will be taken into account during the examination of the economists' thought, and some reflections related to the new view will be also discussed in the conclusion.

1. The expression "natural" monopoly

Aristotle was the first to talk about monopoly (De Roover 1951: 492; Langholm 2006: 397), but who was the first to talk about "natural" monopoly? When did this expression start being used in its current sense? And why was the word "natural" employed? This is what we look at in this section. We limit our analysis here to the meaning and the definition of natural monopoly; the identification of its distinctive features by the economists under analysis will be discussed in the next sections.

Smith never uses the expression "natural monopoly", but he gives a detailed description of the characteristics of what this was to be called immediately after him: "Some natural productions require such a singularity of soil and situation, that all the land in a great country … may not be sufficient to supply the effectual demand"; the consequent "enhancements of the market price are evidently the effect of natural causes which may hinder the effectual demand from being fully supplied, and which may continue, therefore, to operate forever"(1776: I.7.24). The earliest explicit use of the term that I have found in the literature is in the essay *The Nature of Rent* by Malthus, where natural monopoly is distinguished from artificial monopoly. For Malthus there are: "peculiar products of the earth … which may be called natural and necessary monopolies" ([1815] 1969: 13). As an example of natural monopolies, he takes "certain vineyards in France, which, from the peculiarity of their soil and situation, exclusively yield wine of a certain flavour" (13-14)[11]. The expression turns up again in Bastiat, who wrote: "People who class together artificial monopoly and what they call natural monopoly … are quite blind or quite superficial" ([1850] 1864: 180). So far, we have seen that classical economists did use the expression natural monopoly, but we haven't found a definition of the concept yet. This is supplied by J.S. Mill, who explains that natural monopolies are "those which are created by circumstances, and not by law" ([1848] 149: 499). In general we can say that the expression was used to indicate those cases of monopoly deriving from natural agents supplied in fixed quantity, also including talent and location (Cairnes 1861). Economists always regarded them favorably. Hence, we think that the reason for the use of the adjective was aimed at distinguishing natural monopoly (created by nature) from an artificial one (created by law). While the former was seen with favor, classical economists were strongly against the latter, considering it "unnatural".

We now have to go back to J.S. Mill, to point out the important fact that, among his examples of natural monopolies, he includes the production of gas and water (1848: II.15.9). To tell the truth, these examples of natural monopoly are mentioned together with others which are not, such as productions in which the entry barriers are due to capital requirements or to the action of combinations[12]. But still, we can state that he was the first to apply the expression to cases similar to those where it was used later by neoclassical theory[13]. We move now to France, where we find the term employed with more precision by Walras, who writes that transport networks such as railways, roads, and canals "make up a natural monopoly" ([1875] 1936: 232)[14]. Then, after a period in which it was possible to find the old and the new senses used side by side, even in the same text[15], the new one became consolidated, due particularly to the numerous important contributions by Ely (1886, 1889, 1894). In effect, in his 1894 article, where the expression even appears in the title[16], Ely defines natural monopoly as those "undertakings which are monopolies by virtue of their inherent properties" (1894: 294), and lists the following cases: "railways, telegraphs, telephones, canals, irrigation works, harbors, gasworks, street-car lines, and the like" (294). It is interesting that Marshall proposed a different definition for that "class of industries, which are often called monopolies, but which are perhaps better described as *indivisible* industries" ([1890b] 1964: 106; Marshall's italic). Leaving Marshall aside, we

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[11] Note that Malthus uses the same phrase as Smith: "soil and situation".
[12] J.S. Mill writes: "All the natural monopolies (meaning thereby those which are created by circumstances, and not by law) which produce or aggravate the disparities in the remuneration of different kinds of labour, operate similarly between different employments of capital. If a business can only be advantageously carried on by a large capital, this in most countries limits so narrowly the class of persons who can enter into the employment, that they are enabled to keep their rate of profit above the general level. A trade may also, from the nature of the case, be confined to so few hands, that profits may admit of being kept up by a combination among the dealers. It is well known that even among so numerous a body as the London booksellers, this sort of combination exists; though individual interest is often too strong for its rules, nor, indeed, does the combination itself include the whole trade. I have already mentioned the case of the gas and water companies" ([1848] 1849: 499-500).
[13] Sharkey writes: "John Stuart Mill … was the first economist of note to speak of natural monopoly" (1982: 14). We think that he was absolutely the first, if we limit our concern to the new meaning of the expression. Also Hazlett states that it was J.S. Mill "who introduced … the term *natural monopoly*" (1985: 2, author's italics); again, he should have added: in its new meaning.
[14] According to Ekelund and Hébert: "Walras may have been the earliest writer to employ the actual term in its modern sense" (2003: 665); but we have seen that J.S. Mill did this earlier.
[15] As in the case of Hadley (1886), who used "natural monopoly" both for highways and for land ownership.

can see here that there has been a gradual shift from the first meaning to the second, with a period of overlapping of the two; we can also see that the new sense crowded out the first in a period in which it was generally thought that the new natural monopolies were much more important than the old ones[17].

2. The singling out of the concrete situations to which it is applied

Natural monopolies typically occur in two kinds of production: the first is characterized by the need of a large infrastructure to start the operation, as in transport networks and some public utilities; the second is due to the presence of network effects (Liebowitz and Margolis 1996). Over the years economists have identified some industries in which monopoly is spontaneously generated for reasons linked to the production process itself. In this section we analyze the writings of the economists who identified new situations in which this phenomenon occurs. We will show here that the singling out of this kind of industry by economists has not necessarily to do with the development of the theory of natural monopoly. In actual fact, the justifications they gave to explain these cases are not always based on technological reasons, such as economies of scale. It should be also remembered that the expression "natural monopoly" was not necessarily used to describe these situations.

Adam Smith, discussing the subject of joint stock companies, explains that businesses cannot expand without running into problems of mismanagement; however he believes there are domains where large size firms can work better than small ones; they are "those of which all the operations are capable of being reduced to what is called a routine, or to such a uniformity of method as admits of little or no variation. Of this kind is, first, the banking trade; secondly, the trade of insurance from fire, and from sea risk and capture in time of war; thirdly, the trade of making and maintaining a navigable cut or canal; and, fourthly, the similar trade of bringing water for the supply of a great city" (1776, V.1.121). Notice that Smith speaks only of "large size firms", not of monopolies[18].

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[16] The title of the article is: Natural monopolies and the workingman.

[17] See for instance Hadley: "This monopoly, due to the advantages of large organizations of capital, is characteristic of the present day. … Natural monopolies, like that of land ownership, are still important; but they are not the matter of supreme importance in productive industry any more than in transportation" (1886: 40).

[18] Elsewhere, talking about wages, Smith claims that where there are few agents, competition cannot work: "The masters, being fewer in number, can combine much more easily" (1776: I.8.12); the same reasoning