

The conceptual overlap between public goods, externalities and merit goods

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Abstract

In a given situation, any good has the following characteristics: rivalry, exclusion, space, and time. The last two characteristics of a good are the usual physical variables of position in space and time. Rivalry may be seen as an intrinsic physical quality of any good and appears as a binomial variable with the categories yes and no, usually denominated as rival and non-rival. Exclusion reflects the institutional handling of the allocation of a good and appears as a continuous variable that measures the resource cost for enforcing property norms. In a continuous transaction cost function, non-rivalry is only one of the elements that affect its shape and the productivity of the necessary inputs for exclusion. With these two characteristics, most goods may be classified in a market economy, from pure private goods to pure public goods, with an infinite number of intermediary cases. Space is associated with local public goods. Externalities may be considered as a joint production of a rival or non-rival good that results from a market transaction. Finally, merit or demerit goods may be seen as a form of externality deduced from the preferences of a group that wishes to affect another.

Keywords: public good, rivalry, exclusion, externalities, merit goods.

1. Introduction

Public goods, externalities, and merit goods may be described with a basis on some common characteristics of all goods: rivalry, exclusion, position in space, and time. Rivalry – discussed also in terms of its negation, non-rivalry – is an intrinsic characteristic of a good and has a physical nature.¹ Also of a physical nature is the position of a good in space, coupled with an instant or an interval of time. Exclusion, which is defined concerning property rights, depends on the institutions of a given society.

These characteristics help to establish the possible overlapping between the concepts of public goods, externalities, and merit goods. Pure public goods are characterized as non-rival and non-excludable goods that may be consumed either in an instant or during an interval of time. Its benefits may be limited in space. An externality is an unasked sacrifice by a third party that results from a market transaction between two economic agents. It may alternatively be an unasked benefit. Such sacrifice is supposedly non-excludable, although it may be rival or non-rival. A merit good may be construed as a good associated with an externality that involves non-rivalry and non-excludability, although the dominant view is that it is not a concept derivable from individual preferences.

The objective of this paper is to review such possible areas of overlap between public goods, externalities, and merit goods, with emphasis on the physical characteristic of rivalry in consumption. It concludes that these concepts have been interpreted as variants of goods with different combinations of the characteristics of rivalry, exclusion, and position in space. These characteristics are common to goods involved in public goods and externalities discussions.

The paper is organized according to the concepts of public goods, externalities, and merit goods. Due to their key roles in the evolution of the literature on public goods and externalities, and in the present discussion, the characteristics of rivalry and exclusion are discussed in separate sections, just after the main section on public goods. Thus in section 2, the evolution of the concept and the denomination of public goods are

tackled. In section 3, the characteristic of rivalry will be analyzed especially as a means to define the classes of rival and non-rival goods. Still in this section, it will also be seen that the spatial dimension helps to delimit the range of effects of non-rival goods and leads to the concepts of local public goods as well as of club goods. In section 4, the evolution of the characteristic of exclusion is considered as defining a class of goods for which the institutions of society allow for property rights enforcement at varying transaction costs. In section 5, the evolution of the concept of externalities is considered in its interaction with the concept of public goods. It will be shown that public goods have been sometimes characterized as consumption externalities. In section 6, the evolution of the two main definitions of merit goods is described, with one definition focusing on goods supplied without consideration of the beneficiary demand, although reflecting social preferences. In the other definition, there is the possibility of considering merit goods as a form of externality.

Methodologically, welfare maximization guides this study. Thus, the paper does not cover the political process, the financing of public expenditures through taxation or debt, and public administrative mechanisms for revealing demand for public goods when the given property rights institutions and the given technology of exclusion induce economic agents to hide their preferences.² Besides that, the paper does not intend to give a detailed treatment of the evolution of thinking on the subject, limiting itself to following mostly limited semantic issues and some definitions that will help to pursue the question of the interrelations between the main concepts of the public goods and merit goods theory.

2. Public goods

In a nice poem, Mundell (1968) plays with different types of goods, listing also public goods, and ending the list in despair with so many types of them, by writing “Goodness!” in the last verse (as quoted in Box 1). In a chapter devoted to public goods, Mundell characterizes them as magical goods that, “... while they may cost resources to produce, remain in existence and can be consumed by anybody at all”

(p.156). From the literature of public goods, he could have added at least public, local, club, common pool, and merit goods.

Box 1 – A poem on types of goods

Free goods, scarce goods	Dry goods, Hong Kong goods
Goods made for market	Import goods with taxes
Public goods, private goods	Traded goods, home goods
Goods made in Chile.	Goods made with axes.
There are necessities, luxuries	Substitutes, complements
Snob goods of Veblen	Bread, butter, and cheese
There are war goods, peace goods	Superior goods, inferior goods
Goods sent to Vietnam.	Goods made for deepfreeze.
There are present goods, future goods	Outputs, inputs
Consumer goods and capital	Goods and factors
Wholesale goods and wholesome goods	Inventions, patents
Goods not for children.	Plays by actors.
There are stolen goods, hot goods	Goodness!

<p>Used goods and services</p> <p>Intermediate goods and final goods</p> <p>Goods made for retail.</p>	
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Source: Mundell (1968, pp.5-6).

The definition of a public good has changed at least since economists started to discuss the question in the 19th century. Mundell's magical good is just one among many, with the twist that the good remain in existence while being consumed, and in the case of knowledge, it may have the same duration as of mankind.

Since the 19th century, several authors groped for a public goods model. For instance, Dupuit's technique of computing surplus under a demand curve, published in 1844, was used in evaluating "public works", especially in transportation infrastructure. According to Kolm (2010, 698-699), the "corresponding total or marginal individual (money) utility curves were added along the utility axis" and at the quantity finally chosen "the sum of the marginal willingness to pay equals the marginal cost", which is "the condition for the Pareto efficiency of the public good".

Mazzola ([1890] 1958, 42) refers to the "consumption of public goods".³ Gustav Cassel, in 1918, "provides a clear account of non-rivalry and non-excludability as the two *independent* [italics in original] characteristics of pure public goods" (Sturm, 2010; 293).

The summation conditions for efficiency were also presented by Lindahl ([1919] 1958) in a diagram that adds the shares of the voluntary contributions of consumers of a collective good (168). Variants of Lindahl's diagram were later presented in terms of demand curves for social goods by Bowen (1943) and generalized by Samuelson (1955) in the mold of the general welfare analysis of Samuelson (1954).

According to Sturn (2010, 294), Margit Cassel, in 1924, introduced a definition of “*pure collective goods* as strongly non-excludable *and* non-rival goods” [italics in orig.].⁴

Musgrave (1939, 215) mentions the satisfaction of “wants by public economy” in comparison to “alternative wants by private household”.

The theory of public goods gained its modern welfare economics face with the well-known mathematical model of Samuelson (1954). Its key element is the inclusion of a variable that enters equally in every individual preference function to represent the equal quantity of the public good for every consumer. One of the consequences of this treatment is that the varied, individual marginal rates of substitution between the public good and a numéraire should be added up and equalized to the corresponding marginal rate of transformation, attaining thus allocative efficiency. Samuelson uses two alternative expressions, collective consumption goods and collective consumptive goods to name goods “which all enjoy in common in the sense that each individual's consumption of such a good leads to no subtraction from any other individual's consumption of that good” (387). Besides, he adds that “the very notion of collective consumption goods” is associated with “external effects” (389).

Samuelson (1955, 350) changes from collective to public consumption goods on a par with private consumption goods.⁵ The suggested blend of these polar cases to consider “many ... of the realistic cases of government” is a reaction to criticisms on Samuelson's use of public goods to explain all public expenditures.

Musgrave (1956/1957, 334ff) sticks to the concept of public wants, characterizing them as part of individual preferences satisfied by goods and services. Thus, public and private wants are both “*part of one and the same subjective preference systems of individuals*; in other words, *both are individual wants*”; in contrast to “goods and services supplied in the satisfaction of *private wants*”... “goods and services supplied in the satisfaction of *public wants must be consumed in equal amount by all*” [italics in orig.].

Musgrave (1959, 8) writes that social wants are a type of public want. Non-exclusion is inherent, since “people who do not pay for the services cannot be excluded from the

benefits that result” (8). Additionally, “for social wants to arise, the condition of equal consumption must apply to all, whether they pay or not” ... combined with the ... “inapplicability of the exclusion principle” (10n.1).

Samuelson (1969a, 102 and 107-108) again stresses the consumption externalities of the 1954 article. However, he regrets having introduced polar cases in 1955. He then proposes a “knife-edge pole of the private good case” and all the remaining goods classified in the public-good domain due to some degree of “consumption externality”.

Musgrave (1969) changes from goods that satisfy social wants to social goods⁶ and introduces his cases of mixed goods, developing the idea of the blend of polar cases suggested by Samuelson (1955). The mixed cases hinge on the fact that “most goods which give rise to private benefit also involve externalities in varying degrees and hence combine both social and private characteristics” (Musgrave, 1969, 135).

In summary, there are three main branches in the tree of life⁷ for the modern public good concept in the works reviewed here. One of the branches starts with the use of the concept of wants for the public economy by Musgrave (1939), then named as public wants by Musgrave (1956/1957), which he maintained in later works. The other branch starts with the concept of public goods in Mazzola ([1890] 1958), goes through pure public goods with G. Cassel, in 1918, then through social goods with Bowen (1943). Public consumption goods appears in Samuelson (1955), social goods in Musgrave (1969), and returning to the expression public goods, including the pure case, with Samuelson (1969), also secondarily used by Musgrave in several works. Finally, a third branch starts with collective goods in Lindahl ([1919] 1958) and M.Cassel, in 1924, who also defined pure collective goods, went by collective consumption goods in Samuelson (1954). The characteristics of non-rivalry, with the consequent summation of personal evaluations, and non-exclusion for pure public goods was present since at least the work of Dupuit in 1844, although made explicit as an independent property by G.Cassel, in 1918. These two characteristics will be more fully discussed in the next two sections.

3. Rivalry

The evolution of the concept of rivalry was part of the evolution of the concept of public goods itself, starting with Mazzola in 1890 as indivisibility and ending as non-rivalry with Musgrave (1969), as covered in subsection 3.1. The explicit introduction of space by way of the theory of local public goods as well as the more general formulation of the theory of club goods, which is covered in section 3.2, were ways to cover the strategic behavior of consumers in the case of non-rival goods. The final subsection, 3.3, considers how non-rivalry is treated in the case of input goods.

3.1 From indivisibility to non-rivalry

Mazzola ([1890] 1958, 42) exemplifies that the services of “the individual quantities of consumption cannot be divided up and measured and their exact share in separate satisfactions is not known”.

Margit Cassel, in 1924, defines a pure public good “as strongly non-excludable and non-rival goods, including the ‘organisation of the market’ as a pure collective good” (Sturm, 2010, 294). Thus exclusion is not a binomial variable.

Similarly to Mazzola, Musgrave (1939, 216) writes that the “benefits derived from the supply of public services are not divisible into individual benefit shares, but are received jointly by all members of the community”. Note that here non-rivalry is associated with joint consumption.

Samuelson (1954, 387), as seen above, defines a public good wholly in terms of collective consumption of an undepletable good that “leads to no subtraction from any other individual's consumption of that good”. He also argues that there is no decentralized solution for collective consumption due to “external economies or jointness of demand” which leads persons to try to get personal benefits without paying for them (389).

Musgrave (1956/1957, 334 ff; 1959, 10 and 13) emphasizes that equal consumption of units of a given social want applies to all the other consumers. Next, Musgrave

(1969, 126) follows Samuelson's definition of non-rivalry by referring to a "beneficial consumption externality" associated with goods whose benefits "are such that A 's partaking therein does not interfere with the benefits derived by B ". ... The condition of non-rivalness in consumption (or, which is the same, the existence of beneficial consumption externalities) means that the same physical output (the fruits of the same factor input) is enjoyed by both A and B ".⁸

Samuelson (1969) abandons the idea of individually consumed quantities that equate the total quantity of a public good for every consumer due to non-rivalry. Now "a public good is one that enters two or more persons' utility" due to "consumption externality". Thus the identity $X_{n+j} = X_{n+j}^i$ is abandoned in favor of simply introducing X_{n+j} in the individual preference functions, although preserving the external effects associated with non-rivalry.⁹ Bradford (1971, 1123-1124) develops this idea in terms of states of the world that include the non-rival good, without individualizing consumption as in the variable X_{n+j}^i . The agent has a marginal rate of substitution for the level X_{n+j} of the non-rival good.

Laffont (1982, 33) emphasizes that rivalry is a physical characteristic when he defines public and private goods, which conventionally include services, in terms of destruction by consumption:

"A good is said public if its use by an agent does not preclude its use by other agents; there is no destruction of the good by its use unlike, for example, the destruction by consumption of the private good given by an apple. ... The public characteristic is therefore physical and indicates the *potentiality* [italics in the orig.] of collective consumption." (Translated for this paper.)

This physical destruction of a good brings around the time characteristic of any good. Time may be defined for intervals, and an interval may be small enough to have an instant (Debreu, 1959, 29). Physical destruction of a good occurs at given instants.¹⁰ Therefore, by Laffont's definition, the consumption of any rival good should occur at an instant. For non-rival goods, there should be simultaneous consumption (Samuelson, 1954), also usually described as joint consumption (Musgrave, 1959, 10n.1) or a state

of the world (Samuelson, 1969; Bradford, 1971), all at an instant.¹¹ The potentiality of collective consumption, as defined by Laffont, is similar to the above discussion on the state of the world.

Starrett (1988, p.74), in discussing the “problem of the common”, gives an example of a highway which is a rival good: “if we are careful to think of these items as time-indexed (two parties are well-advised not to occupy the same highway lane space at the same time!).” This example of the treatment of highway lanes as a rival good may be generalized. A vehicle on a road during a given instant always occupies a given area of that highway, under and around it, whatever the speed of the vehicle. The more vehicles have access to the highway, the lower the availability of space for each vehicle and the lower is the productivity of the highway in delivering its services. Thus, congestion of a highway is just the same phenomenon as falling productivity of other inputs due to fixed factors in a factory.

In this interpretation of Laffont (1982) and Starrett (1988), the rivalry is then a binomial variable with the categories yes and no, usually denominated as rivalry and non-rivalry. There is no partial or imperfect rivalry.

Summarizing, the concept of non-rivalry evolved in an evolutionary branch as indivisibility, with Mazzola in 1890 and Musgrave (1939). This concept is interpreted as non-exclusion (Pickhardt, 2006, 446). Musgrave (1969) prefers non-rivalness instead of non-rivalry. A second branch follows from externalities and equal consumption with Samuelson (1954 and 1969a) and Musgrave (1956/1957 and 1969). A third conceptual branch may be found in Samuelson (1969a) and Bradford (1971) with the idea of states of the world that include levels of given public goods. A fourth branch of evolution of the concept of non-rival goods emphasizes the physical properties of the good itself, especially the physical destruction, which allows for an alternative delimitation of rivalry and non-rivalry, especially the treatment of Laffont (1982) and Starrett (1988).

3.2 Space, local non-rival goods, and club goods

The concept of local public goods calls attention to the characteristic of space in public goods theory in general. Tiebout (1956) uncovers a competitive process that avoids the free-rider phenomenon due to non-rivalry when non-exclusion is present by including the spatial mobility of consumers between different local communities. Tiebout (1961) develops in more detail the space characteristic of local public goods by using models of regional economics to explain fiscal federalism. The variability of benefits in the local of the provision of the public good should also be considered unless uniformity is assumed.¹² For example, an example is the effect of public lighting, which weakens from the light bulb. Even national defense might be less effective, at least temporarily, as the distance from a concentration of military forces increases. Thus, the benefits of a non-rival good are limited in space for a given level of its production.

Club good theory,¹³ developed by Buchanan (1965), also considers at least partially the context of the spatial characteristic of local goods. A club is a means to exclude consumers of a local non-rival good, excludable by assumption. Possibly, this good is an input to the club's services. However, many of the inputs are rivals. This is the case of a swimming pool, which is a capital good of high cost and technological indivisibility.

Olson (1965, 14) discusses the possibility that "one collective good goes to one group of people, another collective good to another group; one may benefit the whole world, another only two specific people." Thus one may also see nations as a kind of club good provider, as long as one considers the space characteristic of non-rival goods that have a national range. A national border is, from this point of view, just a limit of the area of the intended effect of national non-rival goods. However, with technological innovations, the effective range for which the non-rival good can be provided at an acceptable quality level may go beyond national borders. One example is the signal from a TV station that can reach the whole planet Earth and possibly into deep space with the help of a satellite network. Of course, with the addition of scramblers and infrastructure like satellites or cables, the TV signal becomes a rival good.

As a generalization, “club models are models of group formation”, going beyond spatial clubs. Besides, the “thrust of club theory is that the competitive market will function efficiently to provide club goods, so there is no reason that such goods should be publicly provided at all.” (Scotchmer, 2002, 1999)

3.3 Non-rival inputs

Inputs may also fall into one of the two categories of rivalry, either rival or non-rival. Non-rival inputs have been usually called public inputs. Boadway (1979, pp.86-88) presents welfare optimality conditions for “public intermediate goods”, based on Meade (1952), Kaizuka (1965), and Sandmo (1972).

If a producer of a non-rival good, with local effects, uses it in combination with other inputs, a rival output can then be produced. For example, a lecture by a teacher is a non-rival good when produced live without the help of microphones or media resources like TV transmission. In such a situation, the lecture is circumscribed to the classroom, whose space is rival. Therefore, the service of formal education of a person, using classroom lectures, is a rival good.

Finally, consumption of any good might require the use of inputs for the act of consumption itself. This has been modeled in household production theory, with the representative works being Becker (1965) and Lancaster (1966). In these models, a consumer combines inputs to produce a final good. These inputs may be either rival or non-rival. The own work time of the consumer is a rival service. An example of a non-rival input would be an open TV signal that can only be domestically consumed with the acquisition or rental of a TV set, a rival capital good whose services can then be seen as a local non-rival good. Sandmo (1973) presents the welfare-maximizing conditions for household units that use non-rival inputs under the linear technology of Lancaster (1966).

This section on rivalry has covered initially the evolution of the concept of rivalry for different cases of non-rival goods, starting with Mazzola (1890) until Starrett (1988). The characteristic of space was explicitly considered by Tiebout (1956), complemented

by the theory of club goods by Buchanan (1965), which turns out to be a more general theory of group formation, having spatial club goods as a special case. The benefits of a given quantity of a non-rival good are limited either to an area or to a given number of members of a group. Finally, in the case of non-rival inputs, once they enter a productive process, the output may be either rival or non-rival.

4. Exclusion

The second characteristic of a good is the possibility of exclusion, which is not one of its intrinsic characteristics. Exclusion reflects the institutional handling of goods allocation, independently of being rival or non-rival. It involves property norms even in less complex societies without well-structured markets. In modern, complex societies, institutions include a reasonable legal system with effective property rights enforcement for well-structured markets and with less utilization of private productive resources for exclusion.

However, welfare economics analyzes efficient resource allocation independently of institutions.¹⁴ Thus, the discussion would advance most in the identification of marginal rates of substitution that are consistent with a Pareto optimum, as done initially by Samuelson (1954). The form of exclusion is dependent on the type of society and of its institutions that are being discussed. In the next discussion, a market economy is presupposed.

This section initially presents a definition of exclusion that takes explicit account of the transaction costs involved in the enforcement of property rights. Then, the main transaction costs are discussed, including fees collection costs for the provision of certain goods. Inputs are next briefly mentioned as related to exclusion of non-rival goods. Finally, non-rival inputs are also discussed in the context of household production. In this last case, the discussion involves resources from the viewpoint of both consumption and production.

4.1 From strong non-exclusion to transaction costs

As seen above, Gustav Cassel, in 1918, used the characteristic of non-excludability to characterize pure public goods (Sturm, 2010; 293). A few years later, Margit Cassel emphasized the difficulty of charging for pure public goods, given that their consumption is passive¹⁵ (Sturm, 2010; 294). She, therefore, shows conscience that exclusion is costly and a non-binominal variable, i.e., just excludable or non-excludable.

Musgrave (1939) describes the free-rider behavior as a consequence of indivisible public services (non-rivalry), which might occur because “the contributor will fail to affect notably the total supply of public services ... [and] will result in a gain for the contributor in question without leading to reprisals” (219n.5).

Due to the free-rider effect, a non-rival good might have costlier exclusion as compared to private goods. Beneficiaries of a good may not reveal their true personal evaluation of the good, underestimating possibly down to zero the contribution they would be willing to pay for. This increases exclusion costs, especially in large groups of consumers of the good. On this issue, Pickhardt (2006, 447) states that:

Modern treatments of the exclusion issue often distinguish between technical inapplicability due to the lack of a suitable exclusion technology and economical inapplicability due to prohibitively high costs.

Musgrave (1959) introduces the exclusion principle in a context of the “existence of property titles to the things that are to be exchanged” and due to them, a consumer “is excluded from the enjoyment of any particular commodity or service unless he is willing to pay the stipulated price to the owner” (9). Concerning public goods, which Musgrave called social wants, one of the conditions for their characterization is “that of inapplicability of the exclusion principle” (10n.1). Musgrave and Musgrave (1976) introduce a two-by-two table in which the basic characteristics of rivalry and exclusion appear as binomial variables, of the type yes and no.¹⁶

Costs of exclusion appear explicitly in Arrow (1970, p.60, 65, 68) as one important part of transaction costs. After that, he refers to Musgrave’s exclusion principle. To charge

a price for any good, the possibility of exclusion is necessary, although "...this exclusion may be technically impossible or may require the use of considerable resources." He considers exclusion costs on a par with information costs: "The discussions ... suggest two sources of transaction costs: (1) exclusion costs; (2) costs of communication and information, including both the supplying and the learning of the terms on which transactions can be carried out." It is useful here to remember that the main theme of that paper is, in fact, the allocation of resources between the public and the private sectors.

The main costs of enforcing property rights are possibly represented by running most of a government organization. This enforcement includes even the protection of borders since a country's territory implies a property norm in relation to the rest of the world. Of course, enforcing property rights is not the only service that the public sector provides for its society. For Coase (1960), the government organization may be viewed as a kind of super-firm and the costs of some of its services, such as regulating markets, should be compared to the costs of producing them by private firms. In his own words:

The government is, in a sense, a super-firm (but of a very special kind) since it is able to influence the use of factors of production by administrative decision. ... government has at its disposal the police and the other law enforcement agencies to make sure that its regulations are carried out. (Coase, 1960, 17)

Furubotn and Richter (2005, 51) give an explicit consideration and synthesis of different types of transaction costs and their description as a transaction function, including even the costs of running the government itself:

Typical examples of transaction costs are the costs of using the market and the costs of exercising the right to give orders within a firm. In the first case, we shall speak of market transaction costs, in the second of managerial transaction costs. As far as institutions in the sense of law are concerned, what must be considered is the array of costs associated with the running and adjusting of the institutional framework of a polity. For want of a better term, we shall speak in this case of political transaction costs. ... Then, if productive activity is described by a production function, transaction activity can be described by a transaction function.

They then present a transaction cost model in a partial equilibrium mold, which follows the methodology known as the iceberg transport modeling, in which the transaction activity costs a fraction of the original product (64-67). If transaction costs are proportional to the costs of production, then it is possible to treat them as a proportional tax. In principle, however, this treatment can be valid for any proportional input of the production process. In this model, transaction activities are modeled as any other activity with its use of resources (Foley, 1970). This approach has been criticized on grounds that in a system with “positive transaction costs and some form of ‘bounded rationality,’ decision-makers are in a quite different position” of decision as compared with a neoclassical one.¹⁷ Furubotn and Richter (2005, 120-122) also critically summarize a discussion on the treatment of property rights enforcement as an activity with a cost of exclusion function.

4.2 Collection costs

One more type of transaction cost may be considered as part of the exclusion activity. This is the cost of collecting the revenue from the sale of any good in a market economy. Demsetz (1964, 14), in a theory of property rights, already advances arguments on collection costs in his discussion of charging or having zero-price parking in a shopping plaza. The costs of collecting fees might be higher than the efficiency gain in charging, and “both methods of allocating parking may be efficient” (15).

Collection costs may be significant for both rival and non-rival goods. In some situations, as in toll roads or toll bridges, whose services are rival, resources necessary for setting up the toll collection services are significant and may generate inefficiency. They are dependent on the available technology for these services and may require a high scale of the activity to be economically efficient. Stiglitz (1988, 123), for instance, mentions congestion costs in toll charging plus the costs of the exclusion activity of the toll collectors on a road.¹⁸ However, with technological advances, the situation may

change. For instance, new technology today makes it viable to have even toll streets in dense downtown areas at reasonable costs.

4.3 Household production and exclusion costs

Up to this point, only the viewpoint of production guided the present review of the exclusion characteristic of goods. Yet, from the viewpoint of the consumer-producer,¹⁹ i.e., from the consumer preference viewpoint, some costs sometimes work as an exclusion device, involving both capital goods and human capital.

One contemporary example of a capital good barrier is the requirement of an electronic device for consuming internet services (Cremer and Laffont, 2003). Not so long ago, the consumption of these services involved high capital costs in the form of a personal computer. There are still many people in large areas of the globe for whom these services are also inaccessible for lack of collective internet infrastructure in their regions. Equipment for direct satellite connection is still too expensive for them. It should also be remembered that although most of the information that circulates on the internet is non-rival, the traffic of the packages of information itself is rival. This requires the services of an internet provider that may exclude non-paying users. In reality, complementary inputs to consumption are part of models developed in household economics, as just mentioned.

Summarily, the concept of exclusion has evolved from simply conjecturing non-excludable goods, as done by Gustav Cassel in 1918, next strongly non-excludable goods of Margit Cassel in 1924, then becoming a binomial variable with the only options of excludable and non-excludable in the early writings of Richard Musgrave, and finally being discussed as a continuous variable in the form of an exclusion cost function. A next important change in the concept was the introduction by Demsetz (1964) of the costs of collecting fees of a service and by Cremer and Laffont (2003) of the costs associated with consumption within a household that may also become part of the exclusion activity for non-rival goods. By combining the characteristics of rivalry

and exclusion, it is possible to describe pure public and private goods plus an infinity of intermediary cases in a market economy.

5. Externalities

The concept of externality has a long history, which would take more space than dedicated to the subject here.²⁰ It evolved in parallel with the concept of public goods, although Samuelson's definition of public goods in terms of consumption externalities, as seen above, treated them as a special case of externalities.²¹ The objective of this section is to show that they are different concepts, although with an overlap through the characteristics of rivalry and exclusion.

A. Pigou, in *The Economics of Welfare*, of 1920, argues that some services, goods or bads, not accounted for, might also be provided when a market transaction occurs:

... one person A, in the course of rendering some service, for which payment is made, to a second person B, incidentally also renders services or disservices to other persons (not producers of like services), of such a sort that payment cannot be exacted from the benefited parties or compensation enforced on behalf of the injured parties.²²

Then, Meade (1952), in a formal treatment of externalities in the context of competitive markets, emphasizes the market transaction itself, when distinguishing types of externalities and referring to unpaid factors of production: "The external economies which we have examined ... are concerned with factors of production for which the individual producer pays nothing. (62)"

That paper introduces the well-known example of the interactions between apple farmers and honey producers. In the absence of a market for the benefits provided by honey producers to fruit growers, the possible increase of the orchards' productivity is unpaid. The production and sale of honey generate thus a rival service²³ not accounted for by the honey producers.

Externalities involve both rival and non-rival goods. For the externality of honey and fruits, which involves rival goods, markets have developed in several places, since exclusion is possible by just by moving the beehives to different locations. The interaction between bees and flowers occur one at a time. One important example of a non-rival externality is the service of knowledge, a non-rival good, obtained by scientific research, itself a rival good. Other examples are the sounds produced by socializing groups in public places, as in parties, sports events, musical shows, and political rallies voiced by powerful loudspeakers. As for any non-rival good, the evaluation of each unit of these services varies across social networks.

Congestion in the use of certain goods is also sometimes described as an externality. The most common example is the congestion of a road (Laffont, 1982, 33). However, in the presence of externality, congestion itself would not be either a rival or a non-rival good. Congestion in the use of a rival good like a road is a phenomenon from production theory associated with the decreasing marginal productivity of factors of production when the quantity of capital services is fixed. In the case of a road, the number of handled vehicle drops, as well as the standards of service, without a new, jointly produced good being involved as in the externality interpretation of the phenomenon.

Mishan (1969) suggests a general model of public goods and externalities, in which he treats externality goods as jointly produced with another good (338). It follows that a public good, defined as a polar case of non-rival, non-excludable good, may also jointly produce another good that may involve an externality (340).

As one possibility of a model whose main purpose is to dismiss the joint-supply interpretation of non-rivalry, Samuelson (1969b, 29) presents a “case of private good and joint-supply public goods.” It is a case of joint production of a pair of a rival and a non-rival good (Arrow, 1970, 64-65).

The regulation and development of markets for externality effects will depend on the respective transaction cost function, which may have different forms as discussed in

the previous section. Sometimes markets for jointly produced goods as a result of an externality will be missing, as noted by Arrow (1970).

Laffont (1982, p.34) distinguishes public goods from externalities by their direct and indirect effects, i.e., "... the public goods are produced for themselves and the public external effects are the indirect effects of the activities of consumption and production." Though a public good may also result from a market spillover (Mishan, 1969), yet when produced and provided by itself is not a joint production from another good.

In summary, starting from the definitions of Pigou, in 1920, and Meade (1952), externalities are defined as the joint production of either rival or non-rival goods. According to Laffont (1982), a public good is a good produced and provided by itself. Additionally, Mishan (1969) proposes to treat externality as a market spillover involved in a joint provision of goods. Finally, in the case of goods subject to congestion, under Laffont's definition of rivalry, these goods are rival and do not seem to fit the definition of externality.

6. Merit goods

Musgrave (1956/1957) introduced the concept of merit goods to the English-speaking audience, although Musgrave (1959) is better known.²⁴ The 1956/1957 article divided budget policy into three branches: service, distribution, and stabilization. He then added a concept of merit good as a public expenditure not construed from individual preferences:

Where interference with individual preferences is desired, our schema must be expanded. Such wants – which for lack of a better name I refer to as merit wants – may be thought of as provided for in a separate branch. Here a strict separation from the distribution problem does, indeed, become untenable. (Musgrave, 1956/1957, 341)

Two years later, in his treatise on the theory of public finance, Musgrave puts merit goods into the service branch, renamed as the allocative branch. The public wants now

contain social wants and merit wants. He then restricts the satisfaction of merit wants by goods that are subject to the exclusion principle in the market:

They become public wants if considered so meritorious that their satisfaction is provided for through the public budget, over and above what is provided for through the market and paid for by private buyers. This second type of public wants will be referred to as *merit wants* [it.in orig.]. (Musgrave, 1959, 13.)

The examples for such provision are: “publicly furnished school luncheons, subsidized low-cost housing, and free education” (13). He then adds that certain wants may be “stamped as undesirable”, such as the preference for alcoholic drinks (13).

Thus in these early works, Musgrave considered merit goods as a third type of good, sided with private goods and public goods. However, Musgrave and Musgrave (1976) extends the concept to non-rival goods and softens the imposed preference interpretation by initially saying that “the decision-maker appears ... to interfere with or override individual preferences”, concluding that

Interpreted as a device to provide consumer information, as a means of allowing for externalities, or as an expression of voluntary giving in kind, the merit-good concept falls within the framework of traditional analysis in which efficient allocation must in the end be related to individual choice. (Musgrave and Musgrave, 1976, 65)

In a discussion of public expenditures, Arrow (1970, 67) describes demerit goods, although not using this designation, as a type of externality. One individual's preference is affected by the consumption of goods by other individuals even if it does not involve the consumption of goods, as in possible drug addiction. People spending resources to support legislation on ‘crimes without victims’ (quoting marks on orig.) exemplifies it since there is no direct relation between these persons.

In standard neoclassical welfare analysis, the social welfare function (SWF) is given. Its shape is attributed to the collective decisions of a given society, whatever the political institutions it has. One simplification is to say that the SWF reflects all the personal evaluations on merit goods that include all forms of redistribution, without

entering into their cause. Thurow (1971) attempted the deduction of the SWF directly from preferences as a way to treat the welfare-maximizing distribution of income itself as a pure public good.²⁵ Viewed as a statistical concept, the distribution of income is non-rival and non-excludable. Then, instead of maximizing an SWF, it would suffice to attain a Paretian allocation by the appropriate redistribution of consumption goods.

More recently, Ver Eecke (2008) gives a new interpretation of Musgrave's imposed preference, by connecting it to the works of Immanuel Kant. This philosopher argues that societies develop rational arguments for defining social actions, which, once understood by members of these societies, will be accepted and embodied in their preferences (105-106). For example, in the case of paying a fine for a demerit good, such as a transit law violation, the driver would consider just his punishment for having voluntarily violated such a law.

At the end of the day, although starting from the concept of merit goods as an imposed preference, Musgrave and his co-author Peggy B. Musgrave introduce a somewhat softened position, closer to Arrow's critical stand, by recognizing that those that defend merit goods construe it from their preference.

7. Conclusion

The present survey has stressed the physical interpretation of rivalry to describe the institutional characteristic of exclusion in societies with established property norms and markets. It has also shown that the characteristic of location in space of any good, which defines the range of the spatial effects of non-rival goods, helps discuss in more general form concepts like club goods and non-rival local goods. Exclusion costs are seen as a continuous variable, provided the technology of exclusion allows for that. An externality is seen as joint-production, and the joint goods may be either rival or non-rival. Finally, merit goods can be interpreted either as a form of externality or a social norm, involving both rival and non-rival goods.

So, the denomination of public good is a very special case, that combines a non-rival good with a situation of infinite costs of exclusion. The remaining goods combine different cost levels of exclusion with either rivalry or non-rivalry.

References

Arrow, Kenneth J. 1970. The organization of economic activity: Issues pertinent to the choice of market versus non-market allocation. In Robert H. Haveman and Julius Margolis (eds), *Public Expenditure and Policy Analysis*, Chicago : Markham, 59-73.

Atkinson, Anthony B. and Joseph E. Stiglitz. 1980. *Lectures on Public Economics*. Maidenhead, Berkshire : McGraw-Hill.

Batina, Raymond G. and Toshihiro Ihuri. 2005. *Public Goods: Theories and Evidence*. Berlin : Springer-Verlag.

Baumol, William J. 1965. *Welfare Economics and the Theory of the State*. 2nd ed. Cambridge, Mass. : Harvard University Press.

Becker, Gary S. 1965. A theory of the allocation of time. *Economic Journal*, 75(299) : 493-517.

Boadway, Robin W. 1979. *Public Sector Economics*. Cambridge, Mass. : Winthrop Publ.

Bowen, Howard R. 1943. The interpretation of voting in the allocation of economic resources. *The Quarterly Journal of Economics*, 58 : 27-48.

Bradford, D. F. 1971. Joint products, collective goods, and external effects: Comment. *The Journal of Political Economy*, 79(5) : 1119-1128.

Buchanan, James M. (1965). An economic theory of clubs. *Economica*, 32(125) : 1-14.

Coase, Ronald H. 1960. The problem of social cost. *The Journal of Law and Economics*, 3 : 1-44.

Cornes, Richard and Todd Sandler. 1996. *The Theory of Externalities, Public Goods, and Club Goods*. 2nd ed. New York : University of Cambridge.

Cremer, Helmuth and Jean-Jacques Laffont. 2003. Public goods with costly access. *Journal of Public Economics*, 87(9) : 1985-2012.

Debreu, G. 1959. *Theory of Value*. New York : John Wiley & Sons.

Demarais-Tremblay, Maxime. 2014. On the definition of public goods: Assessing Richard A. Musgrave's contribution. *Documents de travail du Centre d'Economie de la Sorbonne*, 2014.04, ISSN : 1955-611X, <halshs-00951577>.

Desai, Maghnad. 2003. Public goods: A historical perspective. In Inge Kaul et al. (eds), *Providing Public Goods: Managing Globalization*, New York: Oxford University Press, 63-77.

Demsetz, H. 1964. The exchange and enforcement of property rights. *Journal of Law and Economics*, 7 : 11-26.

Foley, Duncan. 1970. Economic equilibrium with costly marketing. *Journal of Economic Theory*, 2(3) : 276-291.

Furubotn, Eirik G. 1990. Different approaches to the economic analysis of institutions: Some concluding remarks. *Journal of Institutional and Theoretical Economics*, 146(1) : 226-232.

Furubotn, Eirik G. and Rudolf Richter. 2005. *Institutions and Economic Theory: The Contribution of the New Institutional Economics*, 2nd ed. Ann Arbor, Mich. : The University of Michigan Press.

Kaizuka, K., 1965, Public goods and decentralization of production. *Review of Economics and Statistics*, 47(1) : 118-120.

Kolm, S. C. 2010. History of public economics: The historical French School. *The European Journal of the History of Economic Thought*, 17(4) : 687-718.

Laffont, Jean-Jacques. *Fondements de l'Économie Publique*. Paris : Economica, 1982.

Lancaster, Kelvin J. 1966. A new approach to consumer theory. *The Journal of Political Economy*, 74(2) : 132-157.

Lindahl, Erik. [1919] 1958. Just taxation—A positive solution. In R.A. Musgrave and A.T. Peacock (eds.), *Classics in the Theory of Public Finance*, London : MacMillan, 168-176.

Mazzola, Ugo. [1890] 1958. The formation of the prices of public goods. In R.A. Musgrave and A.T. Peacock (eds.), *Classics in the Theory of Public Finance*, London : MacMillan, 37-47.

McInerney, James O. et al. 2011. The public goods hypothesis for the evolution of life on Earth. *Biology Direct*, 6 : 41.

Meade, J. E. 1952. External economies and diseconomies in a competitive situation. *Economic Journal*, 62(245) : 54-67.

Medema, Steven G. 2005. "Marginalizing" government: From *la scienza delle finanze* to Wicksell. *History of Political Economy*, 37(1) : 1-25.

Milleron, Jean-Claude. 1972. Theory of value with public goods: A survey article. *Journal of Economic Theory*, 5(3) : 419-477.

Mishan, E. J. 1969. The relationship between joint products, collective goods, and external effects. *Journal of Political Economy*, 77(3) : 329-348.

Mundell, Robert A. 1968. *Man and Economics: The Science of Choice*. New York : McGraw-Hill.

Musgrave, Richard A. 1939. The voluntary exchange theory of public economy. *The Quarterly Journal of Economics*, 53(2) : 213–237.

Musgrave, Richard A. 1956/1957. A multiple theory of budget determination. *Finanzarchiv / Public Finance Analysis*, N.S., 17(3) : 333–343.

Musgrave, Richard A. 1959. *The Theory of Public Finance*. New York : McGraw-Hill.

Musgrave, Richard A. 1969. Provision for social goods. In Julius Margolis and Henry Guitton (eds). *Public Economics*, London : Macmillan, 124-144.

Musgrave, Richard A. 1985. A brief history of fiscal doctrine. In A.J. Auerbach and M. Feldstein (eds), *Handbook of Public Economics*, New York : Elsevier, volume I, 1-59.

Musgrave, Richard A. 1996. The role of the state in fiscal theory. *International Tax and Public Finance*, 3 : 247-258.

Musgrave, Richard A. and Peggy B. Musgrave. 1976. 2nd ed. *Public Finance in Theory and Practice*. New York: McGraw-Hill.

Myles, Gareth D. 1995. *Public Economics*. Cambridge : Cambridge University Press.

Navabi, Ash 2017. *An 'Existence Proof' of Public Goods*. GMU Working Paper in Economics. Available at <http://dx.doi.org/10.2139/ssrn.2972770>.

Oakland, William H. Theory of public goods. 1987. In: Auerbach, A.J.; Feldstein, M. (eds.) *Handbook of Public Economics*, Amsterdam: Elsevier, volume I, ch.9.

Olson, Mancur. 1965. *The Logic of Collection Action*. Cambridge, Mass. : Harvard University Press.

Pickhardt, Michael. 2006. Fifty years after Samuelson's "The pure theory of public expenditure": What are we left with? *Journal of the History of Economic Thought*, 28(4) : 439-460.

Samuelson, Paul A. 1954. The pure theory of public expenditures. *Review of Economics and Statistics*, 36(4) : 387-89.

Samuelson, Paul A. 1955. Diagrammatic exposition of a theory of public expenditure. *Review of Economics and Statistics*, 37(4) : 350–356.

Samuelson, Paul A. 1969a. Pure theory of public expenditure and taxation. In Julius Margolis and Henry Guitton (eds), *Public Economics*, London : Macmillan, 98-123.

Samuelson, Paul A. 1969b. Contrast between welfare conditions for joint supply and for public goods. *Review of Economics and Statistics*, 51(1) : 26-30.

Sandmo, Agnar. 1972. Optimality rules for the provision of collective factors of production. *Journal of Public Economics*, 1(1) : 149–157.

Sandmo, Agnar. 1973. Public goods and the technology of consumption. *Review of Economic Studies*, 40(4) : 517–528.

Scotchmer, Suzanne. 2002. Local public goods and clubs. In A.J. Auerbach and M. Feldstein (eds), *Handbook of Public Economics*, New York : Elsevier. Volume IV, 1998-2042.

Starrett, David A. 1988. *Foundations of Public Economics*. New York : Cambridge Univ. Press.

Stiglitz, Joseph E. 1988. *Economics of the Public Sector*. 2nd ed. New York : W.W. Norton.

Sturn, Richard. 2006. Subjectivism, joint consumption and the state: Public goods in *Staatwirthschaftslehre*. *European Journal of the History of Economic Thought*, 13 : 39–68.

Sturn, Richard. 2010. 'Public goods' before Samuelson: Interwar *Finanzwissenschaft* and Musgrave's synthesis. *The European Journal of the History of Economic Thought*, 17(2) : 279-312.

Thurow, Lester C. 1971. The income distribution as a pure public good. *The Quarterly Journal of Economics*, 85(2) : 327-336.

Tiebout, Charles M. 1956. A pure theory of local expenditures. *The Journal of Political Economy*, 64(5) : 416-424.

Tiebout, Charles M. 1961. An economic theory of fiscal decentralization. In Universities-National Bureau, *Public Finances: Needs, Sources, and Utilization*. Princeton : Princeton University Press, 79-96.

Ver Eecke, Wilfried. 2008. *Ethical Dimensions of the Economy: Making Use of Hegel and the Concepts of Public and Merit Goods*. Berlin : Springer.

¹ Rivalness is the term used in the early literature as synonym of rivalry that is the usual dictionary term.

² Some well-known reviews that consider the fundamental questions of how a society may provide public goods, charging in proportion to benefits and at the same time considering redistributive criteria, are Milleron (1972) and Oakland (1987). Batina and Ichori (2005) not only surveys the theory but also focus on empirical evidence. This last survey also summarizes the theory of public goods in an inter-temporal context, which is not covered in the present paper.

³ In Italian, *beni pubblici*. For contributions of Italian economists towards public goods theory, among them a detailed analysis of Mazzola's contributions, see Medema (2005).

⁴ Sturn (2006 e 2010) cover several other German public finance economists of the interwar period.

⁵ Desai (2003) mentions the ideological context of the fifties, which associated to the expression "collective goods" a socialist connotation in a period of widely accepted public production.

⁶ The social goods expression is kept in Musgrave and Musgrave (1976). However, they also maintain the expression public goods in a few pages out of the main chapter on the concept of social goods. A more equal standing for the two expressions occurs in, for example, Musgrave (1985 and 1996).

⁷ Contrastingly, in the area of biology McInerney et al. (2011) suggests the use of "an axiomatic approach that shows that the Public Goods hypothesis is a better accommodation of the observed data than the Tree of Life hypothesis".

⁸ Pickhardt (2006, 447) argues that the emphasis on non-rivalness as an essential characteristic of a pure public good was a contribution by Musgrave, especially in this paper of 1969. However, Samuelson (1969a, 110n.2) questions the use of the term "non-rivalness", while he himself prefers "consumption externality".

⁹ According to Pickhardt (2006, 444) this was the final definition adopted by Samuelson.

¹⁰ However, during an interval of time, when a flow of consumption is defined, many agents may consume the same rival good (Buchanan; 1965, 29). In this case, however, one could argue that many goods considered rival ones would turn into non-rival. For instance, one single apple could be consumed by a large number of people if each one took just a small bite during a given time interval, making it a non-rival good.

¹¹ In the case of a service, physical destruction is in its own nature, since it is instantly perishable while provided. Still, joint consumption is what allows for distinguishing non-rivalry from rivalry. As several other works, Atkinson-Stiglitz (1980, 484) presumes that the equal consumption assumption of Samuelson and others before him is based on the assumption of no free disposal. Thus "for goods such as television, free disposal is possible" and consumption may be less than available. However, the assumption of potential simultaneous consumption, as proposed by Laffont (1982), puts it differently. The availability of a TV signal results in potential consumption once the service is produced. In case of national defense, simple availability provides a feeling of security, which the individual cannot freely dispose of. Navabi (2017) reinforces Laffont's interpretation by arguing that a non-rival good is always a perishable service due to its physical characteristics of space and time.

¹² Demarais-Tremblay (2014) surveys the development of Tiebout's main contributions. The variability in quality of a local service in space may be described as partial rivalry when the reference is to the uniformity assumption.

¹³ Cornes and Sandler (1996) surveys the theory of clubs with advanced treatment of game theory applications. See also Demarais-Tremblay (2014).

¹⁴ The efficient allocation of resources was the exercise proposed, for instance, by Tiebout(1961).

¹⁵ As kindly quoted by an anonymous referee, M.Cassel exemplifies passive consumption with public lighting and police service, where "consumption ... requires no activity on the part of the consumer."

¹⁶ Demarais-Tremblay (2014) critically surveys different tables with the inclusion of new goods characteristics that appeared thereafter.

¹⁷ Furubotn (1990), as cited by Furubotn and Richter (2005, 65).

¹⁸ Both Stiglitz (1988) and Myles (1996, 258) denominate goods subject to congestion as impure goods.

¹⁹ Consumer-producer here refers to a consumer described by a household production model of a Becker (1965) or a Lancaster (1966) type.

²⁰ For earlier treatments of externalities, see Baumol (1965) and Musgrave (1985).

²¹ In this aspect, Atkinson and Stiglitz (1980) follow Samuelson (1954). They discuss externalities and corrective taxes in Lecture 14, while the optimum provision of public goods, in Lect.16. However, Myles (1995) has one chapter for each concept, with public goods appearing first.

²² As quoted by Coase (1960, 28).

²³ Since bees cannot be in the different orchards at the same instant, this service is rival. In reality the effects might be reciprocal, since the type of the orchard's flowers alters the quality and productivity of honey production.

²⁴ Sturn (2010, 207-298) presents previous German authors who discussed the theme.

²⁵ Kolm (2010, 705n.) says that he gave this idea to Thurow.