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DUMPING AS PRICE DISCRIMINATION

JANNACCONE'S CLASSIC THEORY

by

SIMONA CANTONO AND ROBERTO MARCHIONATTI

Dumping actions and anti-dumping policies were regularly on the political agenda for several years in the pre-World War I period in Europe and the United States. In Italy, politics, economic circles and scholars were engaged in the debate on whether to protect sensitive industries threatened by sales below cost in their home markets practised by foreign competitors. Einaudi and his school of economics tackled the issue with several publications. In this paper we focus on Jannaccone's essays which he contributed to both a symposium in Riforma sociale in March 1914 and an issue in Rivista delle società commerciali in June 1914.

Although we recognize that Viner (1923) theoretically systematized dumping in the wider framework of international trade, we nevertheless claim that the theoretical origin of dumping, in a context of imperfect competition, was Jannaccone's essay. We show that Jannaccone proposed an early theory of dumping as an instance of the more general theory of price discrimination. He both defined and classified dumping; he developed a static analysis of its profitability; he investigated the effects of dumping in both domestic and foreign markets. We further support our claim by formalizing Viner's analysis on the profitability of dumping through Jannaccone's mathematical representation.

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I. INTRODUCTION

The tariff debate between free trade advocates and protectionists at the end of the nineteenth century and at the beginning of the twentieth directed scholars' attention particularly to anti-dumping policies and, consequently, to the need to systematize the theory of dumping.

The practice of export dumping on the part of many manufacturing industries of the industrial nations, especially those organized into producers' trusts and combinations like Germany, increased systematically since 1890. This growing phenomenon brought with it a voluminous literature on dumping as a by-product of the study of industrial trusts action.¹ It identified some outstanding features of dumping: a) protection and cartelisation facilitate export dumping by limiting price-competition in the domestic market; b) cartelisation makes systematic and continued dumping possible; c) export dumping has as its predominant objective the maintenance of both full production and stable and profitable domestic prices and, only secondarily, the development of export trade; d) predatory motives were not predominant, but they were a more important factor in German dumping than in the dumping of other countries; e) export dumping of raw-materials practiced by cartels endanger competitiveness of the industries which employ raw-materials in their production process; it causes vigorous complaints which induces the adoption of compensation policies. All the above points were central in German literature on cartels practices.

In the history of economic thought the first classic theoretical treatment of dumping in the literature is considered to be Viner (1923), which was welcomed in the English-speaking world as a substantial contribution to the literature on the theory and practice of dumping; and for many years it "remained the standard work in the field" (Bloomfield 1992, p. 2064). This remarkable and still today relevant treatment of the subject overshadowed the work of some scholars prior to Viner who had contributed to such a theoretical systematization. The first theoretical attempt to systematize the subject was made at the beginning of 1900, principally by Taussig, Hobson, Dietzel, Pigou, and Shortt, who between 1904 and 1906 highlighted some key questions concerning both the nature and the typology of dumping. In 1904 Frank Taussig,² in his presidential address to the American Economic Association devoted to the doctrine of free trade, defined dumping as sales of goods in

¹ In the period 1902-1908 German literature on cartels practices was particularly abundant: we may quote Lotz (1902), Dietzel (1902), Donges (1902), Martin (1904), Heymann (1906), Bonikowsky (1907), Morgenroth (1907). These works were later widely quoted in the literature on dumping, also thanks to the papers published in journals like *Economic Journal* and *Journal of Political economy* by authors like Dietzel and Lotz, and some papers on German monopolistic combinations published in the *Quarterly Journal of Economics*. An increasing mass of evidence on these phenomena was then available in various English and American official sources.

² Taussig (1915) subsequently investigated the contribution of dumping to the level of exports by a particular manufacturing sector of the US, the iron and steel industry. He used the same reasoning as he had used ten years previously, with an important addition: he concluded that the growth of iron and steel exports was due more to comparative advantages than to dumping or tariffs.

foreign countries at less than normal price and considered the arguments against dumping. The objection against dumping centred on its temporary character, but, Taussig rhetorically asked, if it went on indefinitely, where was the harm? The key question, Taussig continued, concerned the temporal character of dumping: sporadic or continuous. In the same year, Hobson (1904) referred to dumping as sales below costs by firms seeking to unload unmarketable production surplus at a profit in distant foreign markets, the purpose being to avoid the effects of output restrictions in their home market. Although Hobson considered the potential profitability of such action in a free competitive market, he maintained that “If dumping is regarded as anything other than a small causal incident, it requires either protection of the home market or closely concerned action of the body of manufacturers in a trade, or both, as indispensable conditions.” (Hobson, 1904, p. 52). Taussig and Hobson both considered dumping to be a form of price discrimination, and the reason for such discrimination was the problem to be theoretically solved. One year later, in a paper published by *The Economic Journal* in 1905, the German economist Heinrich Dietzel, who largely contributed to the debate on the new aspects of competition at that time, defined two types of dumping: occasional dumping and trust-dumping, where the former is temporary and the latter is permanent: “The former occurs whenever, and as soon as, there is over-production in foreign countries; the latter forms a chronic phenomenon, due to the fact that trusts in protectionist countries are able to sell at lower prices to the foreigner and at higher prices to their countrymen.” (Dietzel, 1905; p. 2). In the same journal, Arthur C. Pigou (1905) criticized Dietzel for disregarding an important distinction between the effects of temporary dumping plus protection on the stability of production and the probability of temporary dumping alone, i.e. given any trade regime, to be beneficial at all in that respect. In 1906, in a paper published in the *Quarterly Journal of Economics*, the Canadian economic historian Adam Shortt differentiated between regular and continuous dumping and temporary and exceptional dumping. Shortt, as opposed to Dietzel and in accordance with Taussig, saw evil in sporadic dumping rather than in permanent dumping.

The next step in the theoretical systematization was, as we will try to show, the most important contribution to dumping theory in the classic period before Viner. This was the analysis conducted by the Italian economist Pasquale Jannaccone (1872-1959) in two long articles both written in Italian in 1914: the first was entitled “Il dumping e la discriminazione dei prezzi” and published in a special issue of the *Riforma sociale* devoted to dumping, an important Italian academic journal edited at that time by Luigi Einaudi; the second – a supplement, essentially, to the first devoted to the effects of dumping on national and foreign markets - was entitled “Prezzi di guerra: a proposito di sindacati, di dumping e di protezione” and published in the *Rivista delle società commerciali* (then *Rivista di Politica Economica*). The first article was known to Viner, who listed the *Riforma*

sociale symposium in his references, but he quoted it in the part of his volume (Viner, 1923, p. 64) where the empirical facts are discussed.

Jannaccone's articles came to the attention of economists only more than twenty years afterwards, when they were reprinted in Jannaccone's book *Prezzi e mercati* (1936) and reviewed in some leading international journals. When reviewing it in *Economica*, Marian Bowley (1937) considered it "an important contribution to the literature on dumping" (p. 229): "Signor Jannaccone's statement of the conditions under which discrimination is possible and his analysis of dumping simply as the particular case where markets happen to be divisible on geographical lines is admirable. So also is his classification of the types of dumping, distinguishing between dumping to get rid of temporary surpluses, to make possible a larger output and to force a rival to come to terms" (229-30). Twenty years later, in 1955, an English translation of Jannaccone's first article ("Dumping and price discrimination") was published in the fifth volume of a series edited by the International Economic Association, *The International Economic Papers*. In his review of the volume Harry Johnson (1956) called it a brilliant precursor of imperfect competition theory. In another review Robert Solow (1956) maintained that it was an "excellent discussion of the condition and purposes of price discrimination", but admitted that he was unable to say "whether this sort of things was advanced for 1914" (p. 982). Since then, for the community of economists, Viner (1923) has represented the only reference to the early literature on dumping – its classic period. Also Ethier (1982), who made the first most important contribution to the revival of dumping theory in contemporary economics, although he recognized that "we have an enormous stock of pre-World War II publications on the subject" (p. 488), nevertheless referred solely to Viner (1923) and Haberler (1936) in order to present the classic theory of dumping.

The formation of the classic theory of dumping is indeed a neglected topic in the literature, and contributions other than Viner's have been largely forgotten. The aim of this paper is to show the relevance of Jannaccone's theory. As we have just shown above, there already was a scientific literature on dumping before his article had been published. Indeed, his contribution is based on the previous rich German and English literature which gives to him the empirical material and suggestions for theoretical connections. Nonetheless his originality and novelty as respect to this literature is, according to us, indisputable: actually Jannaccone himself claims the recognition of his theoretical originality in the preface of *Prezzi e mercati* (1936):

"A contribution to the theory of imperfect competition is represented by the two 1914 essays, where the dumping is studied as a case of price discrimination; price discrimination [...] is considered as the characteristics of imperfect competition, and the imperfect competition [...] is considered the most appropriate configuration to reflect the situation of a real market. These are now common opinions, but I

don't think that it was so at the time when these essays were written. Until then, the literature on dumping had been essentially of practical and financial character, and only my distinguished opponent in the debate on nature and effects of dumping [Cabiati], first, had placed the issue in the field of pure theory [Un contributo alla teoria generale della concorrenza imperfetta sono I due saggi del 1914, nei quali il dumping è studiato come un caso di discriminazione dei prezzi; la discriminazione dei prezzi ... è posta come la caratteristica della concorrenza imperfetta, e la concorrenza imperfetta ... è considerata come la configurazione più confacente a rispecchiare la situazione di un mercato reale. Queste sono ora opinioni di pubblico dominio, ma non credo fossero tali quando quei due saggi furono scritti. La letteratura sul dumping era stata sin allora di carattere prevalentemente pratico e finanziario, e solo il mio insigne antagonista nella disputa sulla sua natura e I suoi effetti [Cabiati] aveva per la prima volta trasportato l'argomento nelle regioni della teoria pura" (pp. 21-22).

Section II presents the theoretical origins of dumping in Jannaccone's essays: we first examine the most relevant aspects of the debate on the theory of dumping in the *Riforma sociale*, March 1914, in particular Attilio Cabati's contribution and Jannaccone's criticism (II.1); we present Jannaccone's theoretical propositions on imperfect competition and price discrimination, his taxonomy of dumping and (II.2). Section III contains the analytical basis for a theory of price discrimination and its application to the profitability of dumping as brilliantly outlined by the Italian economist. Section IV proposes his investigation on the effects of dumping in both domestic and foreign markets. Section V concludes with a comparison between Jannaccone's and Viner's analyses in order to highlight the generality of the theory of dumping developed by Jannaccone. We further support our claim by formalizing Viner's analysis on the profitability of dumping through Jannaccone's mathematical representation, as proposed in the appendix.

II. A RECONSTRUCTION OF JANNACCONI'S DUMPING THEORY

II.1. *Riforma sociale*, March 1914: a debate on dumping theory

Schumpeter wrote that Italian economics, independently of Pareto, "was second to none by 1914" (Schumpeter 1954: 855) and had "attained a high level in a variety of lines". He considered Luigi Einaudi's work to be representative of a school of thought which "really fertilized general economics" (ibid.). In the period around 1900, and until the 1930s, Einaudi was the leader and one of the masters, together with Attilio Cabiati and Pasquale Jannaccone, of the "Torino school of economics". This was characterized by a liberal vision and a methodological-theoretical framework which performed an essential mediating role between historical-empirical inquiry and economic

theory in both Marshallian and Paretian perspectives.³ In the years before the First World War, Luigi Einaudi and the group of liberal economists belonging to the Torino economic school conducted, in their journal *Riforma sociale*, a constant battle against monopolies and protectionism. In 1913, in agreement with his close friend and collaborator Cabiati, Einaudi decided to devote a special issue of the journal – that of March 1914 – to a discussion of dumping. The symposium was entitled “Polemizzando intorno al dumping” (Arguing about dumping), which was considered to be one of the most controversial problems in international political economy at that time and particularly important in discussions on Italy’s political and business *milieu*. Protectionists, and above all steel manufacturers, justified their claims for tariffs with the supposedly unfair dumping policy pursued by German firms in order to conquer the Italian steel market. In his editorial note, Einaudi described dumping as a complex phenomenon, a particular form of price discrimination that had not yet been studied with the attention warranted by its great theoretical interest and practical importance. These two points were discussed by three economists: Attilio Cabiati, Achille Loria and Pasquale Jannaccone, and by the engineer and manager of steel firms Rodolfo Ridolfi. From the point of view of this article, the most interesting aspects of the debate are contained in Cabiati’s and above all Jannaccone’s contributions. Their interaction consisted in a dialogue between one version of the theory of dumping in a general equilibrium framework and another version of it in an imperfect competition context.

Cabiati’s analysis was centred on the concept of general equilibrium and drew mainly on the work of Pareto in his *Manuale*. His point of view on dumping can be summarized by the following statements:

- i. the hampering of international competition through the imposition of barriers is not a necessary condition for dumping;
- ii. the same applies to trusts;
- iii. dumping is an instance of price discrimination employed by industries characterized by decreasing costs of production; such industries seek to maximize “ophelimity”;⁴ the same does not hold in the case of both constant and increasing costs of production;
- iv. dumping is advantageous to both national and foreign consumers.

Cabiati assumed that the interpretation given by Pareto to variable costs and variable prices in time could be applied to variable costs and multiple prices in space: “dumping is simply an application of the principle of variable prices” (Cabiati, 1914, §2). Cabiati was at least misleading in treating the

³ On Einaudi and the Torino school of economics see Forte and Marchionatti (2010) and Marchionatti et al. (2010).

⁴ As well known, ophelimity was a term first introduced by Pareto in the *Cours d’économie politique* (1896-7) in order to express his dissatisfaction with the concept of utility: in particular, he wanted to avoid the misunderstandings due to the different meanings of the term ‘utility’ in ordinary language.

concept of multiple prices in space, in a certain time unit, as an instance of variable prices over time. If multiple prices could be set, this would mean that markets were somehow distinct. Thus the analysis of Cabiati should be considered as a case of either a deviation from the law of one price (e.g. quality variety, obstacle against the free mobility of goods and demand) or other market imperfections (e.g. barriers, trusts). In this regard, as Jannaccone emphasised in his article (1914a), we cannot imagine that firms base their decisions about size on temporary, unstable reasons. The empirical evidence shows that dumping needs obstacles to arbitrage in order to be both advantageous and actually implemented. Such obstacles may originate either from other market imperfections or from tariffs and trusts, or from both. Jannaccone proved that the most natural scientific framework for dumping is imperfect competition (see section II.2.1). He showed that the cost function changes convexity through the stages of a firm's life cycle (section III.1). And that dumping can be profitable for firms exhibiting decreasing, constant as well as increasing costs of production (section III.2 and III.3).

The debate in the *Riforma sociale* was a real occasion to ponder about dumping, and it paved the way, although this went apparently unnoticed, to a theory of dumping before Viner.

In the rest of the paper we support this claim by reconstructing Jannaccone's essay. Section II.2 is devoted to Jannaccone theoretical propositions about imperfect competition and price discrimination (sub-section II.2.1) and the forms of dumping (sub-section II.2.2).

II.2. Unveiling the theoretical origins of dumping

II.2.1. Dumping in the theoretical framework of imperfect competition

In his exposition, Jannaccone (1914) maintained that dumping is nothing but an instance of the more general phenomenon of price discrimination. He developed a theory of dumping in the theoretical framework of imperfect competition. His logical starting point was the law of one price: the price of each unit of a commodity at any instant of time cannot but be the same within the same market. Jannaccone stated the conditions that ensure the existence of such a law:

- a. the units of a commodity are all identical and perfectly substitutable with each other;
- b. free mobility of commodities across markets;
- c. perfect transferability of demand;
- d. commodities must be sold simultaneously;
- e. both producers and consumers are price takers;
- f. free negotiation;

g. free renegotiation / bargaining.

Discrimination and price diversification, and dumping as an instance of it, are possible only when at least one of the above conditions is altered. Indeed, any deviation from the law of one price that is not an alteration of the above conditions is destined to disappear because of arbitrage.

“If none of the conditions *a-g* were altered and yet, at two different points of the market, or for two distinct groups of operators, two different prices should develop, arbitrage operations would immediately set in with the effect that a certain quantity of goods would be purchased at points of lower price and re-sold at those of higher price, until price equality be re-established [Infatti, se nessuna delle condizioni *a-g* venisse modificata, e tuttavia si stabilissero due prezzi differenti su due punti diversi del mercato e per due distinti gruppi di operatori, immantinente si farebbero operazioni di “arbitraggio”, per effetto delle quali una certa quantità di merce sarebbe comperata nei punti di minor prezzo e rivenduta in quelli di prezzo più alto sino a che l’uguaglianza del prezzo fosse ristabilita].” (Jannaccone, 1955 [1914]: 104)

Thus, even though in principle there may be different prices for the same commodities, the instability and unreliability of such a deviation would prevent the implementation of dumping. Moreover, in a perfect competitive world, any temporary deviation from the law of one price would be counterbalanced by other opposing forces.

According to Jannaccone, price discrimination may take different forms. Whatever form it may take, however, price discrimination divides a market into two or more areas in order to impede the re-establishment of a unique price. Jannaccone proposed the following classification:

1. price discrimination among consumer classes (personal discrimination);
2. price discrimination within the same country (local discrimination);
3. price discrimination among different countries (international discrimination, e.g. dumping).

Discriminating among consumer classes is easily accomplished by a deviation from condition *a*. Any slight qualitative change of the product would capture different consumer classes. In this case, discrimination takes place through consumers’ will. However, it could also be realized by raising barriers: by neglecting to consumers the chance to renegotiate (condition *g*), e.g. by hampering arbitrage. A deviation from both condition *f* (and consecutively *g*) can serve the same purpose (boycott). Finally, consumers should be free to choose the quantity to buy at a given price (condition *e*). When this is not the case, a different price will be charged to different consumer classes.

Price discrimination may take place because of an economic distance represented not only by transportation costs but also by the elasticity of demand and supply in different areas within the same country (alteration of condition *b*). There is also evidence of discrimination through changes

in conditions e, f and g jointly. However the same evidence shows that such discrimination can only be temporary. In order to be permanent, it must necessarily be accompanied by obstacles to free mobility. Finally, an occasional change in condition b could be counterbalanced by a change in condition c . Indeed, barriers raised through a deviation of condition b are often reinforced by thwarting the functioning of the transferability of demand.

Price discrimination between countries is hardly possible without permanent deviations from certain conditions. Those deviations are usually artificially reproduced by either tariffs or international trusts or both. Jannaccone places the phenomenon of dumping in the context of great transformations in the economic system at that time (Jannaccone 1914b). He emphasizes that the growing size of economic units was changing the subject-matters of economic theory and was influencing the issue of price formation. What emerged out of a thick network of international economic flows was both vertical integration and the establishment of trusts, cartels and unions. Through price discrimination, monopolistic power can influence the distribution of quantities and prices in both domestic and international markets. In the absence of it, market boundaries are set only by both the spatial validity of condition b and the interplay between free mobility of commodities (b) and perfect transferability of demand (c).

“The more or less perfect transferability of individuals or firms exercising demand for finished goods or means of production is, on the contrary, considered by economic theory as the most important, if not the only, criterion of distinction between internal market, comprising the points within which such transferability is or might be supposed to be perfect – and external market – comprising the points situated anywhere beyond the limit of perfect transferability from any point of the internal market [La trasferibilità più o meno completa di coloro (siano individui, siano aziende produttive), i quali domandano i prodotti finiti o i coefficienti di produzione, è invece considerata dalla teoria come il principale, se non l'esclusivo, criterio di distinzione tra mercato “interno” – comprendente i punti fra cui quella trasferibilità è o si può supporre concreta – e mercato “estero”, comprendente i punti situati in ogni senso al di là del limite della completa trasferibilità da qual si voglia punto del mercato “interno”]. (Jannaccone, 1955 [1914]: 110)

Political frontiers only occasionally follow those boundaries. In the absence of a permanent deviation from condition b , price discrimination between countries can only be implemented if there are either tariffs or international trusts, or both. Neither tariffs nor export subsidies are a necessary condition for international price discrimination. However, if there is perfect free mobility of commodities across markets and borders then other deviations from the law of one price are needed in order to discriminate.

“If it is desired to find some criterion by which to distinguish internal and external market more sharply and by which to identify the one with the National and the other with the foreign territory, it will be hard, given the present economic organization, to find a more adequate one than is afforded by protective tariff duties. [Se si va in cerca di un qualche criterio di distinzione fra mercato interno e mercato estero, il quale più spiccatamente li separi e meglio di ogni altro serva a far combaciare l’uno col territorio nazionale e l’altro col territorio straniero, è difficile, nella presente organizzazione economica, trovarne uno più atto allo scopo di quello fornito dall’assistenza di una barriera doganale protettiva.]” (Jannaccone 1955 [1914]: 111)

II.2.2. Jannaccone’s taxonomy of dumping

Jannaccone distinguished different forms of dumping according to both the way in which they are implemented and their scope.

The modes of discrimination are:

- α . price discrimination with respect to a given quantity of commodities already produced; both the size and cost structure of the firm are unaffected; discriminating means attributing temporarily some costs to certain units of product sold;
- β . price discrimination with respect to a quantity of commodities inconsistent with a unique price, e.g. greater than what would have been produced under price uniformity; the size and structure of the firm change accordingly, the unit and marginal costs change as well.

The aims of discrimination are:

- γ . sales below costs in a foreign market of an existing output left unsold in the internal market;
- δ . sales below costs in a foreign market due to systematic over production;
- ϵ . sales below costs in a foreign market aimed at displacing competitors.

The combinations $\alpha\delta$ and $\beta\gamma$ do not have to be considered: the elements composing these combinations cancel each other out. Any other combination of the above elements has the objective of maximizing the producer’s profit and can be defined as dumping. Jannaccone reproached both scholars in general for paying too much attention only to cases of the types $\alpha\epsilon$ and $\beta\epsilon$, and Cabiati in particular for doing the opposite, i.e. for treating the case $\beta\delta$ as the only form of dumping:

“It is a widespread logical error to ascribe to a genus attributes that should be ascribe only to species: thus, connotations particular to a certain form of price discrimination between internal and external market, i.e. $\alpha\epsilon$ or $\beta\epsilon$, have been attributed to price discrimination in general, as if the other species, $\alpha\gamma$ and $\beta\delta$ did not exist. But one might fall into the same error ex adverso. This seems to be what happened to Cabiati who, having attributed to dumping the connotations of the species $\beta\delta$, concluded that this was the only form of price discrimination between internal and external market for which the

term is appropriate [E' comunissimo errore logico, quello per il quale I soli attributi di una specie sono assegnati al genere: così i connotati proprii di una certa forma di discriminazione di prezzi fra mercato estero e mercato interno, la forma $\alpha\epsilon$ o $\beta\epsilon$, sono stati attribuiti a quella discriminazione in generale, quasiché le altre specie, $\alpha\gamma$ e $\beta\delta$ non esistessero. Ma nello stesso errore si cade anche ex adverso, come appunto mi sembra che capitò al Cabiati, quando, avendo attribuiti al dumping i connotati della specie $\beta\delta$, conclude esser questa la sola forma di discriminazione di prezzo fra mercato interno e mercato estero, cui quel nome convenga].” (Jannaccone, 1955 [1914]: 155-6)

The case $\alpha\gamma$ is an instance of sporadic dumping: the choice of selling an overstock of production abroad even at a cost lower than the average cost of production is made in order to prevent a decrease in domestic prices. The forms $\alpha\gamma$ and $\beta\delta$ could be defined as “pacific forms”. However, they differ in both the degree of risk and its duration. The case $\beta\delta$ is dependent on the trade-off between the benefit of changing the combination of production factors and the profitability of selling the additional output below costs abroad. As Jannaccone showed (section III.3.1), the choice is determined by several variables and in particular by the structure of production costs along with the market structure.

Cases $\alpha\epsilon$ and $\beta\epsilon$ are instances of predatory dumping. As said, dumping cannot be restricted to these forms alone. If it could, dumping should be defined as sales abroad at a price lower than the price set in the home market, the purpose being to crowd out competitors. Instead, these are particular cases of a more general phenomenon. Moreover, the aim of such actions is to establish trusts rather than displacing competitors (section III.3.3). In an international market characterized by free competition, the economic environment constantly changes. Thus trusts and international agreements serve as means to overcome the resistance to price discrimination raised by international competition. A trust may be a substitute for tariffs. Dumping can only be permanent if it is accompanied by permanent deviations from the law of one price (such as those resulting from the raising of barriers and/or the establishment of trusts).

So far we have exposed Jannaccone's theoretical propositions collected from his first article (Jannaccone, 1914a;). Jannaccone placed dumping in the theoretical framework of imperfect competition and he classified it in its different forms. Empirical evidence and real events were widely cited by Jannaccone (1914a) in order to support his thesis. Moreover, he continued his exposition by means of another language, i.e. mathematical, and led the analytical basis of both price discrimination and the profitability of dumping as we show in the next section.

III. THE BASIS FOR A THEORY OF PRICE DISCRIMINATION:

A MATHEMATICAL FORMULATION

The analytical representation developed by Jannaccone aimed to criticize Cabiati on the links both between production costs and firms' life cycle and between the profitability of price discrimination and the costs of production (point iii in Section II.1). Jannaccone showed that the cost function changes convexity through the stages of a firm's life cycle. He also showed how price discrimination can be profitably implemented even by industries exhibiting both constant and increasing costs of production. He supported his critique by demonstrating the validity of the following two propositions:

P1 every production process is characterized by decreasing and then increasing costs of production;

P2 the point of maximum profit for the firm lies on the line of increasing costs of production.

Jannaccone developed a static analysis of a firm's life cycle. Although his aim was to support his arguments against Cabiati, his analytical representation laid the foundations for a theoretical model of both price discrimination and the profitability of dumping. We present the proof of P1 in III.1, while P2 is discussed in III.2. In section III.3 we expose Jannaccone's analysis on the profitability of dumping.

III.1. Production costs and firm's life cycle: a static analysis

We present Jannaccone's mathematical analysis below, as he proposed it in his essay (Jannaccone, 1914a).

Let us define as $c = S/Q$ the average unit cost of production obtained by the ratio between the total cost of production at a certain unit of time and the total quantity produced with such a cost. Assume a firm can decide in isolation and that the variation on the quantity produced by the firm does not influence the price. Assume its net profit to be:

$$R = Q(p - c) = Qp - S \quad [1]$$

where p is the market price at which the quantity Q is sold. The market price p is constant because of the assumption of perfect competitive market. The objective of the firm is to maximize $Qp - S$ by varying Q and S accordingly. Let us define as h the incremental cost originated by a

diverse combination of production factors which, if added to S , will allow the firm to produce the quantity $Q + d_1$ (where d_1 is the incremental output) at the total cost $S + h$. If the firm finds the first additional increment profitable, then it will produce the quantity $Q + d_1 + d_2$ at the additional cost $S + 2h$; and so on. The firm substitutes the combination of production factors related to the total cost S to another displaying a total cost $S + h$ if and only if the profit R_1 given by the latter is higher than the profit R given by the former:

$$R_1 = (Q + d_1)p - (S + h) = (Qp - S) + d_1(p - g_1) > R, \quad [2]$$

$$\text{or, in other words, if } R_1 - R = d_1(p - g_1) > 0, \quad [3]$$

where $g_1 = h/d_1$ is the marginal cost of production, i.e. the additional cost needed to produce d_1 (Jannaccone, 1914, §22).

The quantity will be thus increased to $Q + d_1 + d_2 + \dots + d_{n-1} + d_n$ until the additional cost of producing the last increment, g_n , will be equal to the price p . The additional partial cost h is constant by assumption as well as the market price. Thus the marginal cost of production is a function of the marginal product, $g = f(d)$. Marginal products may be increasing (or constant) at the beginning. However, above a certain threshold of output produced by increasing the amount of variable factors of production, it is also reasonable to assume diminishing (or constant) marginal products. Consequently, marginal costs will be first diminishing and then increasing. However, as long as the price is higher than the marginal cost, the firm will continue to raise output.

“Consequently, if d is first increasing (or constant) and then necessarily decreasing, g is first decreasing (or constant) and then necessarily increasing. It does not matter for the entrepreneur that g increases, provided it remains below the unit sales price of the product; on the contrary, his pursuit of profit pushes him to pass from interval of decreasing marginal costs to that of increasing marginal costs until he arrives at the point at which marginal unit cost and unit price have become equal, which is where he obtains the highest possible profit. [Dunque, se i d sono dapprima crescenti (o costanti) e poi necessariamente decrescenti, i g sono dapprima decrescenti (o costanti) e poi necessariamente crescenti. All’imprenditore non importa che i g vadano crescendo, purchè si mantengano inferiori al prezzo unitario di vendita del prodotto; il suo tornaconto, anzi, lo spinge a passare dal tratto in cui i costi marginali sono decrescenti a quello in cui sono crescenti, per arrivare sino al punto in cui costo unitario marginale e prezzo unitario sono divenuti uguali, nel qual punto egli ottiene il massimo guadagno possibile].” (Jannaccone, 1955 [1914]: 122)

Let us now analyze the situation in which a firm competes with potential competitors attracted by the amount of profit R_n . On the one hand, the unit price will begin to decrease because of the increase in the total output of the economy. The cost of production factors increases as well: the marginal cost is increasing. In this environment firms will face the moment in which the unit price is equal to the marginal cost sooner: firms will thus restrict their output to a quantity $Q < Q_n$, where $p(Q) = g(Q)$. Firms' profit thus depends as much on the level of marginal costs (i.e. the price of production factors and the level of output), as on the unit price. Firms try to influence both of these elements, and dumping is nothing but a way of doing it:

“Since the variations in the profit of firms depend both upon the level of marginal costs, i.e. upon the price of the coefficients of production and the quantity of the product, and upon the sales price of the product, there will be a tendency towards trying to influence all three elements at once: and dumping, amongst others, is one of the expedients for influencing quantity and price. [Poichè le variazioni nel guadagno delle imprese dipendono tanto dall'altezza del costo marginale, cioè dal prezzo dei coefficienti di produzione dalla quantità di prodotto, quanto dal prezzo di vendita del prodotto, è su tutti questi tre elementi ad una volta che si cerca d'influire: e il *dumping* è, fra gli altri, uno degli espedienti per influire sulla quantità e sul prezzo].” (Jannaccone, 1955 [1914]: 123)

Thus far, the expressions ‘constant’, ‘increasing’ and ‘decreasing’ costs refer to marginal costs. Their meaning, Jannaccone emphasises, differs from that in which they are usually applied: “Production at increasing or decreasing costs is neither a prerogative of certain industries ... nor a peculiarity of certain categories of goods” (p. 123); on the contrary, it happens “in the life of any firm, whatever the branch of industry to which it belongs” (ibidem). In their turn, average unit costs can vary as well. Depending on the marginal cost of the additional unit produced and the average cost of the quantity produced until that moment, average unit costs may be constant, increasing or decreasing:

$$\frac{d_2}{Q+d_1} \begin{matrix} < \\ = \\ > \end{matrix} \frac{h}{S+h} \dots \frac{d_{n-1}}{Q+d_1+d_2+\dots+d_{n-2}} \begin{matrix} < \\ = \\ > \end{matrix} \frac{h}{S+(n-2)h} ; \frac{d_n}{Q+d_1+d_2+\dots+d_{n-1}} \begin{matrix} > \\ = \\ < \end{matrix} \frac{h}{S+(n-1)h}$$

or

$$\frac{S+h}{Q+d_1} \begin{matrix} < \\ = \\ > \end{matrix} \frac{h}{d_2}, \text{ etc.}$$

Or, given that $\frac{S+h}{Q+d_1} = c_1$ and $\frac{h}{d_2} = g_2$,

$$\begin{array}{ccccc} < & & < & & < \\ c_1 & = & g_2, & \dots, & c_{n-2} & = & g_{n-1}, & c_{n-1} & = & g_n. \\ > & & > & & > & & > & & > \end{array}$$

Average costs are constant as long as marginal costs are constant. Average costs are increasing if the marginal cost of the additional unit produced is greater than the average cost corresponding to the previous level of production. Otherwise they are decreasing. Increasing average costs are consistent with decreasing marginal costs and *viceversa*; for average costs do not depend only on marginal costs, but also on the ratio between the initial total cost and the quantity produced at such a cost, S/Q :

“There might, thus, be intervals where marginal costs decrease, while average costs increase, and viceversa [Si possono dunque avere dei tratti in cui i costi marginali sono decrescenti, mentre i costi medii sono crescenti, e viceversa].” (Jannaccone, 1955 [1914]: 124)

Jannaccone points out that marginal costs may begin to increase well before average costs. Indeed, the greater S is compared to Q , the sooner average costs begin to increase:

“[...]: the greater the initial expenditure and the smaller the output obtained with this expenditure, the more rapidly arrives the moment at which the interval of increasing average costs succeeds that of decreasing costs; and viceversa. [quanto più grande è la spesa iniziale e quanto più piccola la quantità di prodotto ottenuta con essa, tanto più presto arriva il momento in cui il tratto dei costi medii crescenti succede a quello dei costi decrescenti; e viceversa].” (Jannaccone, 1955 [1914]: 124)

In Jannaccone’s analysis, therefore, constant, decreasing and increasing costs of production represent stages in the life of a firm rather than a particular kind of firm, or industry, or even commodity:

“There are no whole industries operating at a cost which can be termed constant, increasing or decreasing – except in the sense of classical economics which concentrates attention on total production, in the long period, with all the factors of production (land, labour, capital) [...] However, when the object of inquiry is the production of the separate firms during a given period, with given quantities and factor prices, then all we have to consider are firms operating at constant, increasing or decreasing costs. [Non esistono

industrie o merci a costi costanti, crescenti o decrescenti, se non nel senso dell'economia classica, la quale bada alla produzione totale, nel lungo corso del tempo, col complesso dei fattori di produzione (terra, lavoro, capitale). [...]. Ma quando si tratti della produzione delle singole aziende, in un periodo di tempo dato, con certe quantità e prezzi dei coefficienti di produzione, esistono soltanto aziende a costi costanti, crescenti o decrescenti]" (Jannaccone, 1955 [1914]: 125)

III.2. Increasing costs of production and maximum profit

Jannaccone supported the validity of **P2** (i.e. the point of maximum profit for the firm lies on the line of increasing costs of production) with the following explanation. Suppose the firm is producing at its maximum profit at Q_n : the firm has the incentive to increase its output until

$R_n - R_{n-1} = 0$. R_{n-1} and R_n may be computed both by:

- adding to the profit of producing Q , those of producing the incremental units d_1, \dots, d_{n-1}, d_n ,

$$R_{n-1} = (Qp - S) + d_1(p - g_1) + \dots + d_{n-1}(p - g_{n-1}) \quad [4]$$

and

$$R_n = (Qp - S) + d_1(p - g_1) + \dots + d_{n-1}(p - g_{n-1}) + d_n(p - g_n); \quad [5]$$

- multiplying the total quantity produced $Q + d_1 + \dots + d_{n-1} + d_n$ by the difference between the price p , constant by assumption, and the average unit cost c_n (where n is the index of the last profitable increment of output),

$$R_{n-1} = (Q + d_1 + \dots + d_{n-1})(p - c_{n-1}) \quad [6]$$

and

$$R_n = (Q + d_1 + \dots + d_{n-1} + d_n)(p - c_n) \quad [7]$$

The firm increases its output as long as the price of a unit is greater than the marginal unit cost of production or, in other words, until $R_n - R_{n-1} = 0$:

$$R_n - R_{n-1} = d_n(p - g_n) = d_n(p - c_n) - [(c_n - c_{n-1})(Q + d_1 + d_2 + \dots + d_{n-1})] \quad [8]$$

On the one hand, if marginal costs were decreasing then $d_n(p - g_n) > 0$. Hence the firm would continue to increase output. At $d_n(p - g_n) = 0$, $p = g_n$ and $g_n > g_{n-1}$: the point of maximum profit lies on the line of increasing marginal costs. On the other hand, given that $d_n(p - c_n) > 0$, if

$R_n - R_{n-1} = 0$ then $(c_n - c_{n-1})(Q + d_1 + d_2 + \dots + d_{n-1})$ must be greater than zero as well. This means $c_n > c_{n-1}$: the point of maximum profit lies on the line of increasing average costs.

Let us again assume that the firm is competing in a free market. We already know that a firm will be forced to produce a quantity $Q_i < Q_n$. However, if for the same commodity there were a separate, distant, foreign market then the firm would be better off by selling the amount $Q_n - Q_i$ abroad, even at a price lower than the average cost, and the quantity Q_i in the home market. If a firm could adopt that strategy, it would have a chance to maximize its net profits. Thus, dumping is relatively more attractive to firms in their increasing production costs stage (section III.3.2).

III.3. The profitability of dumping to the dumper

III.3.1 The profitability of predatory dumping

Jannaccone showed through his taxonomy of dumping that dumping cannot be constrained only to those forms aimed at displacing competitors, i.e. predatory dumping ($\alpha \varepsilon$, $\beta \varepsilon$). However his intention was not to disregard it. Although it is extremely difficult to pre-empt competitors in a free market, nonetheless predatory dumping must be included in a general theory of dumping. Indeed, the practice of predatory dumping exists in reality, but its aim is to establish international trusts rather than displacing competitors:

“Nevertheless, if it is impossibile or tremendously difficult to succeed, through dumping, in excluding competitors from an open market, one should not argue that dumping of type $\alpha \varepsilon$ and $\beta \varepsilon$ does not exist, or it is a phenomenon of quite a different kind. It does exist, but its objective is somewhat different. This objective is not the suppression of competitors, but their cartelization on an international scale [Tuttavia, riconosciuta la impossibilità o la enorme difficoltà di escludere col dumping i rivali da un mercato aperto, non se ne deve arguire che il dumping del tipo $\alpha \varepsilon$ e $\beta \varepsilon$ non esista, o sia fenomeno di tutt'altra specie. Esiste, ma il suo obiettivo è alquanto diverso: non è la soppressione dei rivali, ma la costituzione di un sindacato internazionale].” (Jannaccone, 1955 [1914]: 116-7)

Being subject to the forces of free competition, resort to dumping is hardly beneficial if it is not accompanied by certain degrees of monopolistic power. The establishment of international trusts serves this function: trusts allow to discriminate between national markets and to influence both the total quantity and the price of the market in which they act, thus making dumping profitable.

III.3.2 The profitability of systematic dumping

Let us follow Jannaccone's analysis on the profitability of dumping of the type $\beta\delta$. By definition, this is the case where the quantity produced by the firm is greater than the quantity that would be produced if the price were unique. An increase in output and the variation of the cost structure of firms always follow the resort to dumping of the type $\beta\delta$.

In a free market, where firms are continuously forced to restructuring and adaptation, the quantity Q_i produced by each firm is less than what the firm would produce in isolation Q_n : attracted by the profit R_n , many firms increase their output in order to maximize their profits. The price in the market falls at p' . Firms approach the point in which the unit price is equal to the marginal cost sooner: $Q_i < Q_n$. Assume that an *average* or *typical* firm must restrict output to $Q_i < Q_n$ (Jannaccone means that (footnote 7, p. 131) when the production of the *average* firm varies, total production varies accordingly). The firm wishes to influence either the quantity or the price in the market, or both, in order to escape the effects of competition.

According to equation [6] (and [7]), the firm's net profit is given by⁵:

$$R'_i = (Q + d_1 + \dots + d_i)(p' - c'_i) \quad [9]$$

But if the firm could sell abroad $Q_n - Q_i$ at a price π , then its net profit would be:

$$R'_n = (Q + d_1 + \dots + d_i)(p' - c'_i) + (d_{i+1} + \dots + d_n)(\pi - c'_n) \quad [10]$$

The firm adopts the new combination of factors of production only if it is profitable. Thus the firm adopts the dumping strategy only if $R'_n > R'_i$.

Dumping of the type $\beta\delta$ implies a change in both the quantity and the cost structure of the firm. Thus, in addition to the scope, it is necessary to account for those changes while computing its profitability.

Let us first consider the case of decreasing average costs, $c_n < c_i$. The firm's profit in the home market at a production level Q_n is higher than that at Q_i . Thus the firm could:

- accept a decrease in the internal price; in particular, if competition gets stronger, there might be no other choice;

⁵ We slightly changed the terminology of equations 9 and 10 with respect to Jannaccone's original terminology.

- sell a certain amount of quantity abroad at a price lower than its average cost, provided the gain in the home market is higher than the loss faced abroad; however, for this to be possible, the home market must exhibit some source of market imperfections (it would be impossible otherwise to stop the forces of competition on the level of the internal price);
- sell a certain amount of quantity abroad at a price higher than its average cost and add the profits realized abroad to the gains in the home market.

Let us now assume that the average costs are increasing (or constant), $c_i < c_n$ ($c_i = c_n$). In this case the net profit realized in the home market when choosing to produce at a cost $c'_n(Q_n)$ (i.e. $R'_n = (Q + d_1 + \dots + d_i)(p' - c'_n)$), would be either lower than or equal to R'_i . Hence, $R'_n > R'_i$ only if $(d_{i+1} + \dots + d_n)(\pi - c'_n) > 0$. In other words, when average costs are increasing (or constant), the firm has the highest incentive in gaining as much as possible from the sales abroad.

III.3.3 The profitability of sporadic dumping

What is the profitability of dumping when it is practiced sporadically, for a short period and with the aim of disposing of an overstock of production (i.e. dumping of the type $\alpha\gamma$)?

The difference between dumping of the type α and dumping of the type β stands in the firm's cost structure: fixed in the former, variable in the latter. If a firm's maximum profit corresponds to a production level Q_n (already produced) but, because of unexpected shocks, the quantity demanded decreases at $Q' < Q_n$, then the firm has to choose whether to get rid of overproduction by accepting a decrease of the price in the home market, or temporarily sell abroad at a price lower than its average cost. The cost structure of the firm cannot be changed thus, as opposed to the case $\beta\delta$, in the case $\alpha\gamma$ the firm does not have to compare R'_i with R'_n (eq. [9] and [10]). The firm has instead to discriminate between p' and π in order to maximize the profit originating by sales in both the internal and the external markets, given the elasticity of demand both at home and abroad.

IV Jannaccone on the effects of dumping in both domestic and foreign markets

Jannaccone ended his first article (Jannaccone, 1914a) with the following words:

“The three forms of dumping here studied are different economic actions, therefore their effects in domestic and foreign markets are different. This is true both from the consumer's and producer's points of view. The inquiry of these economic effects of dumping will be the subject of an another article

[Poichè le tre forme di dumping, qui studiate, sono tre operazioni economiche distinte, [...], è chiaro che diversi sono gli effetti che l'una o l'altra hanno tanto sul mercato interno quanto sul mercato estero, e tanto dal punto di vista dei consumatori quanto dal punto di vista dei produttori sull'uno e sull'altro mercato. Lo studio di questi effetti economici del dumping sarà argomento di un altro articolo]" (Jannaccone, 1914a, §29)

Several months later, he published an article in the *Rivista delle Società Commerciali* (Jannaccone, 1914b), where he exposed, along with his analysis on the efficacy of tariffs and export subsidies, his investigation on the effects of dumping in both domestic and foreign markets. Jannaccone believed that a detailed analysis on the forces operating in markets was necessary to the investigation on the benefits of protectionism against dumping.

He assumed that a) dumping firms are organized in trusts; b) dumping is practiced mainly by firms which produce production factors (both the assumptions were consistent with the empirical evidence at his time). If a trust resorts to dumping then there will be two effects in its home market:

- the client industries employing that factor of production will be relatively more exposed to international competition;
- the price those industries will have to pay will damage them in absolute terms, if it is higher than the price corresponding to the 'no dumping' state.

The same damaged industries will organize themselves in trusts and, through the trusts action, will react by asking for compensation: the biggest obstacle to dumping must be searched in the home market. The economic subjects that initially resort to dumping will be forced to share part of their profits from dumping with their national opponents. This mechanism will drive the economic system into a vicious cycle which both increases interdependence among industries / trusts and hands the market over a regime of high domestic prices (see Lotz, 1902, quoted in Jannaccone, 1914b). The disadvantages of dumping listed above are often among the reasons for industrial integration. The best way of preserving the benefits and escaping the costs of dumping is, according to Jannaccone, vertical integration rather than the establishment of trusts (Jannaccone, 1914a, p. 506). Empirical evidence showed increasing integration both in the United States and in Germany at the beginning of the XX century (see Martin 1904 and Heymann 1904, quoted in Jannaccone 1914b)⁶.

Let us look at the effects in the foreign market. In this case too Jannaccone distinguished two effects:

⁶ Even though sales abroad at a price excessively low may damage their own relative competitiveness (Jannaccone, 1914b).

- dumping damages foreign firms belonging to the same branch of industry of the product dumped;
- all the other firms employing that product as a factor of production are favoured by the lower price.

Dumping decreases the profits of foreign firms which are direct competitors. The other firms employing the dumped product will import it, if its price is lower. Is the cost of the former higher than the benefit of the latter? Empirical evidence had answered negatively: one of the main reason for dumping is to locate overproduction in other markets in order to maintain a stable domestic price rather than displacing competitors (Jannaccone, 1914a). However, Jannaccone continues, if it is true that predatory dumping is a theoretical possibility, rarely experienced in reality, it is also true that the benefits from the lower price of the factor of production have to be compared with the costs of price instability. Indeed, the country dumped on might be temporarily favoured by a lower price, however this price is highly unstable and unlikely to be excessively low because of the following reasons: the instability related to the economic conditions in the dumping country is at least as harmful as the variability of both international competition and the elasticity of foreign demand. For these reasons the cost of uncertainty faced by foreign buyers should be subtracted to the benefits originated by the lower price they pay. The analysis on the costs and benefits of dumping, along with an investigation on the forms of protectionism currently practiced at his time (in Canada, in the United States and in Germany) led Jannaccone to conclude that it might be wise for politicians to leave the market forces free to operate as much as possible. If perfect competition is endangered, policy actions should be set according to each particular case under investigation. Assuming that it is practiced for predatory reasons, the static disadvantages of dumping, have to be compared with the dynamic advantages of economic units integration which aims at decreasing the costs of production and increasing output.

V. JANNACCONE AS A PRECURSOR OF VINER:

FINAL CONSIDERATIONS

Viner (1923) is considered to be the first classic treatment of dumping in the economic literature. His remarkable treatment overshadowed the contributions of other scholars who took part in the theoretical systematization of the theory of dumping at the beginning of the nineteenth century. In this paper, we have focused on the neglected articles written by Pasquale Jannaccone in the special issue of the *Riforma sociale*, March 1914 and in the *Rivista delle Società Commerciali*, June 1914. Although we recognize that the first theoretical attempts to systematize dumping were made at the

beginning of 1900 (principally by Taussig, Hobson, Dietzel, Pigou, and Shortt, who between 1904 and 1906 highlighted some key questions concerning both the nature and the typology of dumping), nonetheless we believe that the most overarching analysis on the theory of dumping in its classic period before Viner is contained in Jannaccone's essays. Not only there are numerous similarities in both the arguments and the conclusions. But also Jannaccone's analytical framework is general enough to be applied to Viner's analysis (as we extensively demonstrate in the appendix).

The origins of the theory of dumping lie in Jannaccone's contribution. Jannaccone defined and classified dumping (1914a). He proved that the most natural scientific framework for dumping is imperfect competition and he definitely formalized dumping as an instance of price discrimination. Viner's classification of dumping is remarkably reminiscent of Jannaccone's taxonomy of dumping (rapid comparison between Table 1 and 2 below will confirm our statement).

Table 1: Viner's classification of dumping (as exposed in Viner, 1923, p. 23, Ch. II)

Motive (dumper's objective)	Degree of continuity
A. To dispose of a casual overstock	Sporadic
B. Unintentional	
C. To maintain connections in market in which prices are on remaining considerations unacceptable	Short-term or intermittent
D. To develop trade connections and buyers' goodwill in a new market	
E. To eliminate competition in the market dumped on	
F. To forestall the development of competition in the market dumped on	
G. To retaliate against dumping in the reverse direction	
H. To maintain full production from existing plant facilities without cutting domestic prices	Long-run or continuous
I. To obtain the economies of large-scale production without cutting domestic price	
J. On purely mercantilistic grounds	

Table 2: A sketch of Jannaccone's taxonomy of dumping (extensively set out in section II.2.2)

aims / modes	α : quantity already produced	β : quantity produced to be dumped
γ : quantity not marketable in the internal market	sales below costs in a foreign market of production overstocks	—
δ : systematic	—	sales below costs in a foreign market aimed at either the maintenance of full capacity or the

overproduction		exploitation of large scale economies
ε : displacement of competitors	predatory dumping	predatory dumping

Jannaccone differentiated dumping in three forms essentially: predatory dumping (i.e. $\alpha\varepsilon$, $\beta\varepsilon$ aimed at displacing competitors), systematic dumping (i.e. $\beta\delta$ aimed at escaping the forces of free competition) and sporadic dumping (i.e. $\alpha\gamma$ aimed at disposing of an overstock of production as the result of either wrong estimates of potential sales or temporary local depressions). In the α case the cost structure of the firm remains unaffected. In the β case both the cost structure and the quantity change, thus the analysis of the profitability of the form β has to account for the effects of those changes. It is not wrong to define the former as short-term dumping and the latter as long-term, however the definition must be in terms of whether the cost structure of the firm can be changed or not. Viner did not specify the duration of dumping exactly according to those terms. He focused more on the distinction between sporadic / intermittent / continuous dumping, but essentially his classification is evocative of Jannaccone's taxonomy. A firm's chance to discriminate the price of its product depends on certain conditions related to the market structure (see section II.2.1). However, the profitability of such a practice depends on its specific scope, risk and duration (Jannaccone, 1914a p.250-251). Or, in the words of Viner:

“[...] for the purposes of economic analysis probably the most serviceable bases for classification are according to the motives or the objectives of the dumper and according to the degree of continuity of the dumping” (Viner, 1923, p. 23)

Based on the development of a static analysis on the links both between production costs and firms' life cycle and between the profitability of price discrimination and the costs of production, Jannaccone developed an analytical framework for investigating the profitability of dumping (section III). Jannaccone generalizes the theory of dumping to any form of market structure. Viner restricts his analysis of dumping to the cases in which there exists a certain degree of monopoly control exerted by either certain firms or groups of firms. Although he recognized that there may be other obstacles to free competition besides monopoly, his theory on the profitability of dumping is nonetheless based on this assumption:

“[...] it will be assumed throughout, except in the case of sporadic dumping or where the contrary is expressly indicated, that the dumping is being practiced by concerns or combinations in substantial

monopoly control of their domestic markets. There is adequate reason to suppose that with the exceptions noted this assumption is in close harmony with the facts” (Viner, 1923, p. 100)

Jannaccone too was aware of the fact that price discrimination between countries is hardly possible without permanent deviations from a perfect competitive environment. In particular, he referred to those deviations, usually artificially reproduced, like either tariffs or international trusts or both. Indeed, his analysis on the profitability of predatory dumping, i.e. $\alpha \varepsilon$, $\beta \varepsilon$, showed that dumping of this type has the objective of establishing international trusts rather than displacing competitors; it is hardly possible to eliminate competition in a free market and, because of this, the best way to obtain a partition of a market in different segments is by raising barriers through the action of international trusts. According to Viner too the objective of predatory dumping is to obtain a certain degree of monopolistic control over a market (unless it is practiced thanks to other market imperfections). However Jannaccone was convinced that dumping should not be confined solely to either predatory or monopolistic practices. Dumping may take other more pacific forms, e.g. $\beta \delta$ and $\alpha \gamma$.

Systematic dumping is not explicitly defined by Jannaccone as a long-term form however, the specific feature which characterizes it leads one to think it is not certainly sporadic: the case $\beta \delta$ refers to changes in both the quantity and the cost structure of the firm, it refers to a quantity which is produced in order to be dumped; it refers to the analysis of the firm’s search for the best combination of production factors which guarantees the maximum profit. The type $\beta \delta$ thus includes what Viner defined as intermittent dumping aimed at exploiting full capacity⁷, because the firm which resorts to dumping changes its cost structure in order to produce the quantity to be dumped. As well as what Viner defined as long-term dumping (exploitation of large scale economies, enlargement of the plant). Indeed Viner treated the analysis of the profitability of both in the same way⁸:

“No fundamental change is made in the character of the problem where what is at issue is the profitability of enlarging the scale of production in order to dump instead of increasing production from already existent plant plants.” (Viner, 1923, p. 123-124)

Viner then defined long-term dumping as profitable only if practiced by firms characterized by both a certain degree of monopolistic control and decreasing costs (see appendix A.1.2 for a detailed

⁷ A possible confusion may be made while reading Viner’s book where there is explicit reference to which kind of dumping is practiced in order to maintain full production. Probably because of a misprint, this type of dumping, which in his table is defined as point H (Viner 1923, p. 23) thus as “long-run or continuous dumping”, is later analyzed as belonging to the category “short-term / intermittent dumping”(Viner 1923, p. 112). We take the latter as valid.

analysis). According to the static analysis developed by Jannaccone, systematic dumping is the way available to firms for escaping free competition in the home market. Obligated to restructure the production process in order to adapt to the increased production in a market where a positive profit is possible, firms must decide between restricting production (at a level which would not allow the best combination of production factors) or selling the additional output at a lower price in the home market (if demand is elastic), or discriminate on the quantity left unsold at the current internal price. If a firm would have the optimal dimensions, i.e. it would produce the quantity which maximizes its profit, then there would not be a reason to continue to increase its output. Thus whether the firm is on the decreasing line of production costs does not depend on whether it is exploiting the existent plant or enlarging it, but rather on how much the quantity currently produced is close to its optimum. In Jannaccone's analysis constant, decreasing and increasing costs of production represent stages in the life of a firm: dumping can be profitable at any stage of a firm's life cycle. He proved that the point of maximum profit lies on the line of increasing costs (both marginal and average - as shown in section III.2) and he showed that firms have the highest incentive to dump when they approach the stage of increasing costs (section III.3.2). While it is true that in a perfect competitive environment dumping is not always possible because the forces of competition in the internal market may be strong enough to reduce the internal price anyway, it is also true that monopoly control over the internal market is not always necessary. Depending on the elasticity of demand at home and abroad, the firm wishes to find the best combination of production factors which yields the maximum profit (see eq. 9 and 10). If average production costs are decreasing then the firm may either accept a decrease in the price in the home market, or resorts to dumping. Viner stated:

“It will be profitable to enlarge a plant, if the added output must be sold abroad at a price lower than the average cost of production of the increased output, only if the volume of export sales multiplied by the excess of the average cost of the increased output over the export price is less than the domestic sales multiplied by the average reduction in cost resulting from the increase in output.” (Viner, 1923, p. 124)

In other words, as far as $(d_{i+1} + \dots + d_n)(\pi - c'_n) > 0$ (which follows from the condition $R'_n > R'_i$, see eq. 9 and 10 in sub-section III.3.1). However, according to Jannaccone, if average production costs are increasing (or constant) the firm has the highest incentive in gaining as much as possible from the sales abroad.

⁸ With the only distinction that costs are decreasing more when the production increases in order to exploit full capacity than when it increases in order to enlarge the plant (Viner, 1923, p. 124 footnote 1).

Monopoly control is also not necessary for dumping to be profitable if the objective is to dispose of an overstock of production (i.e. type $\alpha\gamma$): when the cost structure of the firm cannot be changed, the firm has to discriminate between the price in the home market and the price abroad in order to maximize its profit. The stock of overproduction cannot be sold but by either decreasing the price in the home market (thus, given the elasticity of demand, increasing the quantity sold at home) or selling the additional quantity abroad, even if at a lower price (Jannaccone, 1914a, p. 275). Sporadic dumping is the only form of dumping in which Viner relaxed the assumption of monopolistic power (Viner, 1923, p.100). If the firm's objective is to get rid of an overstock of production than short-term dumping is likely to be profitable (depending on the elasticity of demand):

“There is a general agreement that under certain rather limited circumstances there is a clear case for the profitability of dumping to the dumper concern. When a producer, because of an overestimate of prospective demand, is left with an over stock which he cannot immediately dispose of in the domestic market without making a substantial reduction in his prices, it may be sound policy for him to make no change in his domestic prices and to dispose of his surplus stock at reduced prices in foreign markets.”
(Viner, 1923, p. 110)

Despite the theoretical need strongly felt by Jannaccone to generalize his theory as much as possible, he backed down in his second article by reviving the assumption of a certain degree of monopolistic control. In a dynamic society where international trade was more and more significant in each country's balance of payments, individual economic units were reacting by either the establishment of trusts or vertical integration (Jannaccone, 1914b). The formation of prices, hence any theory dealing with it, was strongly influenced by the increasing size of firms. While investigating on whether the growing size of firms was increasing or decreasing national welfare; and on whether it was improving or worsening the allocation of wealth, Jannaccone completed his exposition of the theory of dumping by adding:

- his analysis on the effects of protectionism;
- his investigation on the effects of dumping on both domestic and foreign markets.

When Jannaccone was writing his article, Italian trusts were invoking protection against supposed unfair practices of monopolistic power exerted by German cartels. Jannaccone suggested caution in front of certain positions expressed by who believed that dumping should be faced by protectionist interventions. Dumping is an extremely dynamic activity, which adapts to the continuous changes of the economic system. A protective tariff should contrast those changes opportunely. But how to face a treat which destroys the relation between price and cost with an instrument which is just

based on that relation? And even by assuming it were possible, protective tariffs and import prices would run after each other and provoke an escalation of price levels. Neither a system of countervailing duties is the solution: a regime of countervailing duties would boost concealed agreements. There unlikely is a policy able to eliminate the static disadvantages of economic integration without undermine its dynamic advantages. Avoiding external interventions may be the best choice:

“Non è quindi più giusto e più conveniente che le industrie, le quali si credono minacciate dal dumping, cerchino un rimedio più efficace per se stesse, meno costoso per la collettività?” (Jannaccone, 1914b, p. 499)

Any case should be specifically analyzed: no rule of thumbs is available to policy makers. Viner's investigation touched extensively this point, probably moved by the same feelings. In the chapter devoted to the effects of dumping on the domestic market Viner wrote: “[..] no one formula exhausts all the possibilities. It is necessary once more to distinguish between the various types of dumping and the different circumstances under which dumping may arise” (Viner 1923, p. 101). He strengthened the above statement in another chapter describing the effects of dumping to the country dumped on: “The incident [...] emphasizes the wisdom of avoiding unqualified generalizations concerning the economic effects of dumping and of acknowledging the probability that any general rule which applies in the majority of cases may nevertheless be inapplicable in some specific instances” (Viner 1923, p. 143).

The costs and benefits of dumping should be carefully investigated, from the point of view of both the internal and the external markets. Both when dumping is resorted to in order not to disturb the internal market and when it is practiced by monopolistic concerns who are already producing at the level of their maximum profit, internal price are not affected by it. Thus the only damage is the loss in competitiveness suffered by internal industries employing the product subject to dumping (Viner, 1923, Ch. VI). According to Jannaccone (1914b) dumping firms / trusts face the main obstacles in the home market for the damaged industries will organize themselves in trusts too and, through the trusts action, will react by asking for compensation. Not only national industries loose competitiveness with respect to their foreign opponents, but also they are directly harmed by a relatively higher price. Jannaccone thus admitted an influence of dumping on internal prices: the increasing interdependence among industries / trusts hands the market over a regime of high domestic prices (Lotz, 1902).

From the point of view of the foreign market, whether dumping is beneficial depends on the loss faced by the industries dumped on, by the costs of price instability and by the benefits of the

temporary lower price of the dumped product. The temporary lower foreign price paid by foreign consumers may later become higher: in any case, disturbing the current equilibrium in the foreign market may trigger price instability (Jannaccone (1914b). Viner too was very concerned with the dangers of temporary dumping: “[..] the evil of dumping from the point of view of the importing country is its uncertain duration” (Viner, 1923, p. 139).

REFERENCES

- Bloomfield, Arthur. 1992. “On the Centenary of Jacob Viner’s Birth: A Retrospective View of the Man and His Work”. *Journal of Economic Literature*, vol. 30, n.4 (Dec.), pp. 2052-2085.
- Bonikowsky, Hugo. 1907. *Der Einfluss der industriellen Kartelle auf den Handel in Deutschland*. G. Fisher, Jena.
- Bowley, Marian. 1937. Review of P. Jannaccone, *Prezzi e Mercati*, *Economica*, vol. 4, n. 14 (May): 229-230.
- Cabiati, Attilio. 1914. “Prime linee per una teoria del dumping”, *La Riforma Sociale*, vol. XXV, n. 3, 193-226.
- Dietzel, Heinrich. 1902. *Sozialpolitik und Handelspolitik*, Berlin, Duncker & Humbolt.
- Dietzel, Heinrich. 1905. “Free Trade and the Labour Market”, *The Economic Journal*, vol. 15, n. 59 (March): 1-11.
- Dönges, Reinhard. 1902. *Die handelspolitische Bedeutung der Ausfuhrprämien*, Diss. Heildelberg.
- Ethier, Wilfred J. 1982. “Dumping”, *The Journal of Political Economy*, Vol. 90, n. 3 (June): 487-506.
- Forte, Francesco and Marchionatti, Roberto. “Luigi Einaudi’s Economics of Liberalism”, *European Journal of the History of Economic Thought*, forthcoming.
- Haberler, Gottfried. 1936. *The Theory of International trade, with Its Application to Commercial Policy*, London, William Hodge.
- Heymann, Hans. 1904. *Die gemischten werke in deutschen grosseisengewerke*,
- Hobson. John. 1904. *International Trade. An Application of Economic Theory*. London, John Atkinson.
- Jannaccone, Pasquale. 1914a. “Il dumping e la discriminazione dei prezzi”, *La Riforma Sociale*, vol. XXV, n. 3, pp. 234-276. Then in P. Jannaccone, *Prezzi e mercati*, pp. 65-114. English Translation: in Jannaccone (1955).

- Jannaccone, Pasquale. 1914b. “Prezzi di guerra: a proposito di sindacati, di dumping e di protezione”, *Rivista delle società commerciali*, June 1914. Then in P. Jannaccone, *Prezzi e mercati*, pp. 115-147.
- Jannaccone, Pasquale. 1936 *Prezzi e mercati*, Torino, Einaudi.
- Jannaccone, Pasquale. 1955. “Dumping and price discrimination”, *International Economic Papers*, N. 5, edited by A. T. Peacock, W. F. Stolper, R. Turvey, E. Henderson. London, Macmillan, pp. 103-133.
- Johnson, Harry. 1956. Review of *International Economic Papers*, N. 5, *The Economic Journal*, vol. 66, n. 263 (September): 506-7.
- Lotz, Walther. 1902. *Sonderinteressen gegenuber der wissenschaft einst und jetzt*, Berlin, Duncker & Humbolt.
- Marchionatti Roberto, Cassata Francesco, Becchio Giandomenica, Mornati Fiorenzo. 2010. “When Italian Economics «was second to none». Luigi Einaudi and the Turin School of Economics”, *CESMEP Working paper*, Department of Economics, University of Torino.
- Martin, Rudolf. 1904. *Die Eisenindustrie in ihrem kampf um den absatzmarkt*, Berlin, Duncker & Humbolt.
- Morgenroth, Willi. 1907. *Die Exportpolitik der Kartelle*, Berlin, Duncker and Humblot.
- Pareto, Vilfredo. 1896-7. *Cours d'Économie Politique*, 2 vols. Lausanne, Rouge. Reprinted as vol. 1 of *Œuvres complètes*, edited by G. Busino, Geneva, Librairie Droz, 1964.
- Pareto, Vilfredo, 1906. *Manuale d'economia politica*, Milan, Società editrice libraria. French translation (revised) : *Manuel d'économie politique*, Paris, Giard et Brière, 1909. Reprinted as vol. 7 of *Œuvres complètes*.
- Pigou, Arthur C. 1905. “Professor Dietzel on Dumping and Retaliation”, *The Economic Journal*, vol. 15, n. 59 (September), 436-443.
- Schumpeter, Joseph A. 1954, *History of Economic Analysis*. New York, Oxford Economic Press.
- Shortt, Adam. 1906. “The Anti-Dumping Feature of the Canadian Tariff”, *The Quarterly Journal of Economics*, vol. 20, n. 2 (February): 250-58.
- Solow, Robert. 1956. Review of *International Economic Papers*, N. 5, *American Economic Review*, vol. 46, n. 1 (December): 981-3.
- Taussig, Frank W. 1904. “The Present Position of the Doctrine of Free Trade”, *Publications of the American Economic Association*, vol. 6, n. 1, Papers and Proceedings of the Seventeenth Annual Meeting, February, pp. 29-65.
- Taussig, Frank W. 1915. *Some Aspects of the Tariff Question*, New York: AMS Press.

Viner, Jakob. 1923. *Dumping. A Problem in International Trade*. Chicago: University of Chicago Press.

APPENDIX

A.1. A recast of Viner's comprehensive analysis on the profitability of dumping

A.1.1. Short-term dumping

Let us present Viner's analysis as if it were seen through the lens of Jannaccone's mathematical representation.

A firm net profit R is given, like in Eq. 1, by:

$$R = Q(p - c).$$

Let us assume that any type of short-term dumping does not influence the domestic price (Viner, 1923, Ch. VI). And that the domestic price is at the level of maximum yield, $p = p(Q_n) = p_n$.

If the firm's objective is to get rid of an overstock of production, than dumping is likely profitable.

If the producer overestimates the level of expected sales to be at $Q_{current} > Q_n$, dumping may be the best choice, for several reasons. A reduction in domestic prices may not be only temporary. If there is competition, other competitors may meet the reduced price. It may not be so easy to increase sales at home if the demand is inelastic.

Assume that the domestic demand is not perfectly inelastic, e.g. that it is possible to increase the quantity sold in the domestic market at a lower price:

- $R'_{current} = Q_{current} (p' - c_{current})$ is the net profit when the firm is willing to decrease the domestic price from p_n to p' ;
- $R_{current} = Q_n (p_n - c_{current}) + (Q_{current} - Q_n) (\pi - c_{current})$ is the net profit when the firm chooses to sell part of the production, $(Q_{current} - Q_n)$, abroad thus maintaining the domestic price at p_n .

The firm will resort to dumping if and only if $R_{current} > R'_{current}$. The profitability of dumping is thus related to the elasticity of the domestic demand reflected by the difference $Q_n (p_n - p') - Q_{current} p'$, and by the difference between the price abroad and the average unit cost of production, $\pi - c_{current}$.

Let us now assume that either the firm does not want to decrease the domestic price or the domestic demand is perfectly inelastic. In this case, the comparison should be made between $R_{current}$ and the profitability of the only available alternative: storing the overstock of production, e.g. $-(Q_{current} - Q_n)c_{current}$. If storing the overstock does not have a cost, the only condition is

$R_{current} > R_n$, where $R_n = Q_n(p_n - c_{current}) - (Q_{current} - Q_n)c_{current}$ is the net profit when the firm keeps the overstock of production $(Q_{current} - Q_n)$ and sells the quantity $Q_n < Q_{current}$ in the home market. $R_{current} > R_n$ if $(Q_{current} - Q_n)(\pi - c_{current}) > -(Q_{current} - Q_n)c_{current}$. The only condition is $\pi > 0$: there is a high chance that dumping will be profitable. If storing the overstock of production has a cost, as it would realistically have, then the likelihood of recourse to dumping increases even more.

The situation is slightly more complicated when the firm has to decide whether or not to produce goods to be dumped (i.e. short-run dumping). Viner had noted certain instances of dumping even when the immediate failures were fully foreseen. His explanation is based on the fact that certain types of short-run dumping are practiced with the objective of maintaining connections with certain markets, or with the end of securing long-term gains. Except for the former particular cases, short-term dumping usually pursues two objectives: the maintenance of full production or the overcoming of localized recessions affecting the domestic/main market in which the dumper operates.

The aim of recourse to short-run dumping may be to maintain full production. In this case, whether or not dumping is profitable depends on several factors. Let us assume that full production cannot be maintained unless either dumping is resorted to or the domestic price is reduced. Remember that the firm is price maker and that, by assumption, dumping does not influence the level of the domestic market price p_n .

Thus, the firm is producing Q_n , that is, the quantity providing the maximum yield in the home market, at the price p_n . Let us define $R_n = Q_n(p_n - c_n)$ the net profit of the firm when the plant is not fully exploited, i.e. no dumping. The choice of the firm will depend on the difference between R_n and R_{fc} , where R_{fc} is the net profit at full production when the excess of production $Q_d = Q_{fc} - Q_n$ is sold abroad at a price π lower than the domestic price:

$$R_{fc} = Q_n(p_n - c_{fc}) + Q_d(\pi - c_{fc}) \quad [11]$$

The average unit cost is c_n when the plant is used at partial capacity, c_{fc} otherwise.

If $R_n < R_{fc}$ then the firm will produce at full capacity and will practice dumping. $R_{fc} > R_n$ iff:

$$Q_n(p_n - c_{fc}) + Q_d(\pi - c_{fc}) > Q_n(p_n - c_{fc})$$

or

$$Q_d(\pi - c_{fc}) > Q_n(c_{fc} - c_n) \quad [12]$$

If the firm exhibits increasing average costs, i.e. $c_{fc} > c_n$, then two conditions must hold for dumping to be profitable: $\pi > c_{fc}$ and $Q_d(\pi - c_{fc}) > Q_n(c_{fc} - c_n)$.

If average costs are decreasing, $c_{fc} < c_n$, there are two cases:

- a) for $\pi > c_{fc}$, recourse to dumping is always profitable;
- b) for $\pi < c_{fc}$, recourse to dumping is profitable only if $Q_d(\pi - c_{fc}) > Q_n(c_{fc} - c_n)$.

Let us now discuss the case in which short-term dumping is practiced in order to maintain the stability of production. If a firm is experiencing recession in the domestic/main market, it may be wise for it to sell part of the output abroad. In a free trade market, will dumping stabilize production? Viner answers this question by citing several scholars already engaged with the issue. He supports, for instance, Marshall's view that as long as a depression is localized, dumping can serve as a means to stabilize production. Even though depressions are rarely localized. Viner partly shares Pigou's perspective on the possibility of dumping to stabilize production (Pigou, 1905), but he does not agree with Pigou's analysis on the effects of dumping on the domestic price.

In addition, Viner specifies the conditions under which a last instance of short-term dumping is profitable, e.g. predatory dumping. Assuming that the firms' aim is to maximize profit, dumping serves them as a means to influence either the price or the quantity (or both) in the markets of interest. In particular, any attempt to displace competitors, and/or to establish international trusts, is profitable as long as it influences the difference between the foreign price and the cost of production, on the one hand, and the quantity sold in those circumstances on the other. If a firm is able to control the market towards which dumping is directed, then both the right-hand side and the left-hand side of equation 12 are affected. For instance, the former increases with the increase in π and, assuming decreasing costs of production, the latter may decrease if the firm influences the quantity sold Q_d .

A.1.2. Long-term dumping

Let us now illustrate the case of permanent dumping. Dumping may be practiced for longer periods. Will it be profitable to increase investment in production facilities given the knowledge that part of the output will have to be sold abroad at a price lower than the domestic price? What if the price abroad were even lower than the average cost of production at the increased level of output?

As a first case, let us assume that the demand at home is perfectly inelastic: that is, even if the firm could decrease the domestic price, it would not be able to sell more units of output. Thus the firm's choice is between maintaining the current size of the plant or increasing the plant facilities through recourse to dumping.

Let us redefine $R_n = Q_n(p_n - c_n)$ as the net profit of the firm when the plant facilities will not be increased in the future.

Suppose instead that the firm chooses to increase the plant size with the objective of exploiting large scale economies. The firm sells the additional output abroad. Its net profit R_{LT}^D will then be:

$$R_{LT}^D = Q_n p_n + Q_d \pi - (S_n + h_d), \quad [13]$$

where S_n , Q_n and p_n are the total cost of production, the total output and the level of price in the domestic market providing the maximum yield. Q_d is the additional output produced at an additional cost h_d and sold abroad at a price π .

The firm will resort to dumping iff $R_{LT}^D > R_n$ or iff $Q_d \pi - h_d > 0$. Or, in other words, iff $Q_d(\pi - g_d) > 0 \Rightarrow \pi > g_d$: the dumping price must be higher than the additional marginal cost of producing Q_d .

“Instead of comparing export price with average cost of the total output, it is necessary to compare the additional cost resulting from the additional output with the increase in gross revenue which it produces.”
(Viner, 1923, p. 123)

Let us use the same reasoning in terms of average costs. Again, $R_n = Q_n(p_n - c_n)$ is the net profit of the firm assuming it can choose whether to increase the total production from Q_n to $Q_n + Q_d$ and to sell the additional output Q_d abroad at a price π . If the firm resorts to permanent dumping then its net profit will be:

$$R_{LT}^D = Q_n(p_n - c_{LT}) + Q_d(\pi - c_{LT}), \quad [14]$$

where c_{LT} is the average unit cost of production at the increased level of output $Q_n + Q_d$.

The firm will practice permanent dumping iff $R_{LT}^D > R_n$, or iff

$$Q_d(\pi - c_{LT}) > Q_n(c_{LT} - c_n) \quad [15a]$$

In the case of decreasing average costs of production, $c_{LT} < c_n$, dumping is doubtlessly profitable for a dumping price higher than the average cost, $\pi > c_{LT}$. Otherwise, if $\pi < c_{LT}$, dumping may still be profitable if

$$Q_d(c_{LT} - \pi) < Q_n(c_n - c_{LT})^9 \quad [15b]$$

“It will be profitable to enlarge a plant, if the added output must be sold abroad at a price lower than the average cost of production of the increased output, only if the volume of export sales multiplied by the excess of the average cost of the increased output over the export price is less than the domestic sales multiplied by the average reduction in cost resulting from the increase in output.” (Viner, 1923, p. 124)

In the case of increasing costs of production, instead, the dumping price must be higher than the average cost of production and, moreover, the gains from dumping must outweigh the increased total cost of domestic production: $Q_d(\pi - c_{LT}) > Q_n(c_{LT} - c_n)$.

As a second case, we now analyze the situation in which the domestic demand is elastic; thus the producer in monopolistic power by assumption can reduce the domestic price in order to increase output. If this is so, then the firm’s choice will be between producing more and selling it at home or producing more and dumping.

Let us define as $R'_{LT} = Q'_{LT}(p'_{LT} - c'_{LT})$ the net profit of a firm willing to decrease the price to $p'_{LT} < p_n$ and to sell the increased output Q'_{LT} in the domestic market.

$R^D_{LT} = Q_n(p_n - c^D_{LT}) + Q_d(\pi - c^D_{LT})$ is the net profit of a firm willing to increase its plant size but not to decrease the domestic price. The additional quantity $Q_d = Q^D_{LT} - Q_n$ is sold abroad at a dumping price. The firm will resort to dumping if and only if $R^D_{LT} > R'_{LT}$, or iff:

$$Q_d(\pi - c^D_{LT}) > Q'_{LT}(p'_{LT} - c'_{LT}) - Q_n(p_n - c^D_{LT}) \quad [16]$$

The benefit from dumping is higher the smaller the difference between $Q'_{LT}p'_{LT}$ and $Q_n p_n$ is. Whether dumping will be profitable depends thus, among other things, on the relative elasticity between the domestic demand and the foreign demand.

Finally, Viner specifies the conditions under which a last instance of what he defines as *long-term* dumping is profitable, e.g. bounty dumping.

Viner claims that “[i]f there is active competition among the exporters who receive bounties, the normal tendency will be for the export price of the bountied article to be less than the domestic price by the amount of the bounty”, (Viner, 1923, p. 126). It follows that in a perfect competitive market the benefit from the bounty is offset by the reduction in the export price.

⁹ Eq. 15b is obtained by multiplying both the right-hand side and the left-hand side of eq. 15a times -1 .

Let us thus assume that an export bounty b per unit of output is granted such that $b = p_n - \pi$, where p_n would be the domestic price at the level of the domestic output Q_n in a perfect competitive environment.. Export bounties tend to decrease the amount of bountied articles sold in the domestic market because they stimulate export more than production (Viner, 1923, p.127). Although only temporarily, production is biased towards exports. As a consequence, $Q_i < Q_n$, the domestic price increases to $p_i > p_n$ and $p_i > \pi + b$.

Let us assume that average unit costs of production are constant, $c_b = c_n$. The firm may choose not to sell abroad; thus its gains would be $R_n = Q_n(p_n - c_n)$. Otherwise, the net profit R_b of a dumper supported by export bounties would be:

$$R_b = Q_i(p_i - c_b) + (Q_n - Q_i)(\pi + b - c_b). \quad [17]$$

If average costs of production are constant and $p_i > p_n$ then

$$Q_n(p_i - c_b) > Q_n(p_n - c_n). \quad [18]$$

For $(Q_n - Q_i)(\pi + b - c_b) > 0$, the dumper receives the profit from the export bounty, $(Q_n - Q_i)b$. Moreover, depending on the elasticity of the domestic demand, dumping firms may gain from the higher domestic price to the extent that $Q_i p_i > Q_n p_n$. Finally, given that $p_i > p_n$ (where p_n would be the competitive price without bounties), domestic consumers bear a cost:

“The production of bountied products will thus yield for a time an extra profit both on export sales and on non-bounty domestic sales, but domestic consumers of the bountied product will suffer correspondingly.”
(Viner, 1923, p. 127)

If average costs are increasing, $c_b > c_n$, then R_n will probably be higher than R_b . Firms will thus be trapped in a less profitable situation because the export bounty may not be enough to off-set the loss due to the increasing cost of production, i.e. $Q_n(p_i - c_b) - Q_n(p_n - c_n)$.

“[...] the increase in cost of production might more than offset the increase in receipts per unit from domestic sales and from export sales after the addition of the bounty.” (Viner, 1923, p.127)

If average costs are decreasing, dumping accompanied by export bounties is likely to be profitable, at least for a short period. Dumping firms get a profit because $Q_n(p_i - c_b) > Q_n(p_n - c_n)$, even if $p_i = c_b$.

However, in a competitive environment, temporary measures are bound to yield transitory profits. As Jannaccone would suggest, without market imperfections, the increasing growth of production will drive the market towards an equilibrium where the economic profit is zero and production costs are increasing. And Viner would probably agree:

“In the long run, however, the export bounty system should be expected to result in the industry being expanded up to the point at which the returns to producers, including the bounties, are again at the normal equilibrium with the returns in other industries, so that no special gain will any longer accrue to the bountied industry from the bounties. Production would increase until either the increase in the unit cost of production or the decrease in the domestic and export prices wipes out all the extra profit resulting from the bounty” (Viner, 1923, p. 128)

The analysis yields different results if the assumption of perfect competition is relaxed. A monopolist may set the export price π such that either $\pi > p_n$ or $p_n - \pi < b$ if $\pi < p_n$. If the monopolist is constrained by limits to export it may be that $\pi > p_n$, so that the bounty system does not give rise to dumping.

“When limits are put on the amount that may be exported subject to bounty, there may be no fall in export prices, and the bounty system may not give rise to dumping.” (Viner, 1923, p. 128)

However, even if bounties granted in an imperfect competitive environment do not give rise to dumping, they must be financed in some way. Viner rightly warns about the dangerous loss that the community as a whole may face: “But the bounties themselves do not fall from the heavens, and must be paid for”, (Viner (1923, p. 128).