

Method of Detecting Monopolies in Markets

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Abstract: As agreed by most economists the high market concentration and monopolies are negative for the whole industry. However, detecting monopolies due to market share is not easy. Alternatively, this study focuses on the measurement of price elasticity of demand to distinguish monopolies and explain the reason for this approach. Price elasticity of demand is a basic economics concept measuring the responsiveness of the change in price and quantity demanded. Finally, this study wants to find out which portion of the Price elasticity of demand will be allocate due to the nature of monopoly.

Keywords: monopoly, high market concentration, price elasticity of demand.

1. Introduction

Measuring market concentration is important since, it is inevitable that a concentrated market will bring a multitude of drawbacks such as rising prices, reduced bargaining power on the consumer side and diminished innovation. However, these issues are often less severe compared to the dangers posed by monopolies. Monopolies occur when there is only or almost one single supplier in the whole market. That's to say, when the consumers have a need for such products, they have no choice but to accept the normally expensive goods. Indeed, monopolistic companies can manipulate the prices and control the output to maximize profit, due to the absence of competition. Such monopolies can have severely determined effects on both the market and individuals, making it crucial to accurately identify and address their existence. To this end, this paper gives a theory on detecting monopoly through its pricing strategy.

2. Literature review

According to the theory, market concentration will increase the possibility of the appearance of a financial crisis[1]. "The 'concentration-stability' and the 'concentration-fragility' hypotheses suggest opposing effects operating through specific channels." Through analyzing data from 160 countries between 1970 and 2009, the negative indirect effects of the financial market structure have been tested and proved. What's more, with a simultaneous system, the financial stability and corresponding variables can be evaluated together and the result of the study provides strong support for the hypothesis, containing channel effects, concentration fragility and concentration stability. The effectiveness of these factors varies between high-income countries and low-income countries due to this research. At the same time, the influences of high market concentration occur in various industries[2]. Through the study, the hypothesis that if the competitiveness of the airline market increases, price discrimination will be boosted has been tested. Utilizing the prices of tickets of all

kinds of airlines by different companies and the marginal prices of ticket restrictions provided by the companies to approximate price discrimination: purchase discounts. The study found that these restrictions are related to low ticket prices. However, the discounts are small in amount, if the airline has a high market concentration. The result shows that ticket restrictions will increase the price dispersion with the increase in market competitiveness[3]. Antitrust advocates assert that horizontal consolidation can decrease competition and raise prices. By contrast, those merger advocates confirm the view that it can benefit consumers by diminishing repeated services. The research analyzes the market conditions, costs and profits of 3500 general hospitals from 1986 to 1994 to test the effects of market concentration and hospital mergers. The results show that in the health care market price competition is increasing which is accelerated by the buyers who are sensible to changes in prices. Horizontal consolidation can truly decrease 5% costs. Indeed, such a decrease can bring a lower price to the consumers. Shreds of evidence prove that in a market with low competition, the price changes are small after mergers.

However, the monopoly is one of the extreme situations which will bring prohibitively negative drawbacks[4]. A neglected effect of monopoly is the distortion of resources supplement. Monopolies not only influence the production structure but also make the prices of the factors lower than the social marginal value. "This latter distortion is shown to be quantitatively important when other policies, such as taxes on labour earnings, also depress factor prices." The study researches the negative effects of monopolies on the stability of markets and prices of products[5]. Nowadays, the power of monopoly has a dominant status and is utilized by multinational companies and governments to secure more profits. This situation disturbs citizens' lives and increases unbalance in societies. What's more, it will pose severe influences to the low-income individuals. The study takes Turkey as an example, examining how monopoly policy will cause inflated prices and harm consumers. Through selecting first-hand and second-hand information as well as using qualitative methodology, the result shows that monopoly truly poses negative influences on the economy. Especially, during the period of COVID-19, the prices of bulk commodities have increased a lot and the stability has decreased. "Addressing monopolistic practices through effective regulation is vital to bolster economic stability and reduce disparities." My research of testing monopoly using price elasticity seems to be effective and necessary.

3. Conception of Price elasticity of demand

Price elasticity of demand (called PED) is used to measure the responsiveness of the quantity demanded for a product following a change in the price of the product. PED can determine some characteristics of the products, which is essential in detecting monopolies in the market. Firstly, the conceptual definition of elasticity will be discussed. PED describes how the percentage of quantity of the goods changes in sales by one percentage change in price, *ceteris paribus* (the price is the only change). To illustrate, having an elasticity of 2 represents one percent price rise for a kind of goods causes the quantity demanded of such goods to increase 2%. Normally, the PED should be negative, because the decrease of price will incentive more people to buy. Indeed, in the calculation, there will always exist a negative sign. What's more, when comparing the magnitude of PED, this study ignore the negative sign and compare the absolute values. The good with a greater absolute value of PED is more elastic. After comparisons, all products can be divided into two types. One is price elastic, meaning that the relative change in the quantity demanded is greater than the change in price of the product. The absolute value of PED is always greater than 1. On the other hand, the other type is called price inelastic, meaning that the relative change in quantity demanded is less than the change in price of the product, so the absolute value of PED is less than 1. However, there are two special situations. When PED equals to 0 means that the demand will not change, whatever how the price of the product fluctuates. When PED equals to infinity means that the demand will change incredibly

even a small change in price. Secondly, the formula for the coefficient of the price elasticity of demand for a good is:

$$PED = \frac{\% \text{ change in quantity demanded}}{\% \text{ change in price}} \quad \text{or} \quad PED = \frac{\Delta Q/Q}{\Delta p/p} \quad (1)$$

This is the formal definition of elasticity of price. ΔQ and ΔP are the change of quantity and change of price respectively. Otherwise, Q and P are the initial quantity and price of the goods.

4. Price elasticity of demand in monopoly market

This measurement is better than just calculate the $\Delta Q / \Delta P$, because it is more accurate to calculate the ratio of the changes and compare with other goods. If only consider the ΔQ and ΔP , the luxuries and necessities will have considerable difference. That is hard to tell whether a good is elastic or not. This study is going to use a simple example to illustrate that a demand curve has both elastic and inelastic segments.

Use η to denote the coefficient of the demand elasticity and by definition $|\eta| > 1$ means the demand is elastic as well as $|\eta| < 1$ means the demand is inelastic. If the demand curve for a product is $P(Q) = 10 - 5Q$, then the elasticity η is calculated as $\frac{\Delta Q/Q}{\Delta P/P} = \frac{P \cdot \Delta Q}{Q \cdot \Delta P}$. As above mentioned, when ΔQ is very small, $\frac{\Delta P}{\Delta Q} = \frac{dP}{dQ} = -5$, $\frac{\Delta Q}{\Delta P} = -\frac{1}{5}$. Then the η can be measured as:

$$\frac{\Delta Q/Q}{\Delta P/P} \times \frac{P}{Q} = -\frac{1}{5} \times \left(\frac{10}{Q} - 5\right) = -\frac{2}{Q} + 1 \quad (2)$$

It can be seen that $Q \geq 1 \rightarrow |\eta| \geq 1$, $Q \leq 1 \rightarrow |\eta| \leq 1$. In conclusion, the demand curve will have both elastic and inelastic portion. Finally, this research would like to analyse the monopoly pricing. Monopoly means where one firm dominates the market due to having a large market share. The firm may act as the price maker who can determine the price of their goods and control the quantity Q supplied in the market. To make things simpler, let's make some assumptions. $P(Q)$ is linear in Q , in other words, $P(Q) = aQ + b$ for some constant $a < 0$ and $b > 0$. Denote the cost of producing Q many goods as $C(Q)$ and assuming $C(Q)$ is strictly increasing on Q , $C(0) > 0$ and $C(Q)$ is a convex function. Meanwhile, the monopoly firm can choose any $Q \in [0, \infty)$, and also large enough so that the monopoly will never find it optimal to choose $Q = 0$ otherwise this problem is meaningless. Let's evaluate and judge these assumptions first. Assuming $C(0) > 0$ means the firm needs to pay a fixed cost and $C(Q)$ strictly increasing on Q is a realistic assumption. Because more Q is produced, more cost will exist. However, assuming $C(Q)$ to be convex is not a realistic assumption, which violate the economies of scale, because more products manufactured and increasing in economies scale should in most cases lower the marginal cost. However, $C(Q)$ being convex is opposite to this conception. (marginal cost: $C'(Q)$, convex: $C''(Q) > 0$: $C'(Q)$ is increasing on Q) This study is going to argue this assumption is not actually needed later. Based on the above assumptions, the firm's profit can expressed as

$$\text{profit}(Q) = (aQ + b) \times Q - C(Q) \quad (3)$$

The first and second order derivatives are

$$\text{profit}'(Q) = 2aQ + b - C'(Q) \quad \& \quad \text{profit}''(Q) = 2a - C''(Q) \quad (4)$$

the firm's profit function is a concave function, since $a < 0$, $C(Q)'' > 0$. Firm should choose Q where $\text{profit}'(Q)=0 \rightarrow Q=\frac{(C'(Q)-b)}{2a}$. This condition is in general a necessary condition for profit maximizing, but here since it is already known that profit function is concave, this also becomes a sufficient condition. However, when a firm aims to maximize profit, the condition that the first-order derivative equals zero must always hold, as it is a necessary condition. Therefore, this study doesn't actually require the profit to be concave for $\text{profit}'(Q^*)=0$ being a profit-maximizing quantity. In other words, the research doesn't need to assume that $C(Q)$ is a convex function. Rearrange the profit maximum condition by the following steps and get a new expression. At the profit maximizing quantity, there is $\text{profit}'(Q)=0 \rightarrow P'(Q) \times Q + P(Q) = C'(Q)$. Therefore, the study proves that:

$$\frac{1}{|\eta|} = \left| \frac{\Delta P}{\Delta Q} \times \frac{Q}{P} \right| = \left| P'(Q) \times \frac{Q}{P} \right| = \left| \frac{C'(Q) - P}{Q} \right| \times \frac{Q}{P} = \frac{P - C'(Q)}{P} < 1 \quad (5)$$

In a word, in the profit maximum condition, left-hand side of the equation is < 1 . the formula $\frac{1}{|\eta|} < 1$. Therefore, $|\eta| > 1$. The elasticity of that position is elastic. So the monopoly price on the elastic side of the demand curve in order to achieve the maximum profit.

5. Conclusion

At first, this research make some assumptions about the situations of the market. Through proving, the study found that to achieve the maximized profit, the monopoly will act on the elastic portion of the demand curve. This result is always accessible and is not related to the assumptions above mentioned. Consequently, it can be confirmed that this approach feasible to detect the existence of monopoly in the market due to their specific pricing strategy.

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