UNIVERSITÀ DEGLI STUDI DI SIENA

QUADERNI DEL DIPARTIMENTO
DI ECONOMIA POLITICA

Massimiliano Vatiero

Positional Goods:
A Diagrammatic Exposition

n. 575 – Settembre 2009

Abstract - Positional good shares with public good the non-private characteristic of consumption: for a positional good, given the consumption choice of one party, the other(s) must consume a corresponding negative amount of what the first party chooses to consume. Therefore, we treat positional good in a diagrammatic illustration similar to the Samuelsonian criteria for the public good. The aim of this work is to introduce the implications for this in terms of Pareto efficiency.

JEL Classification: D52, D61, D62.
Keywords: Positional Good, Externality.

I would like to thank Ugo Pagano for his invaluable advice. Comments made by Massimo D'Antoni, Luca Fiorito, Antonio Nicita and Giuseppe Niglia have much improved a previous version of the manuscript.

Massimiliano Vatiero, Department of Economics, University of Siena. E-mail: vatiero@unisi.it

1. The Triad of Economic Goods

As Samuelson (1955:350) wrote, "doctrinal history shows that theoretical insight often comes from considering strong or extreme cases." Samuelson (1955) distinguished two extreme (pure) cases: private and public goods.

- For a pure private good, if X denotes the total consumption of such a good, and X_1 and X_2 are the respective private consumption of agent 1 and agent 2, then the total consumption equals the sum of the separate consumptions, or $X_1 + X_2 = X$.
- For a pure public good, both agent 1's and agent 2's private consumption of such a good (Y_1 and Y_2) equals the total consumption Y. Thus, $Y_1 = Y_2 = Y$.

As Pagano (1999) notes, following Hirsch (1976), it is possible to individualize a third type of good: a positional good.

- This is a good whose positive consumption Z_1 for agent 1 is related to negative consumption Z_2 for agent 2, or $Z_1 = -Z_2$.

Putting it very simply, pure private goods are characterized by the fact that other individuals consume a *zero amount* of what each individual chooses to consume: "the satisfaction derived from a square meal is unaffected by the meals other people eat" (Hirsch, 1976:2). That is to say, others are excluded from the consumption of private goods that do not belong to them and their position with respect to the consumption of these goods is not altered by the consumption choices of the other agents. This exclusion is impossible in the case of a pure public good. For a pure public good, each agent must consume the *same positive amount* that other agents decide to consume.

In an economy consisting of two individuals, a pure positional good is a good such that, given the consumption choice of one agent, the second agent must consume *a corresponding negative amount* of what the first chooses to consume. As a result, certain goods could never be universalized: "what each of us can achieve, all cannot" (Hirsch, 1976:5). This stems from the fact that positional goods are scarce for social consumption.[1]

[1] Here we will follow Pagano's (1999) definition of a positional good. Such a definition is more restrictive than Hirsch's (1976). Hirsch also includes under this heading goods whose total supply is fixed. In Pagano's definition, this latter characteristic is irrelevant and what matters is only the *social scarcity*. On the various definitions of positional goods, see also Schneider (2007).

Notice that for a pure public good, each agent must consume the same positive amount that other agents decide to consume.[2] Even a positional good has a sort of non-private consumption, although with the opposite sign (Pagano, 1999): the consumption of such a good for one agent implies a negative consumption for another.

In a Cartesian plane (chart 1) with the consumption for agent 1 on abscissa and the consumption for agent 2 on ordinates, a given amount of good 'a' is a public good when it could be depicted by the point (a;a) in which both agents consume the same positive amount of such a good; it is a private good when there is a negative ratio between two consumptions but the sum of the two consumptions is the total amount: hence, the segment (a;0)(0;a); and, finally, it is a positional good when there is a negative ratio between two consumptions but the sum is zero: hence, the segment (-a;a)(a;-a).

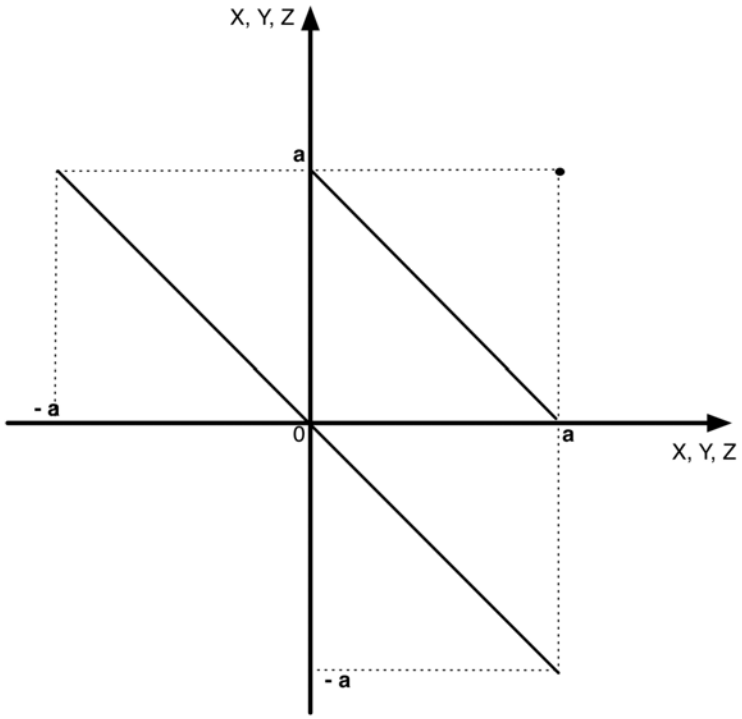

Chart 1

Examples of positional goods are power, prestige and status (see, Pagano, 1999; Vatiero, 2008). In a two-person economy, when a party exerts or consumes a positive amount of power, prestige, or status, the second party must consume a negative amount.

[2] For instance, the lighthouse (typical case of a public good) warns ships away from hazards of some sort. The fact that a ship is warned does not exclude other ships from being warned at the same time.

This implies, therefore, "a system of evaluation, shared by both individuals" (Pagano, 1999:64). For instance, dressing certain *griffe* must be recognized as a status symbol by the parties. A second concern of positional goods is the fact that, by definition, the consumption of a positional good is unequal: for the one party it is positive, for the second party it is negative; "Only zero consumption of the positional good is compatible with its egalitarian consumption" (Pagano, 1999:64). We will not focus on these two relevant concerns but on the Pareto efficiency derived from the consumption of a positional good.

The work is structured as follows. Section 2 introduces the exposition. Section 3 is dedicated to discussion of implications in terms of efficient equilibria in a two-player context. Section 4 extends the analysis to more than two agents. Section 5 remarks on the main findings.

2. Graphical Depiction

The distinction among private, public and positional goods brings different rules for deriving total demand. In a diagrammatic view, total demand of a private good is the horizontal sum of individual demands. For a public good, instead, total demand is the vertical summation of individual demands (Samuelson, 1969).

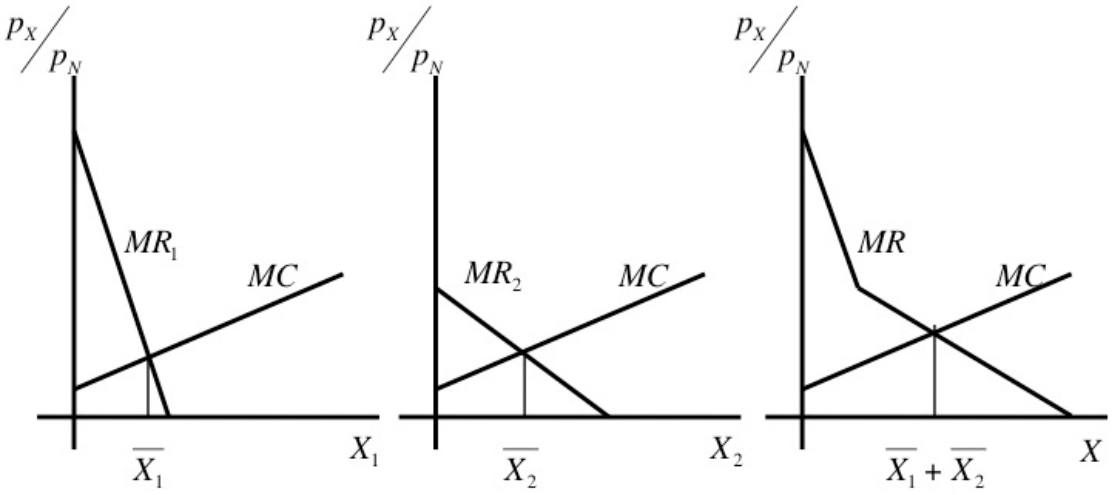

Chart 2

Taking private good N as numeraire (then each price is divided to the price of such good p_N), the marginal cost (MC) curve is the absolute slope of that production-possibility schedule plotted against varying amounts of a good; this assumes the standard law of non-decreasing marginal costs. MR

denotes the marginal revenue for consuming the good under investigation and assumes the standard law of non-increasing marginal benefits.

In the case of private good X, the total demand is the horizontal sum of individual demands as shown in chart 2. The total demand of private good X is the sum of two individual demands obtained by the intersection of each individual marginal rate curve with a marginal cost curve. On the contrary, for a public good the total demand is derived as the vertical sum of individual marginal rate curves. The total demand of public good is derived from the intersection of the total marginal rate curve with the marginal cost curve (chart 3).

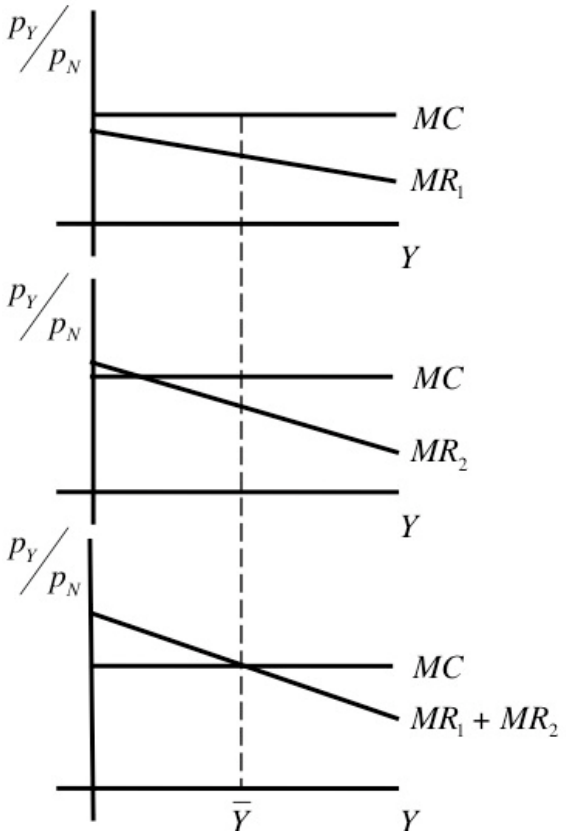

Chart 3

Finally, for positional goods, the optimal level of consumption does not coincide, as it does in the case of private goods, with the intersection of any individual marginal rate of substitution curve with the marginal cost curve since an externality emerges for the consumption of other. Thus, we should first calculate the total marginal rate of substitution and, consequently, find the intersection with the marginal cost curve. As in the case of public goods, the total marginal rate of substitution is calculated by the summation of individual marginal rates of substitution. But in the case of positional goods,

one marginal rate of substitution is subtracted since there is negative consumption. Therefore, as noted originally by Pagano (1999), the total marginal rate of substitution is the difference between the two individual marginal rates of substitution. It is, in our case,

$$MR = MR_1 - MR_2 \qquad (\textit{rule of derivation for positional goods})$$

However, it can occur also that agent 2 may benefit from the negative consumption of a positional good (it depends on his own preferences). This case, however, has an analytical framework completely analogous to the classical treatment of a public good as formulated by Samuelson (1955) because the total demand comes back as the vertical summation. Thus, for our purposes, the case in which negative consumption of one party is related to a negative externality for the same party looks more interesting.

Given such a rule of derivation, a positional good case is illustrated in chart 4.

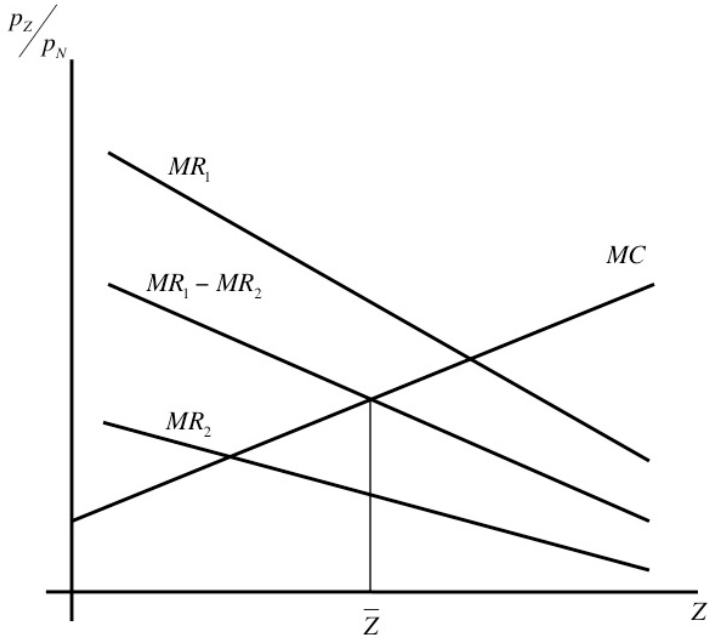

Chart 4

In this illustration the shape of marginal rate of substitution for agent 2 when he consumes a negative level of a positional good is assumed, for sake of simplicity, to be equal to the shape of marginal rate of substitution for agent 2 when he consumes a positive level of such a good. In other words, if agent 2 benefits 100 N by consuming a positive level of the power, then the consumption of a negative level of the power for agent 2 equals to –100 N. Relaxing such assumptions, however, does not crucially modify our results.

3. Pricing and Free-Riding

As in the public good case, the evaluation of goods is not common-knowledge and the effects of consumption by one party will be ignored by the other party. For instance, if we allocate a positional good by a first-price auction, the negative effects for the loser will be ignored by the winner. This yields an over-supply result ($\overline{Z^{OS}}$) for positional goods, which is opposed to the under-supply result for public goods (see also Pagano, 1999), as shown in chart 5.

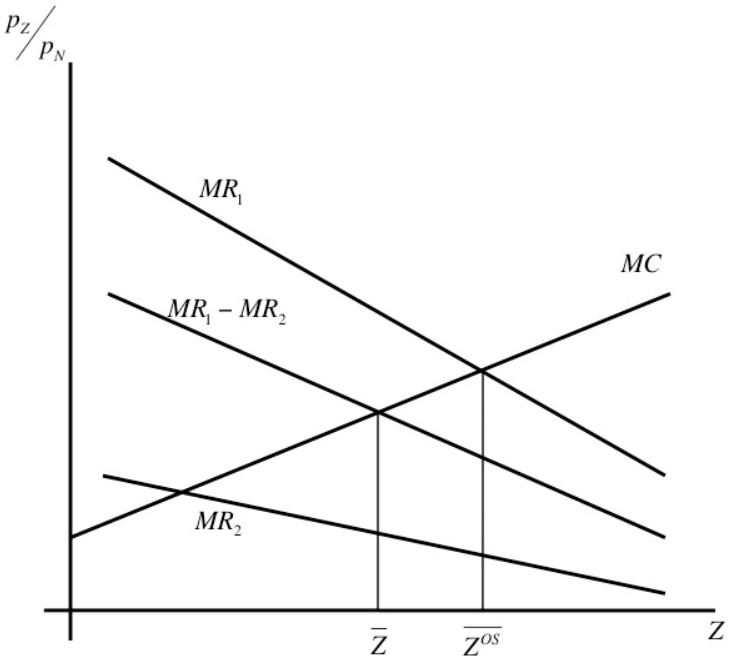

Chart 5

This implies that in order to achieve the Pareto efficiency, the price of an individual consuming something should not only pay for the benefit of the individual consumption (and production), but also for the relatively 'dangerous' effects on the counterparties: namely, the price should be a sort of 'double price.' As noted by Pagano, this situation closely resembles a Lindahl equilibrium:

> [t]he existence, enforcement or, even, the definition of property rights is as hard in the case of positional goods as it is for the case of public goods. However, the consequences of the failure to establish property rights have opposite signs. In the case of public […] goods, the consequences of this failure implies that an agent consuming the public good does not get paid for other people's consumption; in the case of a positional […] good, the equivalent failure implies that an agent

consuming positive amounts is not charged for the negative consumption of other agent's consumption (Pagano, 1999:71).

This double price derives from the characteristics of a positional good in terms of excludability and rivalry. Unlike public goods, private goods involve non-owners that simply are excluded from the consumption of the units which they do not own. As introduced in Vatiero (2008), in the case of positional goods, non-owners also must be excluded from some other effects related to their necessary, corresponding, and negative consumption. This double exclusion involves a double rivalry. Individuals do not only compete to gain the exclusive private benefit of the good, but also to avoid losses related to the corresponding negative consumption.

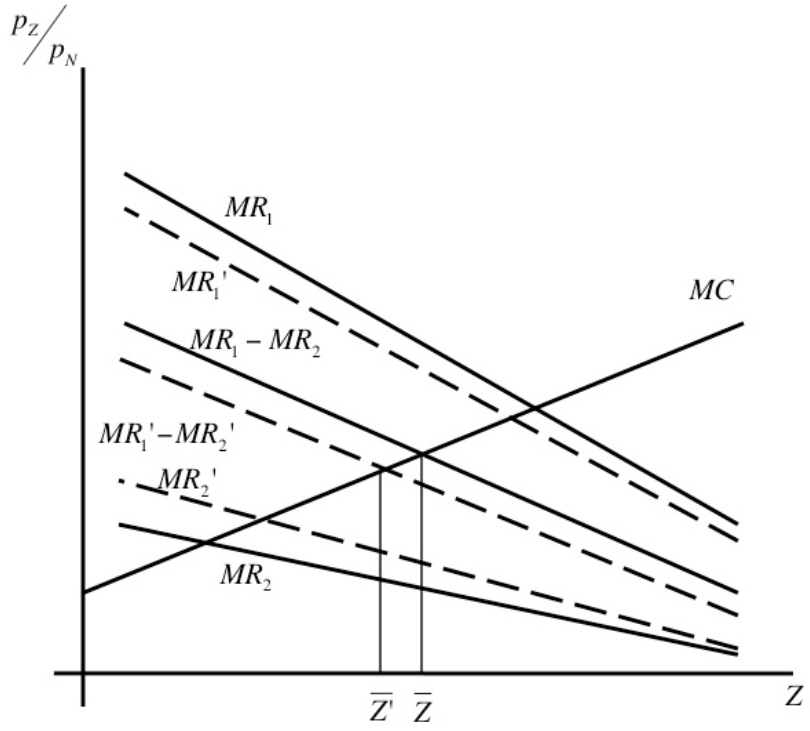

Chart 6

Let us assume a mechanism for including negative effects of a non-owner in the price of the owner and determining a potential double-price. In this respect, while in the public good, each party attempts to declare a lower level of positive effects by consuming public goods in order to pay a lower contribution for their production, i.e. free-riding behaviours; in the case of positional good there are two divergent attempts. On the one hand, the agent 1 consuming a positive level of a positional good will try to declare a lower level of positive effects, while the agent consuming a negative level of a positional good will attempt to declare a higher level of negative effects. In other words, in chart 6 agent 1 will attempt to declare MR_1' rather than MR_1,

while agent 2 will attempt to declare MR_2' rather than MR_2. Hence, there is an under-supply of positional good ($\overline{Z}'$) with respect to the Pareto efficiency.

We could define a second-price auction, as in the Vickrey-Clarke-Grooves auction, to discover individual preferences. But, as in the case of public goods (see, Green and Laffont, 1977), individuals should pay two times the good: first, for discovering the individual evaluation and then for the production. In light of this, positional goods are faced with the same problems related to the production and consumption of public goods.

4. *Beyond* Two Agents: Multi-Public-Positional Goods

As noted by Pagano (1999), in an economy there are goods that from one point of view are positional goods, while from another point of view they are public goods. One of these is national security. Among citizens of the same nation it is a public good, while among citizens of different nations it is a positional good in the typical form of an *arms race*. Also, education is a good with positional characteristics for one party and public characteristics for another party: it is a public good in order to develop a country and it is a positional good among countries. Moreover, education produces positional characteristic also within the same context because level of education gives social status and power.

These kinds of goods cannot be described by a two-agent context because they involve triadic effects (Vatiero, 2008). This requires expanding the unit of analysis from two agents to at least four agents. In a four-agent context we can illustrate the case of a good that is a public good for a multiplicity of agents (i.e.: two agents) and is a positional good with respect to another agent or a multiplicity of agents (i.e.: two agents). We call these goods 'public-positional' due to their public and positional characteristics.

Take, for example, a public good a_{1-2} for agents 1 and 2. Such a good a_{1-2} is positional for agents 3 and 4 producing a similar public good a_{3-4}. In this four-agent context the optimal level of good 'a' is given by:

$$MC = (MR_1 + MR_2) - (MR_3 + MR_4) \text{ if } (MR_1 + MR_2) - (MR_3 + MR_4) > 0$$
$$MC = (MR_3 + MR_4) - (MR_1 + MR_2) \text{ if } (MR_1 + MR_2) - (MR_3 + MR_4) < 0$$

In terms of efficiency, this implies the agents that consume a negative level of positional competition are compensated by agents consuming a

positive level, or vice versa. In this respect, the open issues that have to be solved by looking to positional goods are evident: citizens of more armed (or educated) nations should compensate citizens of lower armed (or educated) ones, besides investing to produce the chosen level of national security (education); or citizens of lower armed (or educated) nations should pay in order to compensate a reduction of national security (or education) for citizens of more armed (or educated) nations, besides investing to produce the chosen level of national security (education). This double-price, as noted above, renders the market very difficult and may not be feasible or effective.

Analogously, for a good 'b' that is a positional good among a pair of agents but determines a public good among four agents, the optimal level is given by:

$$MC = \|MR_1 - MR_2\| + \|MR_3 - MR_4\|$$

Think of Siena's Palio. This spectacular horse race is based on the rivalry among *contradas*, districts into which the town is divided, each having their own government, oratory, emblems and colours, official representatives, patron Saints, delimited territories and population (that consists of all those people who were born or live within the topographic limits of the district). The victory of Palio is a typical positional good for contradas. Many tourists come to Siena to see Palio. Therefore, the Palio represents also a public good as a tourist attraction in the town.

The diagram explanation of public-positional goods can be derived from charts 3 and 4, but we want to focus, instead, on chart 7. Given a community of n persons, the number of people consuming a positive level of a certain good is indicated on the abscissa, while the number of people consuming a negative level is indicated on the ordinate. In chart 7, we illustrate the various combinations between positional, private and public characteristics.

The case, indicated by α, where only one agent consumes the positional good and all others consume a negative level, is called a pan-positional good by Pagano (1999). An opposite case, indicated by β, is when all agents except for one consume a positive level, while one consumes a negative level. Both are a public-positional good: in the case of α, such a good is positional between the consumer of a positive amount of this good and others, but it is a public bad for consumers of a negative amount of this good; in the case of β, the good is positional between the consumer of a negative

amount and the others, but it is a public good for consumers of a positive amount.

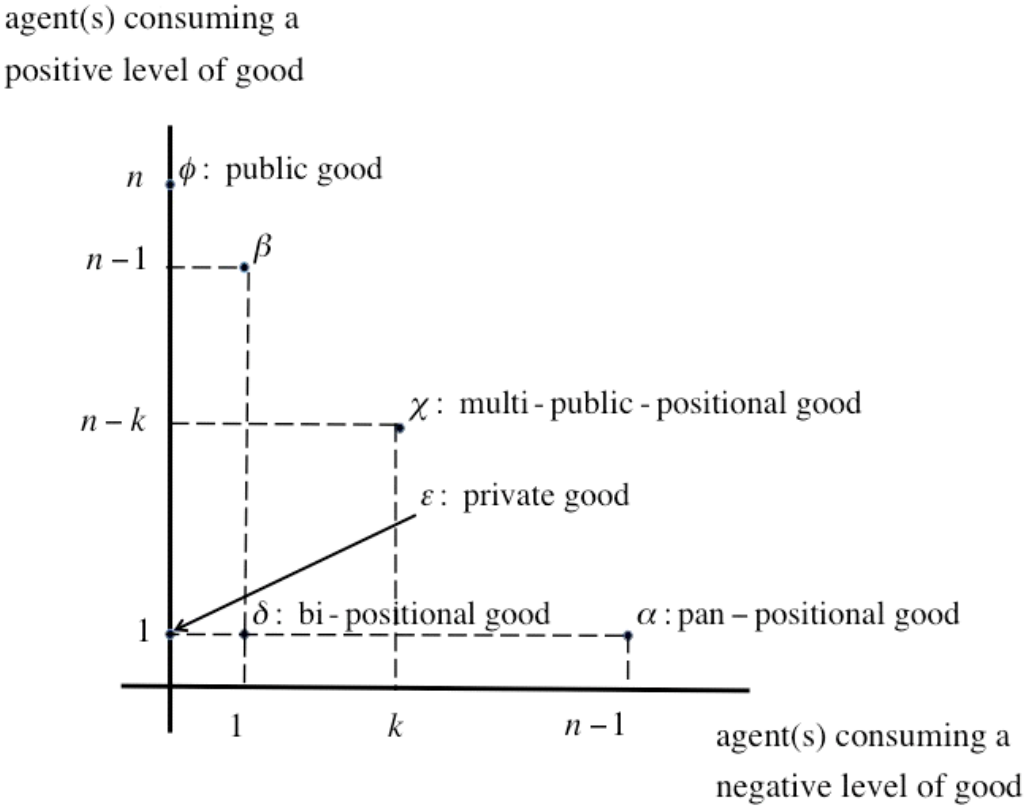

Chart 7

In the previous sections, we have analyzed bi-positional goods, whose positive consumption by one party implies negative consumption by the second agent in a two-player transaction. This case is indicated by δ. As seen above, private goods indicated by ε are defined as goods such that a positive consumption by one person implies zero consumption for all other people. ϕ denotes public goods: each agent of our community consumes a positive level of such a good.

We call the multi-public-positional good the case χ, where a multiplicity $n-k$ consumes a positive level of a good and contemporary a multiplicity $k>1$ consumes a negative level. It implies that, for assessing a market, the case of a multi-public-positional good is likely the most difficult case since there are, on the one hand, market failures deriving from public characteristics and, on the other hand, the problems stemming from positional characteristics.

5. Remarks

A positional good is defined in a two-person economy by the fact that if a party consumes a positive quantity of this good, then the second party must consume an equal but negative quantity. Positional goods have non-private characteristics of consumption as public goods. While in the latter individual consumption implies positive consumption by a counterparty, in the former it causes negative consumption by the counterparty.

It determines that for positional goods, on the one hand, individual demand should be derived vertically and not horizontally as in the case of private goods and, on the other hand, the rule for deriving total demand is not the vertical summation of individual demands, as in the public goods, but their vertical subtraction. Therefore, to achieve the Pareto efficiency, the agent(s) consuming a positive amount of a positional good should compensate the agent(s) consuming a negative amount, or vice versa. This double-price renders the assessment of a market for this good very difficult.

Moreover, such characteristics of consumption causes the classic free-riding problem, but with different implications with respect to the public goods case. The agent(s) consuming a positive amount of a positional good will attempt to declare a lower level of benefits deriving from this consumption, whilst the agent(s) consuming a negative amount will attempt to declare a higher level of costs deriving from its consumption.

Such a problem is more complex in the case of multi-public-positional goods. Indeed, such goods involve market failures brought about by both public good's and positional good's characteristics.

References

Green J. and J.J. Laffont (1977), "Characterization of Satisfactory Mechanisms of the Revelation of Preferences for Public Goods." *Econometrica*, 45(2):427-38.

Hirsch F. (1976), *The Social Limits to Growth*. Cambridge, Massachusetts: Harvard University Press.

Pagano U. (1999), "Is Power an Economic Good? Notes on Social Scarcity and the Economics of Positional Goods." In Bowles S., Franzini M. and Pagano U. (eds.) (1999), *The Politics and the Economics of Power*, pp. 116-45. London: Routledge.

Samuelson P.A. (1955), "Diagrammatic Exposition of a Theory of Public Expenditure." *The Review of Economics and Statics*, 37(4):350-6.

Samuelson P.A. (1969), "Contrast Between Welfare Conditions for Joint Supply and for Public Goods." *The Review of Economics and Statistics*, 51(1):26-30.

Schneider M. (2007), "The Nature, History and Significance of the Concept of Positional Goods." *History of Economics Review*, 45:60-81.

Vatiero M. (2008), *Towards a Law and Economics of Power*. PhD Thesis, unpublished.

Siena, October 2009