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Perfect Competition According to Enrico Barone

1. Introduction

The Italian economist Enrico Barone (1859-1924) is well known for elaborating the theory of marginal productivity and for his seminal contributions to the socialist calculation debate. In this paper we follow the development of Barone's ideas on the concept of perfect competition throughout his career as an economist¹. Schumpeter (1954 [1976]: 994) mentions him on the theory of costs and the supply curve, while his fundamental contribution to the development of *U* shaped cost curves is highlighted by Keppler and Lallement (2006: 748-750), and that to the concept of natural monopoly by Mosca (2008)².

The literature on the history of the concept of competition reveals many different approaches. One of these obviously concerns perfect competition; it is usually said to start with Cournot, passing via Knight to end up with Joan Robinson and Chamberlin³. Nevertheless, although Knight would appear to owe his "rigorous notion of equilibrium" to Pareto and Barone (Marchionatti 2003: 66), the secondary literature on perfect competition does not mention Barone, probably because none of his writings are devoted exclusively to the subject of competition, but above all because most of his works have not been translated into English⁴. In this paper we shall be making extensive use of quotations drawn from the original Italian edition of Barone's works, with the aim of demonstrating that the Italian economist deserves a place in the history of the notion of perfect competition.

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¹ There is also a great wealth of other, non economic work (military, political, and historical) which are not relevant here, see Gentilucci (2006).

² The originality of Barone in the foundation of the new welfare economics is stated (in Italian) by Petretto (1982). For a detailed and contextualized analysis of Barone's thought (in Italian) see Micheline (2001, 2005, 2007). On Barone see also Bousquet (1935), Jaffé (1964), Kuenne (1968), Caffè (1987), Maneschi and Thweatt (1987), and Dooley (1998). Bradley and Mosca (2010) have examined the content and the context of Barone's "Ministry" (1908b).

³ See among others Stigler (1957), Peterson (1957), Dennis (1977) and Backhouse (1990).

⁴ Barone's *Principi* (1908a) were translated into German in 1927 and into Spanish in 1942. His "Ministry" (1908b) was translated into English in 1935. In English are also available Barone (1894a, 1894b).

The paper is organized as follows. In section 2 Barone's various definitions of competition are analyzed. Section 3 deals with the conditions he thought needed to be realized for perfect competition to work. In section 4 we examine his description of the adjustment process required to reach the equilibrium price; and then section 5 considers the outcomes Barone believed perfect competition could achieve. Section 6 deals with the institutional context, specifically Barone's demonstration that theoretically the outcomes of perfect competition could also be achieved in a planned economy. Section 7 shows some graphs that Barone created to illustrate the working of perfect competition, and section 8 considers other meanings of the term competition for Barone. Finally, section 9 gives an overall evaluation of his contribution to the issue against the background of the secondary literature on the history of the concept of perfect competition.

2. Definitions

Barone was already speaking of competition using the adjective "perfect" in 1896, when dealing with the equality between marginal productivity and the price of inputs: in particular, he writes, this equality is realized only "in a perfect competition régime" ([1896] 1936: 200)⁵. We notice that the word "régime" suggests that for Barone competition here is not a behaviour, but a market structure: in fact he defines the other market structures he examined in the same way – *i.e.* the "régime of monopoly," the "individualist régime," and the "collectivist régime"⁶. In the same essay of 1896 Barone uses "indefinite" with competition as well as "perfect", indicating with this term the opposite situation to monopoly; he takes this expression from Walras⁷, and in the *Principi* he uses it again: "*indefinite* free competition" ([1908a] 1936: 45, his italics⁸). It is worth noting that the term competition appears very early on in the *Principi*, on the third page, with a different meaning: in the case of an elastic demand, as we would say today, a reduction of supply "will establish among consumers ... a competition which will considerably raise the price" ([1908a] 1936: 7). In this case Barone, just like Smith,

⁵ In the *Principi* a similar expression can be found: "a free competition régime" ([1908a] 1936: 26).

⁶ Barone speaks of these other régimes in ([1908a] 1936: 39) and ([1908b] 1935: 246).

⁷ In Barone's words: "From Walras, and also here, we deal with the case of an indefinite competition among entrepreneurs" ([1896] 1936: 195).

⁸ The *Principi di Economia Politica* was published for the first time in 1908, then in 1909 with a few additions, and then again in many other editions up until the end of the 1920s. The edition of 1936 contains the original version plus all the various additions and changes; moreover, it includes university lecture notes and articles that Barone wrote over the years. Through the dates of the bibliographical references we shall be giving an account of these later layers so as not to lose sight of the evolution of Barone's thought over the years. On the various editions of Barone's *Principi di Economia Politica* see Michelini (2007).

considers competition as a behaviour, preceding the term with the indefinite article⁹. In his early writings the simple expression “free” competition¹⁰ can also often be found, a commonly used term in that era meaning free entry. However, from a passage in Barone it would seem that for him free competition is a realistic approximation of the limit concept of perfect competition; in fact he states that the characteristics of free competition are “realized all the better the more it is perfect”¹¹ ([1908b] 1936: 294). With the passing of time the adjective “perfect” becomes the one he uses in his writings: in 1921, in the introductory chapter of a treatise of his on Transportation Economics, he speaks of “perfect free competition” ([1921] 1936: 391), of “perfect competition régime” (405, 437) and also simply of “perfect competition” (392). As we shall see in section 8, with these different expressions Barone attributes various meanings to competition¹².

3. Conditions

In this section we set out the characteristics necessary for perfect competition to be achieved, as they appear in Barone’s economic writings.

- *Product homogeneity* is mentioned by Barone only once, in the *Principi*, when he states that to determine economic equilibrium the entrepreneurs must produce “the same product” ([1908a] 1936: 8).
- The question of the *number of firms* deserves special exploration. Sometimes Barone explicitly states that the multiplicity of economic agents is necessary for competition. For example in 1895, referring to the market of input, he identifies the competitive régime among capitalists with the situation in which: “all the capital is not concentrated in the hands of one capitalist alone, but is divided up among several of them” (Barone [1895] 1936: 122).

The idea that competition required a high number of agents is also confirmed elsewhere. For example he states that, because firms are price takers, we need to follow Walras’ hypothesis that they are numerous (Barone [1896] 1936: 195). In the “Ministry”, too, Barone considers price taking behaviour as the result of the presence of “several competitive enterprises” ([1908b] 1935: 251). These statements notwithstanding, however, there are others where Barone condemns the excessive

⁹ This indication on competition in Smith can be found in Backhouse (1990: 59). It should be recalled that this kind of competition between buyers (or between sellers) within an industry is called by Cairnes “commercial”, whereas that between entrepreneurs to enter a market is called “industrial” (Cairnes [1874] 1888: 303 fn).

¹⁰ For example in Barone ([1896] 1936: 155, 190, 207; [1908a] 1936: 34, 36).

¹¹ The translation of this sentence in the English edition is not faithful to the original Italian: “the maximum is more nearly attained the more perfectly they [the characteristics] are realized” ([1908b] 1935: 289).

¹² Moore also (1906: 211) asked the same question: “In what respect is the idea of competition changed when the modifiers ‘perfect’, ‘unlimited’, ‘indefinite’, ‘free’, ‘pure’, are added?” It does seem to us, however, that in his article Moore doesn’t give an answer to his own question.

number of firms, for example in the cases “in which competition is hardly or not at all at work, despite the considerable number of firms”; he actually goes so far as to state that “if competition was working more actively, the number of [firms] would certainly diminish, with an increase in their size, with a reduction of the cost of production and hence of the selling price” ([1908a ed. 1909] 1936: 290).

In other passages it appears that Barone identifies the “the limit state of competition” as that in which the firms are “reduced to a few, of the same type, of the most economic size” ([1921] 1936: 411). Nevertheless, he also expresses the conviction that when the firms are few, they continue to compete, to the point that he wishes for the good of society they would call something of a truce¹³. Barone also considers the idea that from competition only one single firm may survive¹⁴, but he believes that not even in this case would exposure to competition disappear, since in his opinion potential competition was always just around the corner¹⁵. In fact in the case of natural monopoly, which he defines perfectly and that he several times recalls, the firms “left on their own, arising from competition, will always have to fear *potential* competition ... from other similar firms that could spring up” ([1908a ed. 1909] 1936: 289 his italics).¹⁶

As will be seen, sometimes Barone derives price taking behaviour from the assumption that there are many firms in the market, while sometimes he suggests that it doesn't depend on the number of firms¹⁷. This variety of opinions on the relation between number of firms and competition finds confirmation in his very own words: “Between the greater or lesser multiplicity of firms ... and the greater or lesser effectiveness of competition, there is not always ... a necessary relation” ([1908a ed. 1909] 1936: 287). We shall be seeing further on that for Barone the equilibrium number of firms is determined by technology, *i.e.* by the size of the minimum efficient scale, but it would appear that for him, whatever the market

¹³ Barone writes: “when competition (*i.e.* the régime of struggle) has only left in the landscape of production just a few big firms, the continuation of the war is enormously costly for the firms that won through” ([1908a ed. 1909] 1936: 326-327). We shall be coming back to this in § 8.

¹⁴ In Barone's own words: “In some cases it is ... the question of the most economic size of the firm which leads, through competition, to one single firm” ([1908a] 1936: 25). This subject is dealt with in Mosca (2008).

¹⁵ We therefore deduce that Barone believed that there were potential competitors also in the case of scale economies and sunk costs, so that his theory cannot be thought of as analogous to that of contestable markets.

¹⁶ Mises ([1949] 1996: 276) used railroads as an example of an apparently natural monopoly with very large sunk costs that faces competition from another industry (automobiles and airplanes): “The bigness and economic ‘power’ of the railroad companies did not impede the emergence of the motor car and the airplane”. See Bradley (2010: 254-257).

¹⁷ Already in 1908 Barone speaks of the “limiting case to which free competition tends, in which there are *one or more* competing entrepreneurs who make no profit and who produce at the same cost” ([1908b] 1935: 252 our italics).

structure that emerges from this number, the price will be the same as that of perfect competition.

- As for *free entry and exit*, it is clear from an examination of Barone's writings that for him competition consists above all in the "substitution of entrepreneurs with lower cost for those that produce with higher cost" ([1908a ed. 1909] 1936: 287)¹⁸. Sometimes he states that it is the firms with lower cost that crush those with higher cost; for example in the construction of the supply curve Barone thinks he should order firms in increasing order of cost and shows that if a new firm enters the market producing at the same cost as the first, the last one sustaining the highest cost of production is forced to exit the market ([1908a] 1936: 8-9). We shall be coming back to this process in section 7 on the graphical representations of competition.

Barone prefers to focus on exit more than on entry; for him competition acts through "successive eliminations of firms with higher cost" ([1908a ed. 1909] 1936: 289). In other words he believes that in the case of insufficient demand, competition forces the less efficient firm to exit the market, allowing those that remain to exploit scale economies to the full. This is the subject of the "destruction of firms (those with higher cost) by free competition" ([1908b] 1935: 288), taken up by Barone also with specific references to concrete episodes, such as the attempt to provide remedies for the wine producing crisis, an attempt in his opinion absurd because to get out of the crisis he could see no other way than the reduction of production, in other words the bankruptcy of the producers with higher cost¹⁹. As we shall see in the later sections, this approach enables him to demonstrate that if there are too many firms they cannot reach the "most economic size" ([1908a] 1936: 25) and that it is precisely competition in the sense of exit that realizes "a reduction in the number of firms with the reduction of costs" ([1908a ed. 1909] 1936: 288). Barone complains that sometimes competition is "lazy", or "not very lively", specifically referring to the process of entry and exit ([1908a ed. 1909] 1936: 287-289; [1911-12] 1937²⁰: 316-317), but we shall be dealing with this in section 4.

¹⁸ As we shall see in section 8, this idea does not concern perfect competition, but the technological or dynamic competition.

¹⁹ Barone for example writes concerning a reduction of the alcohol tax: "The subsidy was intended to be a way of getting out of the wine producing crisis: an absurd idea, because to resolve the crisis the only way was to reduce production, in other words make the producers with higher cost bankrupt" ([1911-12] 1936: 242). The case of the sugar industry is similar ([1911-12] 1936: 243-251).

²⁰ Like the *Principi di Economia Politica*, also the *Principi di Economia Finanziaria* published in 1937 consist of a mixture of articles and lecture notes, most of which were written in the years 1911-12. Unlike the former, however, we shall not distinguish between the various editions, because in this paper we don't deal with subjects of Public Finance; the citations and quotations from the *Principi di Economia Finanziaria* here mainly play the role of confirming and strengthening statements Barone made elsewhere.

- We haven't found in Barone's writings any mention of the role of *perfect information* as a requisite of competition, with the exception of the admirable metaphor of the Ministry of Production, the only one subject to be "omniscient". In the next section we shall trace the reasons for this choice of Barone's.

4. Adjustment

Before examining the results of competition once equilibrium is reached, we raise the issue with Barone of the problem of the analysis – which he calls "dynamic" – of the path towards equilibrium, *i.e.* of the "transitional period from one equilibrium to another" ([1894b] 1936: 93)²¹. The study of this period is essential for Barone because it is only this that confers descriptive realism on the economic theory; in his own words: "The analysis of equilibrium – which is indispensable ... – if it is not then integrated with the analysis of all these *dynamic* phenomena, of all these phenomena of *adaptation*, would give rise to very different conclusions from the phenomenon in the real world", and he adds significantly "In this lies the aspect missing in many economic theories" ([1908a] 1936: XVII his italics)²².

Barone describes both the forces which in practice drive the economy in the direction of equilibrium, and those that slow down its attainment²³. Among the former we find the auction mechanism: "there is – he writes – no other more efficient means than to put up for auction, so to speak, the quantity of saving available, and to assign its use to the people who can pay the higher interest thanks to the greater productivity of their firms. And this is what free competition does" ([1908a] 1936: 62). According to Barone, the same result is obtained with speculation: "Speculation in general ... carries out an important economic function. Speculation in commodities competes, indeed, to solve the problem of the adaptation of supplies to demands, helping the avoidance of sudden jumps in prices" ([1919-20] 1936: 398). And again: "The speculators in stocks are intermediaries between saving and capitalization, just as the speculators in goods are intermediaries between production and consumption. Speculation in bonds serves as a compass for the practical solution to this problem: to divide up or share out the new saving in such a way that – as far as possible – it produces the same net rate of return everywhere, a

²¹ On the dynamics of Barone's thought, see (in Italian) Michelini (1993: 17), Bellanca and Giocoli (1998: 203), and Tusset (2004: 24).

²² Concerning this, Blaug argues that Walras "simply gave up the effort to provide a convincing account of how real-world competitive markets achieve simultaneous multi-market equilibrium" (1997: 72).

²³ As we shall be seeing in section 8, for Barone there are also forces which totally impede the achievement of the new equilibrium.

condition we know to be essential for the achievement of the maximum of utility in capitalization" ([1919-20] 1936: 438-439). As we shall see, to skip the path up to equilibrium Barone develops the theoretical figure of the Ministry: "Speculation solves ... a problem before which a hypothetical omniscient economist, ministry of production in a collectivist State, would not know how to proceed differently from it" ([1919-20] 1936: 408, see also 412-413). We shall be coming back to this subject of the Ministry in section 6.

We come now to Barone's description of the movements that take place when the path towards equilibrium is slowed down by the presence of "frictions" ([1908a] 1936: XVII), in his opinion easily the most frequent case. He attributes this slowness to the fact that, after an exogenous shock (which he calls "the disturbing cause"), the "labour of adaptation by the individual, when we suppose he also is endowed with an exquisite hedonistic sensitivity, can only occur by trial and error" ([1894b]: 1936 91). It is precisely the presence of these attempts, and their being essential to Barone's system, that in our opinion justifies his decision mentioned earlier to omit the hypothesis of perfect information. We find an example of this in his analysis of the markets of input in which Barone comments on the following figure.

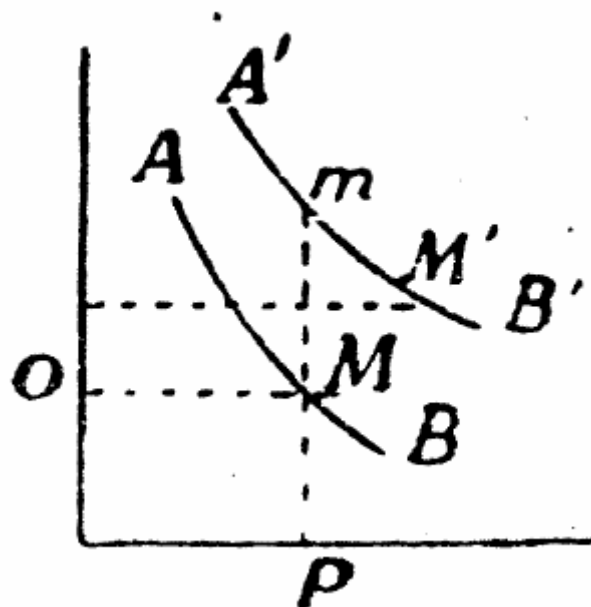


Figure 1. Source: Barone([1908a] 1936: 48).

"In the real world - he writes - on the subject of the factors of production, there are almost always two phases ...: supposing that the demand passes from AB to $A'B'$, the new equilibrium point M' is not reached immediately; in the first phase equilibrium is

established in m with the new demand and the existing quantity OM : it is only afterwards that, because of the reaction of the new price mP on the quantity supplied ..., this extends (or diminishes) tending to the new equilibrium M''' ([1908a] 1936: 48). With regard to the speed of convergence towards a new equilibrium he specifies that “for the saving, the phase of passing from m to M' proceeds with a certain speed; for property capital there is greater or lesser speed; for the land, on the other hand ... there is no passing from m to M' , because lands cannot be reproduced; for labour the passing from m to M' is slow” ([1908a] 1936: 49). And again: “The difficulty over the adaptation of production to consumption is already very serious for direct goods; it becomes increasingly serious, to the extent we are dealing with instrumental goods of an increasingly higher order” ([1908a ed. 1909] 1936: 606). This concept is generalized in the 1932 edition of his *Principi*: “The so-called *law of supply and demand* would like to give summary form to dynamic facts. To express it more exactly, we distinguish: a) *provisional* equilibrium, in which the price is determined by the demand and by the amount available; b) the *distant* equilibrium ... as far as the quantity produced is great or contracted, so as to equal the price at the production cost of the marginal firm. (The real world generally consists of provisional equilibria)” ([1908a, ed. 1923] 1936: 11).

It would seem that Barone’s provisional equilibrium corresponds to that of Marshall’s very short, or “market,” period, in which supply is fixed (perfectly inelastic). We end this section on adjustment with a telling statement, in his manual on Transportation Economics, where Barone applies these subjects precisely to the subject of perfect competition: “in the real world – he writes – we are dealing with *provisional* equilibria, not with *definitive* equilibria – we would say dynamic, not static, – *competition is never perfect*” ([1921] 1936: 437-438 his italics)²⁴. So in these cases, in the analysis of competition he employs dynamics, meaning the study of the adjustment toward equilibrium and of the impediments that in the real world are opposed to them. As we mentioned earlier, Barone repeats that the substitution of firms may not occur if “competition is not sufficiently active” ([1911-12] 1937: 316); in the next section we shall see that this substitution *tends* “to reduce the price to the cost of production” ([1908a] 1936: 9 e 35). Then in section 8 we shall see the reasons why this *tendency* does not necessarily culminate in the achievement of final equilibrium.

5. Outcomes

²⁴ We come back to these subjects in section 8.

Barone repeatedly and insistently spells out the two following outcomes, considering them typical of perfect competition: “the cost of production equals the prices and the costs of production are at a minimum” ([1908b] 1935: 254)²⁵. In the *Principi* he also finds other outcomes, *i.e.* firms must stay “within the limits of decreasing costs”, and the marginal productivity of factors is equal in their various uses ([1908a] 1936: 34-36). Others again, as we have seen, are summed up by Barone in his manual on Transportation Economics: “the firms reduced to a few, of the same type, of the most economic size, the profits annulled” ([1921] 1936: 411). We shall pause over these outcomes, examining them one at a time.

- We have already met many cases where he describes the agents as *price takers* in perfectly competitive markets: in this case every capitalist “taken in isolation, makes his calculations as if the wage remains what it is, as if he had no means to modify it” ([1895] 1936: 123). For Barone a characteristic of this type of market structure is in fact that “each entrepreneur ... will consider as constants (because he is unable to change them himself) the prices of the product and of the services” ([1908b] 1935: 252)²⁶.
- Barone speaks of the *single price* that is determined under perfect competition; one of the occasions, for example, regards the market of inputs in which, he states, “it is only by virtue of the competition that the capitalists carry out between themselves, that a single wage ends up by being established, and a single interest rate” ([1895] 1936: 123).
- *Zero profits* are considered by Barone to be a perfectly correct outcome, given the hypotheses, of Walras’ system of equations. This outcome is reiterated many times in his writings, both citing Walras’ idea “of an entrepreneur who – in the conditions postulated of competition between entrepreneurs – makes neither gain nor loss” ([1896] 1936: 194-195, see also [1911-12] 1937: 279), and also – as has been seen – illustrating “the tendency of free competition to reduce the price to the cost of production” ([1908a] 1936: 9). It is also expressed by Barone with reference to the market of capital: “In a régime of free competition... the *net rate* [is] everywhere equal to the interest on saving. This is none other than another way of saying the equality of price to the cost of production” ([1908a] 1936: 30). We would point out that it was precisely thanks to Barone’s theory of marginal productivity that Walras, starting from the third edition of the *Elements* (Walras 1874, ed. 1896), considered the

²⁵ The same definition frequently recurs in the “Ministry” (Barone 1908b).

²⁶ He often comes back to this subject: in the “full régime of free competition, each individual in the market ... acts ... *subject to the market prices of products and services*” ([1908b] 1936: 259-260, his italics).

zero profit in perfect competition no longer a hypothesis but an outcome (Jaffé [1971] 1983: 277). If the profit in the real world exists, for Barone, as we have said, this is because of the slowness of the adjustment process toward perfect competition equilibrium; it is therefore a temporary phenomenon ([1908a] 1936: 9 e 35; [1911-12] 1937: 312).

- Among the most original of Barone's outcomes on this subject is certainly the one on the *minimum efficient scale* and on the equilibrium number of firms. Already in the *Principi* he is stating that "competition also tends to define the size of firms" ([1908a] 1936: 24), and "forces each firm to stay within the limits of decreasing costs" ([1908a] 1936: 25). And again: "the quantity produced overall, when competition is fully operative, tends to be divided up among firms producing at the minimum cost, so that each of them produces a certain quantity, corresponding to the limit of decreasing costs" ([1908a ed. 1909] 1936: 288). As we have already mentioned, his demonstration that technology may determine the presence of just one firm in the market also derives from these reflections on the minimum efficient scale ([1908a ed. 1909] 1936: 287-289).
- We now come to the outcomes in terms of efficiency: Barone shows that the perfect competition equilibrium contains the characteristic of *optimality*. We have already spoken of the fact that for Barone competition has to be able to act making the least efficient firms exit the market, allowing those remaining to exploit the scale economies to the full. As will be seen, Barone is here utilizing the concept of dynamic efficiency, not that of allocative efficiency, but let us continue to follow his argument: the reduction of average costs that derives from this generates a reduction in prices, with a consequent increase of consumers' welfare, and this is advantageous for the "social organism, for which consumers' rent increases continuously" ([1908a] 1936: 35). Nevertheless, he recognizes that as well as this advantage, competition also involves a social cost, which is the "destruction of the fixed capital of the firms it devours" ([1908a ed. 1909] 1936: 327), so competition creates victims, too. It is true that for Barone the bankruptcy of the firms producing with higher costs is only a healthy "elimination of the organisms less able to manage" ([1908a ed. 1909] 1936: 619), yet he does not think that for this reason society as a whole should passively suffer the damage: in fact for Barone those that lose their jobs "are the inevitable victims of competition, of crises, and it is useful if society, which benefits overall every time there is economic progress, does not abandon them" (1911-12 [1936]: 95).

In conclusion, for Barone, even if perfect competition is a limit state, the “free” competition that is realized in the real world is the only market structure that allows us to obtain the most efficient outcome²⁷; in his words: “To change this equilibrium artificially, to place obstacles or binding limitations before the automatic functioning of the forces that competition unleashes or liberates, is to lose sight of that equilibrium that gives the maximum of utility, and destroy wealth in the sense we frequently use: *i.e.* of utility it would have been possible to make, and that is not made” ([1908a] 1936: 255).

6. The institutional context

As we have already mentioned, the outcomes of perfect competition for Barone can be obtained in a planned economy, as well as in a private market economy²⁸. In his “Ministry of Production” article (Barone 1908b), he applied the Walrasian general equilibrium approach to a “collectivist régime”, in which non-labor resources are collectively owned and price and allocation decisions are made by a centralized Ministry of Production.

Nearly half of Barone’s “Ministry” article deals with the “individualist régime,” essentially a private-property market economy where individuals own all productive resources, have property rights in their goods and resources, and are free to allocate their resources and expenditures as they see fit. Unlike the neoclassical model of perfect competition, his individualist model is not, however, a single market structure, as it is “one in which free competition, monopolies and cartels are all present” (Barone [1908b] 1935: 247). Since our paper deals with Barone’s analysis of perfect competition, we will limit our analysis to the place of perfect competition in the context of Barone’s “Ministry” paper.

The problem facing Barone’s Ministry of Production is essentially the problem facing the individualist regime, *i.e.*: “to solve the problem of combining ... individual and collective services in order to procure the *maximum welfare* of its people” (Barone [1908b] 1935: 265 his italics). By excluding “metaphysical” utility from his analysis, Barone is able to aggregate *welfare* without aggregation of individual ordinal *utilities*, although the exclusion of utility maximization leaves a considerable hole in the concept of economic welfare.

²⁷ We will see that in theory also the Ministry manages to do this.

²⁸ On the connection of the concept of perfect competition with the socialist calculation debate of the 1930s see Blaug (1997: 77).

In Barone's "Ministry" model national income is a measure of welfare, and changes in national income measure changes in welfare. The Ministry establishes a set of shadow prices of goods and resources (λ_i) , which the individuals take as constant, like the price takers in the perfectly competitive economy. Individuals then allocate their time and resources and choose the combinations of goods (r_i) and saving (e) to maximize their individual welfare (θ) , where

$$\theta = r_a + \lambda_b r_b + \dots + \lambda_s r_s + \lambda_t r_t + \dots + e.$$

Since θ is a cardinal magnitude in Barone's model, the task of the Ministry is to determine the shadow prices and outputs (R_i) that maximize society's economic welfare (Θ) , which is simply the sum of the individuals' welfare – *i.e.*, to maximize

$$\Theta = \Sigma \theta = R_a + \lambda_b R_b + \dots + \lambda_s R_s + \lambda_t R_t + \dots + E.$$

The Ministry determines outputs (R_i) and shadow prices (λ_i) equal to the average cost of production and the average costs of production are at a minimum ([1908b] 1935: 254). These two results – to which, as we have seen, he several times returns – Barone also calls the "two fundamental laws" of perfect competition.

As we have already mentioned, Barone argues that theoretically the results of competition can be realized without having recourse to the process of adjustment. He writes that logically it is "possible to imagine higher beings, capable of achieving outcomes that are obtained with free competition, avoiding the conflict and stress that emerge in the mechanisms of the latter" ([1908a] 1936: 63).

However, in his "Ministry" article, Barone takes a somewhat more practical approach to the problem of welfare maximization. He argues that the Ministry of Production cannot solve equations necessary to maximize welfare *a priori*, but must reach the maximum social welfare by *ex post* trial and error or by large-scale "experiments" (*Ibid.*: 286-289).

Barone writes that it is evident:

That the Ministry of Production in this perfecting of its first approximate and indeterminate solution (the sole criterion of perfection being the maximum collective welfare) comes to the conclusion that production should be so organized that (with the systems of technical coefficients, of the λ 's and R 's) *the cost of production may be minimized and that the equivalents for the products and for the additions of capital may be such as will correspond to their respective costs of production.*

That the system of equations of the collectivist equilibrium is none other than that of the free competition (*Ibid.*: 274, his italics).

This suggests a role of the Ministry of Production in the collectivist régime similar to the auctioneer in the Walrasian general equilibrium model, but Don Lavoie points out that, although Barone could have substituted the Ministry for the Walrasian auctioneer as the mechanism to adjust prices and outputs to equilibrium, he didn't (Lavoie 1985).

In Barone's analysis of the collectivist régime, the Ministry apparently has made all of the trial-and-error adjustments and/or conducted the experiments to reach the optimal solution. He simply shows the conditions that must be satisfied for this result and at least the theoretical possibility that the Ministry could attain these conditions in a collectivist economy.

Barone argues that if the Ministry were capable of introducing more efficient technologies, the "firms with higher cost, succeeding the least" (Barone [1908a ed. 1909] 1936: 645) should exit the market, generating the same outcome as freedom of exit in individualist market economies. At the same time he claims that in practice this wouldn't happen in the collectivist régime, because the Ministry would be under political pressure to let "firms survive that it would be in the interests of society if they disappeared" ([1908a ed. 1909] 1936: 340), which would negate the gains in efficiency and welfare from the innovations²⁹. However, as we have noted earlier, Barone paid more attention to exit than entry in the long run. In the "Ministry" article, there is no discussion of how the Ministry of Production would reproduce the effects of entry.

He writes that some collectivist writers lamented the destruction of firms (those with higher cost) in competitive markets (*Ibid.*: 645). If the Ministry of Production in a collectivist state could not remove firms with higher cost from the market, there would

²⁹ Barone writes that by remaining bound to the previous technology the Ministry procures "a destruction of wealth in another sense - in the sense that the greater wealth which could have been realized will not be realized" (Barone [1908b] 1935: 288). Michelini (2005) has gone very thoroughly into this subject.

be weak (if any) incentive for entrepreneurship and innovation. The role of entrepreneurship and incentives to innovate are among the most difficult issues for the collectivist economy. If the Ministry is hesitant to eliminate higher-cost firms from markets, there could also be a serious moral hazard problem that would contribute to inefficiency.

7. Graphical representations

To show the originality of the contribution provided by Barone through his graphs on the subject of competition, we start with the construction of the supply curve, where he represents the movement of entry and exit of firms.

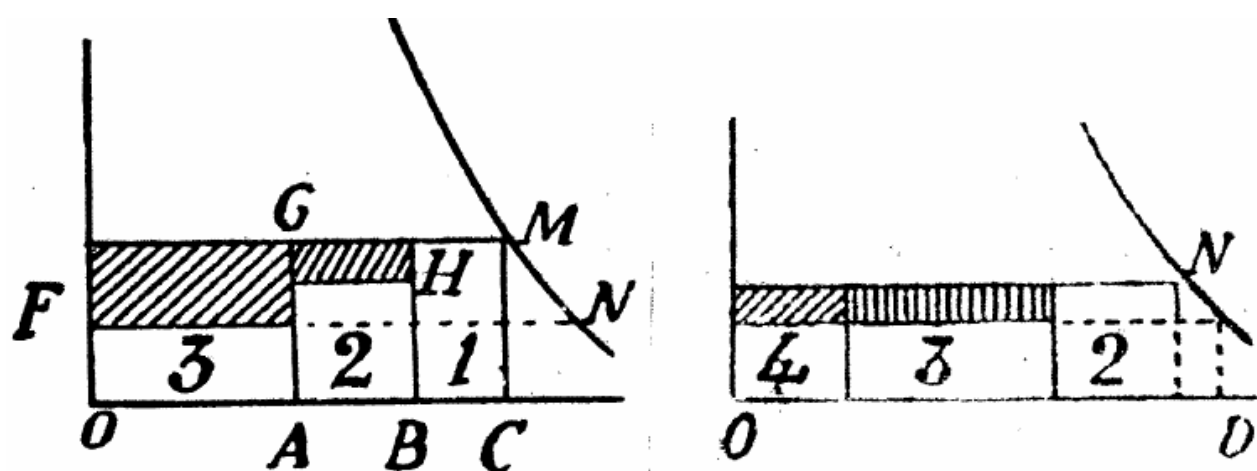


Figure 2. Source: Barone([1908a] 1936: 8).

Barone writes: “the quantities OA , AB , BC are those produced by entrepreneurs 3, 2, 1 with costs of production, per unit of product³⁰, represented by the height of the rectangles. ... If in the market another entrepreneur 4 intervenes, who produces at the same cost as entrepreneur 3, this intervention will be able to squeeze entrepreneur 1 out of the market. ... Continuing, one tends towards equilibrium N : the quantity produced and consumed OD , to the price ND corresponds the lowest cost of production” ([1908a] 1936: 8-9).

If the following graph of Barone is not “by steps”, but represents continuous functions, this is thanks to the idea that it is dealing with “a large market and several competitive entrepreneurs” ([1908a] 1936: 9).

³⁰ From this it can be seen that for Barone the supply curve coincides with the average cost curve.

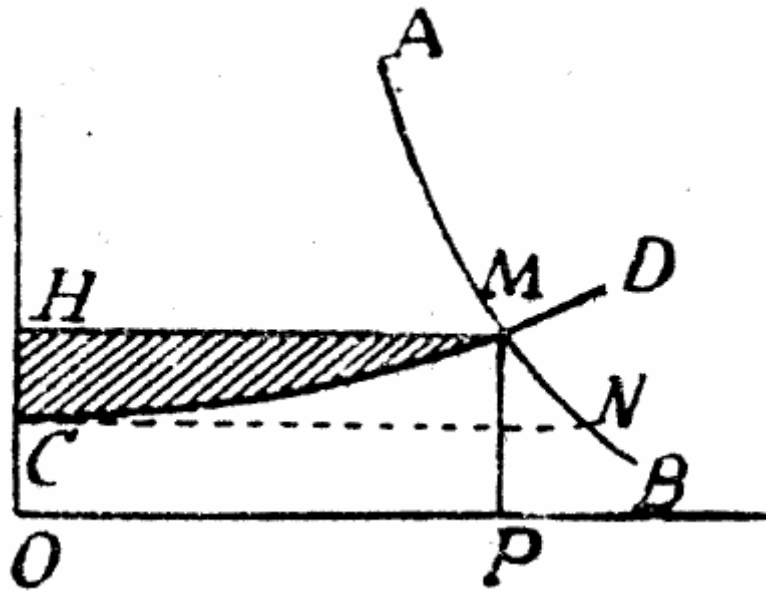


Figure 3. Source: Barone([1908a] 1936: 9).

In this graph Barone illustrates the effect of competition in the following terms: “The competition of the entrepreneurs tends to push point *M* toward point *N*, to straighten *CD* on *CN* and to reduce the area *MHC* to zero” ([1908a] 1936: 9-10). In other words, the short run market supply curve, which is a continuous and increasing function, in the long run became horizontal to the level of the minimum average cost, thanks to competition (*i.e.* entry of more efficient firms, and exit of those least efficient). This same graph is taken up again in a very simplified version in the *Principi di economia finanziaria* concerning the shifting of consumption tax.

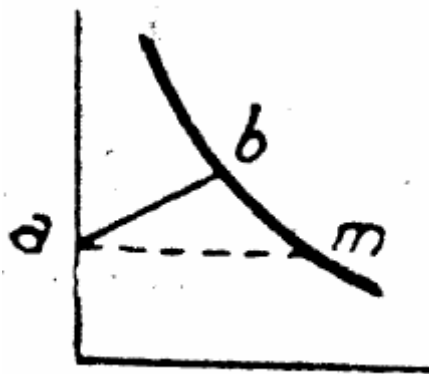


Figure 4. Source: Barone ([1911-12] 1937: 312).

Barone writes: “We will adopt increasing cost curves; and, when necessary, we will also take into account the continuous dynamism of the market ... so that the *ab* tends to lean towards the *am*” ([1911-12] 1937: 312).

It is worth noting that Barone’s competitive supply curves are quite different from the neoclassical supply curves. First, as already noted, the supply prices are *average* costs and not *marginal* costs – unless, of course, the firms are operating at the minimum point on their average cost curves where marginal cost equals minimum average cost. His supply curves are apparently long-run supply curves because they are generated by the entry and exit of firms, which is impossible in the short run with at least one fixed input. Furthermore, the long-run supply curve is the locus of prices and outputs at which the industry is in long-run equilibrium.

In the *Principi* ([1908a] 1936: 21) there is a very important graph in which Barone illustrates other effects of competition:

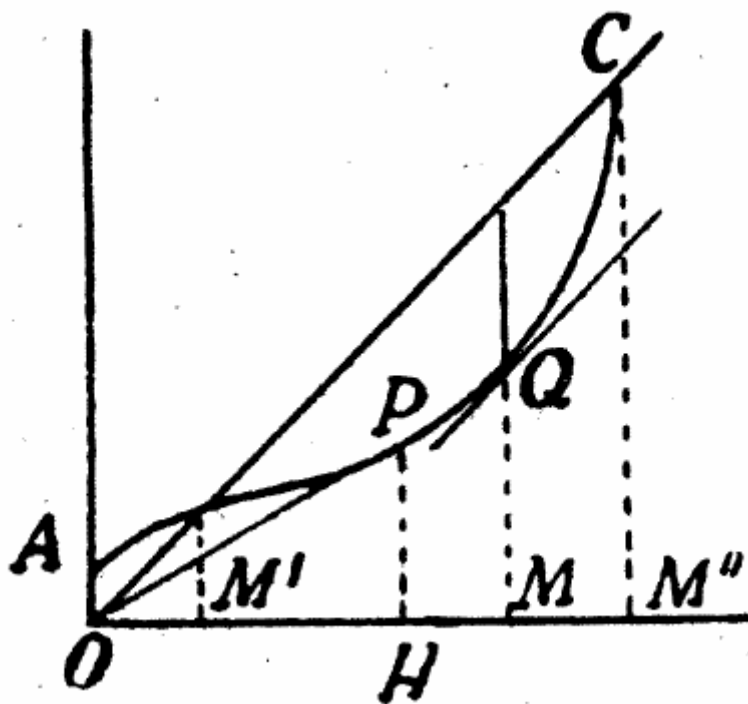


Figure 5. Source: Barone ([1908a] 1936: 21).

This is the representation of a function of total cost through which he explains that: “The competition between entrepreneurs, decreasing the price *OC*, annuls profit and tends to push point *Q* toward point *P*, which means that it tends to *force entrepreneurs to stay within the limits of decreasing costs*, which they have surpassed to obtain maximum profits; [...] competition will also define the capacity of the firm; this means that the [total] quantity produced will tend to distribute itself among the firms that produce at

minimum cost such that each one of them produces OH , which corresponds to the limit of decreasing costs" ([1908a] 1936: 24, his italics)³¹. He thus shows that on the curve of total cost the price tends to shift towards the minimum long run average cost, and also shows the corresponding equilibrium size of a firm.

8. Other meanings of competition

In the history of the idea of competition, the literature distinguishes between *Competition as an End-State and Competition as a Process*, to cite the title of a well known essay by Blaug (1997), and says that the former prevailed from the 1930s, and led people to forget the process view of competition. Even if in this paper we have tried to concentrate only on Barone's end-state conception of competition (and on the adjustment toward the end state), it is perfectly possible to examine his thinking by concentrating on competition as a process of rivalry. Indeed, as will have been noticed, many of Barone's ideas which we've met with already evoke this latter approach. In this section we consider other meanings he gave to the term competition, such as: price undercutting, war, selection, game, and so on. We are very keen to complete this paper with a section on the other meanings of competition in Barone, because we don't want to create misunderstandings over the complexity of his thinking on competition, and we don't want this side of his contribution to be forgotten.

We wish to introduce the argument by speaking first of all of the limits he saw in the idea of perfect competition: we have already pointed out that Barone said without hesitation that "*competition is never perfect*" ([1921] 1936: 438 author's italics). This is the reason why, as we noted in section 2, he prefers to speak of free competition: perfect competition for him is only the hypothesis of a limit state³² necessary for the study of equilibrium³³. This doesn't mean, as we have seen, that he thinks of the latter as anything other than a very powerful concept, the indispensable "fabric" on which "embroidery" can be carried out³⁴, *i.e.* study dynamic phenomena, necessary to the uncovering of correct explanations of facts in the real world. If Barone thinks competition is never perfect it is because he believes that in the real world final equilibrium is never attained. Going back to figure 1, Barone argues that during

³¹ This passage is also quoted in Keppler and Lallement (2006: 749-750), from which we have taken this translation.

³² Barone writes: "let us begin by considering the limiting case of free competition" ([1908b] 1935: 251).

³³ We recall that for Barone that of perfect competition is not the only régime allowing us to calculate the equilibrium price and quantity: "Let us state the conditions of equilibrium, dealing first with free competition, afterwards introducing monopolies and cartels" ([1908b] 1935: 247).

³⁴ Having set out the kernel of his economic theory, Barone adds: "Out other studies will not, on the whole, be other than embroidery on this general fabric" ([1908a] 1936: 45. the same term recurs later: "It may be useful to set out a first rough synthesis of the phenomenon [of competition] to then carry out some embroidery" ([1911-12: 275).

adjustment demand continues to vary “so that the real world gives us a picture, not so much of definitive equilibrium, – to which it continuously tends without ever reaching it – but of a series of successive provisional equilibria between a demand that changed and a pre-existing quantity, which then expands or contracts through the reaction of prices on it” ([1908a] 1936: 48). He goes more deeply into these dynamics illustrating with graphs a cobweb oscillation around equilibrium without ever culminating in it: in one of his figures which we don’t show here it can be seen, after an increase in demand, production increases slowly, then overtakes consumption, then falls behind etc. ([1908a: ed. 1909]: 603-604); for Barone this was a basic general conviction, in fact he says that “the point of equilibrium in dynamic changes is always gone beyond” (635). In any case the reason why for Barone the final equilibrium is never reached is that during this oscillation new shocks make their appearance; in his words: “before an equilibrium is reached, other causes intervene to change the *data* [...] and to determine a new one” ([1908a] 1936: 45 his italics; see also XVII).

As far as the various meanings Barone attributes to competition go, we have already noted that for him entry coincides with the introduction of innovations by new firms: so perfect competition is not the concept he uses in this case, but rather that of technological or dynamic competition (Vickers 1995: 16-17). In addition to the points already made on the adjustment process, we have also seen that Barone does not put forward a hypothesis on perfect information and that he doesn’t believe the number of firms to be important. We add that he sometimes calls competition “a selection” ([1908a ed. 1909] 1936: 303), “a war” ([1908a ed. 1909] 1936: 327) that “is declared” between individuals and between nations ([1911-12] 1936: 378), that “liberates” forces ([1908a] 1936: 255); this implies that the firms he considers are not price takers, but that on the contrary they do have some degree of monopoly power. He also speaks explicitly of firms which compete in prices and that modify the quality of the product: “Competition often takes place between private producers not in the sense of lowering the price maintaining the good quality of the goods, but in the sense of lowering the price but making the quality deteriorate and falsifying it” ([1911-12] 1937: 118). It is important to point out here that in Barone’s *Principi* there is a chapter entitled *Monopoli e Sindacati* [Monopolies and Syndicates] devoted to the situation where just a few big firms remain on the market, which come to an agreement over reducing the costs of production and that organise themselves into trusts. We may say that Barone in actual fact is here

dealing with oligopolistic competition³⁵, and in this chapter he even goes so far as to outline games³⁶.

On concluding this section, we would like to stress that in Barone, as in other marginalists of that generation who made contributions to the subject of competition (such as Clark, Hadley, Wicksell, Moore, and H.C. Adams), overlapping paradigms are present: as will have been seen, the Italian economist interrelates the idea of perfect competition, which for him is only entirely theoretical, with that of dynamic competition inherited from the classical thinkers and with another similar idea that will be developed in modern Industrial Organization³⁷. Also in Barone's case, therefore, Blaug's comment (1997) that Cournot's "end-state conception of the properties of market-clearing equilibria ... did not succeed in wiping the slate entirely clean of an interest in competitive processes" (66) is valid. Barone in fact, while he takes important steps forward in perfecting the conception of perfect competition as a market structure, never abandons the idea of competition as a behaviour. So we have to apply to him the same conclusion we came to in the concept of competition in the U.S. in the same period, *i.e.* that we do not find a pure neoclassic theory in this period, but rather methodological contaminations (Morgan 1993).

9. Conclusion

In this section we give an overall evaluation of Barone's contribution to the issue, seeking to define the place that in our opinion he should occupy in the history of the concept of perfect competition. In the historical literature on perfect competition Walras appears with some regularity, Pareto only occasionally, while as we pointed out in the introduction, Barone never appears. An exception is in Machovec (1995) who, radically critical towards the perfectly competitive model, assigns to him the role of having

³⁵ The situation where "the number of entrepreneurs is very limited - writes Barone - represents something intermediate between monopoly and indefinite competition" ([1896] 1936: 195). On the history of the term "oligopoly" see Chamberlin (1957).

³⁶ Barone writes that in the case of duopoly "there are only two ways: either war or coalition. War may exclude one of the two from the market; but its costs are enormous not only to the defeated one, but also to the winner" ([1908a ed. 1909] 1936: 313). In the same chapter he also deals with the problem of the behaviour of a cartel towards a new firm: "if, instead of aggregating new firms, the syndicate decides to declare war on them to get rid of them, having recourse to the means of a momentary and abrupt lowering of prices to destroy them, and it succeeds, the expenditure of the struggle ... ends up ... by adding to the cost of production, thinning out the profits" ([1908a ed. 1909] 1936: 325-326).

³⁷ We agree with Blaug (1997) when he says that "the very essence of the competition process ... now had to be labelled and analysed as 'imperfect' or 'monopolistic' competition" (68). And again that in every chapter of every Industrial Organization textbook "there is never any doubt that competition is an active process, of discovery, of knowledge formation, of 'creative destruction'" (80). Vickers (1995) voices a similar idea: "incentives, selection, and innovation ... are three of the front on which advances are being made. The concept of competition as equilibrium resource allocator is not the only model of a modern micro-economist".

“encouraged the appealing ahistorical notion, directly rooted in Walras, that the basis of ownership was irrelevant to the achievement of static efficiency” (75).

In this paper we have seen that Barone provided many contributions to the notion of perfect competition. His definitions were perhaps not new, since Moore in 1906 allows us to glimpse an already consolidated use of the expression “a régime of perfect competition” (212). On the other hand his theory of marginal productivity was very innovative. And yet in the literature on perfect competition it is not indicated as one of the outcomes of this market structure that was first found by Barone. And in addition, in our opinion his rigorous demonstration, also through graphs, that in the long run the equilibrium price equals the minimum average cost, is also very original and important. Another really new contribution of Barone’s, and still totally unknown, concerns the treatment of the minimum efficient scale and of the optimal number of firms in perfect competition, which as we have seen he also illustrates by graphs. We would hope that after bringing these significant contributions of Barone to light, his name will be included in the historiographical literature on the concept of competition with the recognition he deserves. But before concluding, we once again wish to point out that perfect competition is not all there is to Barone’s thinking on this subject: we don’t want it to be forgotten either that he attributes a purely instrumental character to this concept, or his constant effort to remain anchored in the real world through the employment of other concepts of competition.

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