial results obtained by monopoly on a long-term depend on what states the long-term average cost curve: in the long-term, monopoly will come out of the situation in which all costs can be covered. Long-term equilibrium for a monopoly involves equality of marginal costs in the long term (MCLT), marginal costs in the short-term (MCST) and marginal income (MR), so that profit is the maximum, price  $(P) >$  average costs in the long term (ACLT) and all opportunity costs are covered (Maddala and Miller, 1989).

The monopoly is supposed to an extent that this assumption is an axiom of economic *theory* of the monopoly, it can not be prevented by anyone - whether authorities or consumers, even aligned in one way or another - *outside its interest to obtain the highest profits*, to increase the price - with or without reducing production, and thus supply (aggregate) product / products sold. And, moreover, it is inevitably to assume that the monopoly is able, in order to *remain a monopoly*, to introduce market entry barriers (natural, in that case they are not placed by the monopoly, but it

only benefits from them, or made up by monopoly itself, or the entity that patronize it – *exempli gratia*, state) (Lipsey and Chrystal, 2002).

Before proceeding to the comparisons between production and price under competitive conditions and monopoly, we consider the assumption that market demand and costs do not change with the market structure and that there is a long-term balance in terms of constant average costs. This means that  $MC = AC$  and supply curve in competitive market is also equal with both  $MC$  and  $AC$ . The competitors' production will be at that level to which demand equals supply and prices or average incomes equals both  $MC$  and  $AC$ . As for the monopoly, the production will be exceeded only at the point where  $MR = MC$  and  $MR$  has a level below than monopoly price.

The comparison between competition and monopoly can be observed in the figure below:

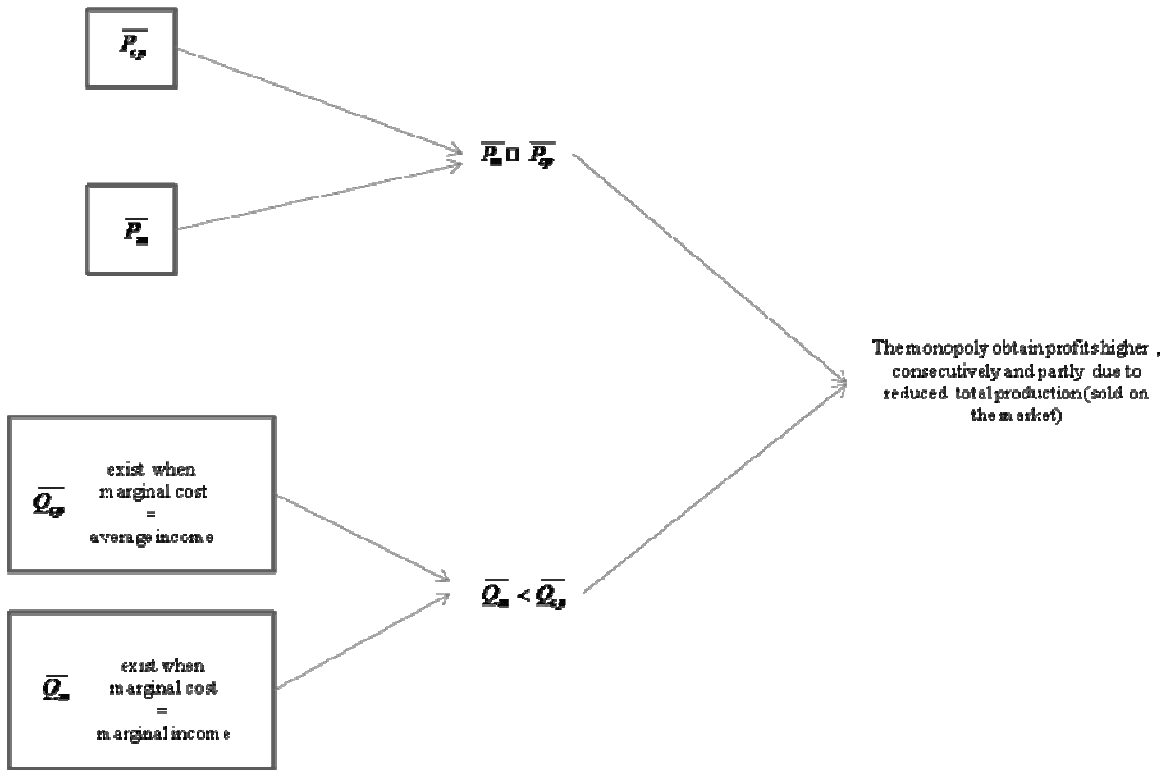


Fig. no. 2 – Comparison between competition and monopoly

If  $\bar{P}_{cp}$  is the market equilibrium price under competitive conditions,  $\bar{P}_m$  market equilibrium price under conditions of monopoly,  $\bar{Q}_{cp}$  the equilibrium quantity produced under competitive conditions and  $\bar{Q}_m$  the equilibrium quantity produced under conditions of monopoly, then  $\bar{Q}_m$  is the production for which  $MC = MR$  (Dobrotă, 1999), while  $\bar{Q}_{cp}$  is the level of production in which  $MC = AR$  (average incomes). We can conclude that a monopoly will produce a smaller quantity and will sell it at a higher price than the equivalent of competitive industry (to compare the two equilibrium prices, we used the sign  $>$  to illustrate the situation usually encountered in practice, i.e.

that the price imposed by a monopoly tends, at least, to be much higher than the price paid by the consumer in terms of (perfect) competition).

If monopoly unit costs are  $C_m$  and monopoly prices are  $P_m$ , the difference between them,  $P_m - C_m$ , is the amount of the increase of the price used by the monopoly.

There are other significant differences between competition and monopoly, which are often not considered: whether there are situations that generate increasing marginal costs of monopoly and thus increasing certain categories of expenditure, charging monopoly as an "exploiter" may we suggest that monopoly will transfer the cost increases to consumers, which would not happen under conditions of competition.

*Equilibrium under competitive conditions* is represented by the formula:

$$P = MC, \text{ hence } \Delta P = \Delta MC \quad (1)$$

Where:

$\Delta P$  = the change in price

$\Delta MC$  = the change in marginal cost  $\Rightarrow$  the entire marginal cost increase is passed on to consumers.

*Equilibrium under conditions of monopoly* is represented by the formula:

$$MR = MC \text{ hence } \Delta MR = \Delta MC \quad (2)$$

Where:

$\Delta MR$  = the change in marginal income

$\Delta MC$  = the change in marginal cost  $\Rightarrow$  the changes of marginal income are equal to those of marginal cost.

Also,

$$MR = P \left( 1 - \frac{1}{e} \right) \quad (3)$$

Where:

$e$  = elasticity of demand.

The increase of the marginal income will cause the displacement of the demand curve, the increase of the elasticity and hence the growth of factor  $(1 - \frac{1}{e})$ ; therefore prices rise to a lesser extent than the increase of the marginal cost, and monopoly will not be able to transfer the entire cost increase to consumers.

If, in terms of competition, we can talk about a supply curve, which shows the quantity of goods that a company is able to produce and provide to consumers at a certain price, under the monopoly conditions there is no such a curve, the concept of supply being meaningless, given that the monopolist is more likely a price setter rather than a price taker; the monopoly sets an exclusive price and quantity covers the whole demand curve, the first being charged, the second being sold by the cost structure - described briefly but not lack any essential element, above.

### **The Lerner Index**

There are many studies on the pricing of non-competitive markets that suggest that company managers set prices for products or services by fixing price using as benchmark the cost size (size at which to obtain the desired value in the price), plus a certain percentage of that cost - that is just the augmentation of the price increase to which we refer.

This growth records different value from one product to another, from one firm to another and from one industry to other industry and can be calculated as the difference between price and average cost or of the increase price percentage over the average cost.

In the case of monopoly, the price that leads to profit maximization is given by the formula (Maddala and Miller, 1989):

$$P = MC \times \frac{e}{e-1} \quad (4)$$

Where:

P = price

e = elasticity of demand

MC = marginal cost

$\frac{e}{e-1}$  = the increase in price factor

If the concept of perfect competition is an idealistic one, and is not, in normal circumstances, found on the market, similar conclusions can be stated about concept of monopoly, characterized by controlling 100% of the market - but the question is how far the company has a monopoly if, for example, controls 70% of the market share. To answer this question it is necessary to quantify the monopoly power.

It notes that no matter how small the monopoly power is - which is characterized by the ability to establish a price above marginal cost - it is extremely necessary to measure it, an important tool in this regard is Lerner's index (Maddala and Miller, 1989) that is determined as follows:

$$Li = \frac{P - MC}{P} \quad (5)$$

Where:

Li = Lerner index;

P = Price;

MC = Marginal cost

Due to the fact that profit maximization implies equality between marginal cost and marginal income (MC = MR) and price = average income level (AR) Lerner index can be written as it follows:

$$\text{Lerner index} = \frac{AR - MR}{AR} = 1 - \frac{MR}{AR} \quad (6)$$

$$\frac{MR}{AR} = 1 - \frac{1}{e} \Rightarrow \text{Lerner index} = \frac{1}{e} \quad (7)$$

For companies operating on the market with a perfect competition,  $e \rightarrow \infty \Rightarrow \frac{1}{e} = 0$ , which shows that firms do not have the power to increase the price. If the price elasticity is low, then the companies record a high degree of monopoly power.

Limits of Lerner index exist because of the difficulty of determining the following: the elasticity of demand mentioned above is the elasticity of demand facing particularly companies, like the situation where the elasticity of demand for a product where exists only in the case of a single firm who operates that product-producing companies if there is several producing companies we can only deduce elasticity of demand facing each firm from a number of firms and the elasticity of demand for a particular product.

Lerner index could also be calculated using data on the marginal cost of firm, but even if the monopoly knows the cost would be skeptically or even would resist in the disclosure. It could however be deduced that from monopoly behavior, as it follows:

- By analyzing the periods in which there was no monopoly on that market, but there was competition;

- By analyzing the markets where monopoly acts as a competitor - the method works in the cases where the monopolist is *able to act* as a monopoly in the domestic market and acts as a competitor (among other competitors, that is, not as a monopoly - but, at best, oligopolistic) in the international market. Because the attitude of the monopoly by reporting of its activities on the criterion of the price required to the consumers of the product / products offered by him (this is what is called price discrimination) makes the monopoly to match the marginal income earned in the two markets, and in the international market:  $MR = AR = P = MC$  (Maddala and Miller, 1989). The final result is a quantification of the marginal cost of monopoly price charged by the international market.

The monopoly power of a monopolist is the weighted average of domestic monopoly power and foreign monopoly power (the weighting is done with domestic sales, exports respectively), where the Lerner index is as follows:

$$\text{Lerner index} = \frac{P_i - P_e}{P_i} \quad (8)$$

Where:

$P_i$  = domestic price

$P_e$  = export price

If one wants to quantify total power monopoly, domestic monopoly power can be calculated as:

$$\text{Domestic monopoly power} = \frac{P_i - P_e}{P_i} \times \frac{S_i - S_e}{S_i} \quad (9)$$

Where:

$P_i$  = domestic price

$P_e$  = export price

$S_i$  = domestic sales

$S_e$  = export sales



The relationship between price discrimination (the monopolist can set one price for all buyers or set different prices for different buyers, known as price discrimination) that a monopoly establishes in both markets, takes the following form:

$$P_i \left(1 - \frac{1}{e_i}\right) = P_e \left(1 - \frac{1}{e_f}\right) \quad (10)$$

$$\frac{P_e}{P_i} = \left(1 - \frac{1}{e_i}\right) / \left(1 - \frac{1}{e_f}\right) \quad (11)$$

Where:

$P_i$  = domestic price

$P_e$  = export price

$e_i$  = price elasticity of domestic demand

$e_f$  = price elasticity of foreign demand

$$\text{If } e_f \rightarrow \infty \Rightarrow \frac{P_e}{P_i} = \left(1 - \frac{1}{e_i}\right) \text{ or } \frac{1}{n_i} = 1 - \frac{P_e}{P_i} = \frac{P_i - P_e}{P_i} \quad (12)$$

$$\text{Thus, the Lerner index of monopoly power} = \frac{P_i - P_e}{P_i} \quad (13)$$

## Conclusions

The monopoly power can be highlighted through price discrimination, given that price discrimination indicates that monopoly controls all prices; knowing the demand elasticities we can calculate the monopoly power - if there are two markets and we know the market prices that monopoly fix them, we need only one of the two elasticity of demand to determine the power monopoly.

Monopoly is not an entity, including the purely economic point of view, autonomous and almighty: the costs of economic activity carried out, on the one hand, and consumer preferences, on the other hand, influence the monopoly power in the sense of making the difference between prosperous long-term monopoly and long-term bankrupt monopoly; also, in our opinion is not absolutely necessary to have full control in a market, for economic and financial success of a monopoly to be fully insured.

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