

# A Practical Method for Diagnosing the Existence of Industrial Barriers to Entry

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## Abstract

Entry relates with the appearance of a new producer in a market or industrial sector. The role of entry is critical, because it operates as a balancing force against high levels of industrial concentration and the abuse of dominant position by firms with large market shares. The ease of entry is adjusted according to the number and height of barriers to entry. A barrier to entry can be defined as anything that restricts competition in a sector, when more competition would be socially beneficial. The current research proposes a practical method for diagnosing the existence of industrial barriers to entry and for measuring their overall height. The method is based in the principle that profits attract new entrants in an industry, and sectors in which there is an increase of incumbent firms' profitability, without new entry taking place, are cases of sectors with high barriers to entry. The method is applied in six European industrial sectors, based on data taken from Eurostat.

**Keywords:** barriers; entry; competition; industry; diagnostic method

## 1. Introduction

The current research aims to propose a practical method for diagnosing the existence of industrial barriers to entry and for measuring their overall height. The study begins by explaining what entry is and its role in business and economic activity. It continues with explaining barriers to entry: the term is defined and there is a reference about the barriers' possible categorization methods, the identification of specific barriers and the various measurement methods proposed in the past. Following there is a theoretical explanation of the proposed method and a practical application in 6 European industrial sectors. In the end there is a short discussion about the limitations and weaknesses of the proposed method and the conclusions of the study.

## 2. Entry

The entry of new competitors relates with the appearance of a new producer in a market (OECD, 2005). Entry can take many forms, such as investments in new industrial facilities, exports, trade licenses, joint ventures, strategic alliances, mergers and acquisitions etc. The entry of new competitors operates as a balancing force against high levels of industrial concentration and the abuse of dominant position by firms with large market shares. Entry increases supply, lowers prices, intensifies innovation and restores equilibrium in markets that don't operate in a socially desirable manner.

## 3. Barriers to Entry

The ease of entry is adjusted according to the number and height of barriers to entry. Various definitions of barriers to entry have been proposed in the industrial organization literature, as the ones by Bain (1956), Stigler (1968), Ferguson (1974), Caves & Porter (1977), Fisher (1979), VonWeizsacker (1980), Demsetz (1982), Baumol & Willig (1981), Gilbert (1989), Geroski et al (1990), Carlton & Perloff (1994), Church & Ware (2000), McAfee et al (2004) and the OECD (2005).

The definition adopted in the current study is the following: a barrier to entry is defined as anything that restricts competition in a sector, when more competition would be socially beneficial. It is based on Fisher's (1979) definition, with a small variation: the phrase "anything that restricts entry" in Fisher's definition was replaced by the phrase "anything that restricts competition". This change was necessary in order to cover cases of mobility barriers from one intersectoral effectiveness group to the other. This definition can include a large number of possible barriers to entry, covers intra- and extra-sector mobility situations and clearly points out the aim of the whole analysis, which is social welfare enhancement.

#### 4. Categorization of Barriers to Entry

In regard to the categorization of barriers to entry, again there have been various proposals in the relevant literature. Howe (1978) separated barriers to natural and technical, Shepherd (1990) separated barriers to indogenous and exogenous and Jacobson & Andreosso-O'Callaghan (1996) separated barriers in first and second line barriers. The European Competition Commission follows the separation in legal, technical and strategic advantages (as mentioned in the 2004 Horizontal Merger Guidelines).

The most practical separation proposed in the literature was the one by Geroski et al (1990), followed also by the OECD (2005). They separate barriers between structural and strategic. Structural barriers arise from the exogenous demand, cost and technology conditions of an industry and are the same for all firms in a sector, new or incumbent, while strategic barriers, on the other hand, are created from the actions and strategic choices of established firms.

This categorization, even though far from perfect, as some barriers fall in both categories, can still help in an affective analysis of barriers to entry. Examples of structural barriers are economies of scale, capital costs and diversification, while examples of strategic barriers are limit pricing, patent hoarding and collusion.

#### 5. Definition of Specific Barriers

The absence of a commonly accepted definition of barriers to entry has caused many arguments on what exactly is a barrier to entry and on how it can be measured. If someone searches the literature on the topic he is going to discover a variety of opinions. Most authors adopt different definitions and examine different barriers.

The first one who worked systematically with barriers to entry, Bain (1956), identified three key barriers: product differentiation, economies of scale and absolute cost advantages. Stigler (1968) considered as a barrier to entry the costs faced by an entrant firm that were not faced by an incumbent firm, without specifying what these costs are and how they can be measured. Caves & Porter (1977) considered as the most important sources of entry barriers capital requirements, excess capacity, product differentiation, cost advantages, vertical integration, limit pricing and strategic behaviour. VonWeizsacker (1980) in his study examined two barriers, economies of scale and product differentiation.

Baumol & Willig (1981) argued that fixed costs and economies of scale do not necessarily belong to barriers to entry, but agreed with the view that sunk costs are a very important barrier. Demsetz (1982) placed emphasis on aspects such as legal restrictions on the entry, property rights and predatory pricing. He considered as the most important barrier to entry the high cost of informing consumers and advertising. Gilbert (1989) did not accept economies of scale and absolute cost advantages as significant barriers to entry, if there are no unique factors of production in the possession of established firms. However he considered as significant barriers to entry strategic behaviour and structural advantages such as legal constraints, sunk costs, product differentiation, learning economies and cooperation

networks. Geroski et al (1990) in their work examined the strategic behaviour of established firms, economies of scale, sunk costs, limit pricing, absolute cost advantages, learning curves and product differentiation.

McAfee et al (2004) argued that economies of scale, capital requirements, capital costs and sunk costs are auxiliary barriers that can prevent entry only in combination with each other, rather than individually. Schmalensee (2004) argued that the barriers to entry can be determined solely by sunk costs. Finally, the OECD (2005) identified and examined a large number of entry barriers, including sunk costs, absolute cost advantages, economies of scale, economies of scope, high capital costs, reputation, cooperation networks, legal barriers, exit barriers, first-mover advantages, vertical integration, limit and predatory pricing, overcapacity, price discounts, product tying, product differentiation, exclusive deals and patent hoarding .

In conclusion it can be observed that throughout the theoretical and empirical literature on barriers to entry, each author has accepted some sources of entry barriers and rejected others, with the exception of the recent OECD study which examines a large number of obstacles. The same confusion is met also in the barriers' measurement methods.

## **6. Application and Importance of the Diagnostic Method**

Barriers to entry are important because they are relevant in virtually every kind of competition case. They must be taken into account by competition authorities when measuring monopoly power, assessing dominance, analyzing the likely competitive effects of mergers, intervening in a market in order to fix prices etc. This is because entry barriers may retard, dampen or nullify the market's usual mechanism for balancing market power: the attraction and arrival of new competitors.

For example, if a merger will substantially increase concentration, entry barriers matter because competition will not be reduced if new firms can enter easily, quickly and significantly. Moreover, competition authorities seeking to block a merger will usually need to show that entry barriers make quick and significant entry unlikely. Similarly, establishing the presence of substantial entry barriers is usually necessary to prove that a high market share translates into market power in monopolization or abuse of dominance cases (OECD, 2005).

## **7. Barriers to Entry Measurement Methods**

The methods that have been applied in the past for the measurement of entry barriers' height are various. The first attempt was made by Bain (1956). He applied a questionnaire approach in order to investigate managers' perceptions about 3 barriers to entry: economies of scale, product differentiation and absolute cost advantages - including capital costs. He then used the replies received in order to construct a table in which he estimated the barriers' total height for each industry of the sample. The questionnaire approach was followed by other

authors as Mann (1966), Smiley (1988) and Karakaya & Stahl (1989).

Other methods that have been proposed for the measurement of barriers to entry are those of Comanor & Wilson (1967), Salop (1986) and Dunne et al (1988). Comanor & Wilson (1967) applied an econometric approach in order to investigate the effect of a number of barriers on profitability. Salop (1986) proposed a method based on estimates about entrants' cost and demand disadvantages, entry time duration, sunk costs and economies of scale. Dunne et al (1988) chose to focus on entrants' viability, performance and market impact over a 20 year time period.

The most widely used method for entry barrier measurement is the one primarily proposed by Orr (1974a & 1974b). Orr, based on Bain's (1956) theses about the relation of entry barriers with profitability, tried to determine the profit level that could be sustained continuously without attracting entry. In order to determine that profit level, he used a multiple regression analysis model in which he investigated the effect of various barriers and entry motives on real entry levels (Geroski et al, 1990; Burton et al, 1999). Following the negative signs of the results, he then constructed an index of the barriers' overall height by adding them. Orr's method has been followed by many other authors, as Gorecki (1975 & 1976), Duetsch (1984), Khemani & Shapiro (1986), Geroski (1991), Mata (1993), Yang (1998), Burton et al (1999) etc, with various alterations in the model's sample and variables specification. The major problem with above index is that it doesn't include all the barriers in the sector. The lack of measurement tools for barriers such as legal restrictions, absolute cost advantages, cooperation networks and capital costs, complicate the calculation of all possible barriers to a single index. As a result, the height of the calculated index for each industry, expresses only part of the entry barriers' total height. Moreover, each barrier's measurement method is also an issue in question.

This is why the present study makes a different, more practical proposal for diagnosing the possible existence of entry barriers and assessing their overall height.

## **8. Proposed Method**

The proposed method is based on the fundamental, commonly accepted by economic theory, principle that profits attract new entrants in an industry, and new firm entry is the mechanism through which equilibrium is restored in industries where incumbent firms earn excessive profits. Sectors, in which there is an increase of incumbent firms' profitability, without new entry taking place, are cases of sectors with high barriers to entry. Based on this principle, the current study proposes a method for diagnosing the existence of barriers to entry based on a sector's number of firms and profitability.

The existence of entry barriers is diagnosed by using the following simple method: for a fixed period of time (5 and 10 year period), the growth rate in the number of firms is compared with the growth rate of profit. If profits increase and the number of firms decreases or remains constant, it is a sign of an industrial sector with high barriers to entry. If profits increase correspondingly to the number of firms, it is a sign of an industrial sector with low

barriers to entry. In substance, this particular method does not measure the effect and height of particular barriers to entry. It diagnoses the existence of overall barriers to entry in order to assist competition authorities in the process of assessing monopoly power and in measuring the effect of mergers.

## 9. Application

In order to examine the effectiveness of the proposed method, it will be applied in a sample of 6 European industrial sectors. The data used are taken from the Eurostat Structural Business Statistics Database. The industrial sectors are:

- The United Kingdom Production and Preserving of Meat Sector
- The Spanish Manufacture of Footwear Sector
- The German Manufacture of Pharmaceutical Products Sector
- The German Manufacture of Explosives Sector
- The French Manufacture of Chemical Products Sector
- The Finish Manufacture of Agricultural Tractors Sector

For each of these sectors there is a table that presents the number of firms and the gross operating surplus for a 10 year period (1999-2008). Gross operating surplus has been used in order to approximate profits. Gross operating surplus, as defined by Eurostat in the context of structural business statistics, is gross output less the cost of intermediate goods and services (to give gross value added) and less compensation of employees. It is gross because it makes no allowance for consumption of fixed capital. This variable was the closest one to net profits that could be retrieved from the Eurostat database, and that is the reason it is used. It has to be noted however, that the most suitable variable would be net profits, and if Competition Commissions have access to net profit data, they should definitely prefer them.

For both variables there is a separate column that measures the percentage change in the number of firms and profits for a 5 and 10 year time period, taking as base year 1999. The percentage change between the two variables is compared and related to barriers to entry according to the following scale:

**Table 1.** Scale for Assessing Entry Barriers' Overall Height

<b>Difference between Number of Firms and Profits variables</b>	<b>Possible Overall Height of Industrial Barriers to Entry</b>
0%-33%	Low
34%-66%	Medium
67% +	High

This scale serves the purpose of providing the thresholds according to which the overall height of barriers to entry in a sector can be characterized as low, medium or high. Overall entry barriers' height is characterized as low when the difference between the percentage change in the number of firms and profits is between 0% and 33%, as medium when it is between 34%-66% and high when it equals or exceeds 67%. The results of the analysis are presented below.

**Table 2.** Number of Enterprises and Gross Operating Surplus in the United Kingdom Production and Preserving of Meat Industrial Sector

<b>UK - PRODUCTION AND PRESERVING OF MEAT</b>				
<b>Year</b>	<b>Number of enterprises</b>	<b>5 and 10 year % change</b>	<b>Gross operating surplus (m €)</b>	<b>5 and 10 year % change</b>
1999	433		283,9	
2000	400		240,0	
2001	398		281,9	
2002	390		197,7	
2003	283	-34,64	273,4	-3,70
2004	296		353,0	
2005	306		408,1	
2006	286		486,3	
2007	296		631,3	
2008	297	-31,41	631,3*	+122,37

Source: Eurostat \*Estimate

From Table 2 we can observe that, taking 1999 as the base year, the number of enterprises in the UK production and preserving of meat industry has been reduced -34% during the following 5 year period and -31% in the following 10 year period. Gross profits on the other hand have been reduced -3,7% in the following 5 year period, but increased +122% during the following 10 year period. From the difference of the percentages in the 10 year period we can conclude the possible existence of high barriers to entry in the sector from 2004 onwards. This is because there is simultaneous decrease in the number of firms and very high increase in the rate of profit. The difference between the two percentages is 153%, which on 2008 would place the industry in the high barrier scale.



**Table 3.** Number of Enterprises and Gross Operating Surplus in the Spanish Manufacture of Footwear Industrial Sector

<b>SPAIN - MANUFACTURE OF FOOTWEAR</b>				
<b>Year</b>	<b>Number of enterprises</b>	<b>5 and 10 year % change</b>	<b>Gross operating surplus (m €)</b>	<b>5 and 10 year % change</b>
1999	5.610		266,7	
2000	5.443		260,9	
2001	4.805		250,4	
2002	4.675		232,0	
2003	4.418	-21,25	265,8	-0,34
2004	4.556		218,3	
2005	4.389		217,5	
2006	4.276		233,5	
2007	4.097		214,0	
2008	4.111	-26,72	239,2	-10,31

Source: Eurostat

In Table 3 we notice that in the Spanish manufacture of footwear industrial sector the number of enterprises has decreased -21% between 1999 and 2003, and -26% from 1999 to 2008. Profits on the other hand have remained almost stable for the 5 year period after 1999, and decreased -10% after 10 years. As observed from the data, this sector has low barriers to entry, as the decrease in the number of firms is accompanied by a decrease in profits and the percentage change between the two variables is 16%. This percentage places the sector in the low barriers to entry threshold mentioned earlier.

**Table 4.** Number of Enterprises and Gross Operating Surplus in the German Manufacture of Pharmaceutical Products Industrial Sector

<b>GERMANY - MANUFACTURE OF PHARMACEUTICAL PRODUCTS</b>				
<b>Year</b>	<b>Number of enterprises</b>	<b>5 and 10 year % change</b>	<b>Gross operating surplus (m €)</b>	<b>5 and 10 year % change</b>
1999	37		66,0	
2000	37		133,7	
2001	42		118,0	
2002	23		101,4	
2003	68	+83,78	164,2	+148,79
2004	79		142,0	
2005	65		166,2	
2006	66		207,2	
2007	74		226,8	
2008	78	+110,81	226,8	+243,64

Source: Eurostat



From Table 4 we can see that in the German pharmaceutical sector there was an increase in the number of firms, both during the 5 year (+83%) and 10 year period (+110%). Also there has been an increase in profits (+148% in 5 year and +243% in 10 year period). As the increases in these two variable are not proportional (actually the increase in profits is almost double that the increase in the number of firms), we can diagnose the possible existence of considerable barriers to entry (difference of 133%).

In Table 5 for we notice that the number of firms in the German explosives sector has increased +9% during the 5 and 10 year period after the base year 1999. Profits on the other hand have increased +42% in the following 5 year period and +67% in the following 10 year period. This is a sign of the possible existence of medium barriers to entry in the sector (difference of 58%).

**Table 5.** Number of Enterprises and Gross Operating Surplus in the German Manufacture of Explosives Industrial Sector

<b>GERMANY - MANUFACTURE OF EXPLOSIVES</b>				
<b>Year</b>	<b>Number of enterprises</b>	<b>5 and 10 year % change</b>	<b>Gross operating surplus (m €)</b>	<b>5 and 10 year % change</b>
1999	22		107,3	
2000	20		121,0	
2001	26		96,9	
2002	16		147,1	
2003	24	+9,09	152,7	+42,31
2004	28		176,6	
2005	22		165,4	
2006	22		156,4	
2007	21		179,8	
2008	24	+9,09	179,8	+67,57

Source: Eurostat

From Table 6 we observe that in the French chemical sector industry the number of firms has decreased -1,7% between 1999 and 2003, and -14% between 1999 and 2008. On the other hand profits decreased -1% between 1999 and 2003, and increased +27% between 1999 and 2008. This 41% difference in the percentages is a sign of the existence of medium barriers to entry.

**Table 6.** Number of Enterprises and Gross Operating Surplus in the French Manufacture of Chemical Products Industrial Sector

<b>FRANCE - MANUFACTURE OF CHEMICAL PRODUCTS</b>				
<b>Year</b>	<b>Number of enterprises</b>	<b>5 and 10 year % change</b>	<b>Gross operating surplus (m €)</b>	<b>5 and 10 year % change</b>
1999	4.017		9.680,2	
2000	3.953		10.180,1	
2001	3.917		9.724,0	
2002	3.898		8.837,6	
2003	3.948	-1,72	9.579,7	-1,04
2004	3.919		9.375,8	
2005	3.848		9.717,8	
2006	3.759		11.865,1	
2007	3.868		12.363,7	
2008	3.440	-14,36	12.363,7	+27,72

Source: Eurostat

Finally in Table 7 we observe that in the Finnish agricultural tractors sector the number of firms has decreased -6% between 1999 and 2003 and -23% between 1999 and 2008. On the other hand, profits increased +260% between 1999 and 2003 and +430% between 1999 and 2008. This 453% difference in the percentages is a sign of the possible existence of high barriers to entry in the sector.

**Table 7.** Number of Enterprises and Gross Operating Surplus in the Finish Manufacture of Agricultural Tractors Industrial Sector

<b>FINLAND - MANUFACTURE OF AGRICULTURAL TRACTORS</b>				
<b>Year</b>	<b>Number of enterprises</b>	<b>5 and 10 year % change</b>	<b>Gross operating surplus (m €)</b>	<b>5 and 10 year % change</b>
1999	166		-17,2	
2000	163		33,4	
2001	166		21,5	
2002	160		32,9	
2003	155	-6,63	27,6	+260,47
2004	147		23,2	
2005	140		33,6	
2006	137		41,2	
2007	134		56,9	
2008	127	-23,49	56,9	+430,81

Source: Eurostat

## 10. Limitations and Weaknesses

This diagnostic method is practical and easy to use as a screening method for the possible existence of industrial barriers to entry. It also serves the purpose of approximating the barriers' possible overall height. However, it offers no insight on which are the exact barriers that delay or block the entry of new competitors in the industry. The discovery of the exact barriers met by new firms requires extensive and thorough research in the sector and its parameters.

Another important limitation comes from the use of gross operating surplus as the profit variable. This variable was not the most suitable for the purposes of this research, but it was used due to the fact that net profit data were not available from Eurostat website. If national authorities have access to net profit data, they should use them in order to make the results of the diagnostic method more accurate.

## 11. Conclusions

Competition Authorities around the world, while carrying out their duties, need to identify the possible existence of barriers to entry and assess their height. Various measurement methods have been proposed in the Industrial Organization literature in the past, and each one has its own advantages and disadvantages. They depend largely on the definition adopted by each author and the barriers he identified.

This study suggests a practical and easy to use method for diagnosing the possible existence of overall barriers to entry and assessing their height. It is based on comparisons between the growth rate in the number of firms and the growth rate of profit for a fixed period of time. The difference between the two rates classifies sectors in three possible barriers to entry scales: low, medium and high. The main weakness of the method is that measures the effect of the overall barriers, without pointing which these barriers are and what their effect is.

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